



開發人員指南

適用於 .NET 的 AWS SDK (V3)



適用於 .NET 的 AWS SDK (V3): 開發人員指南

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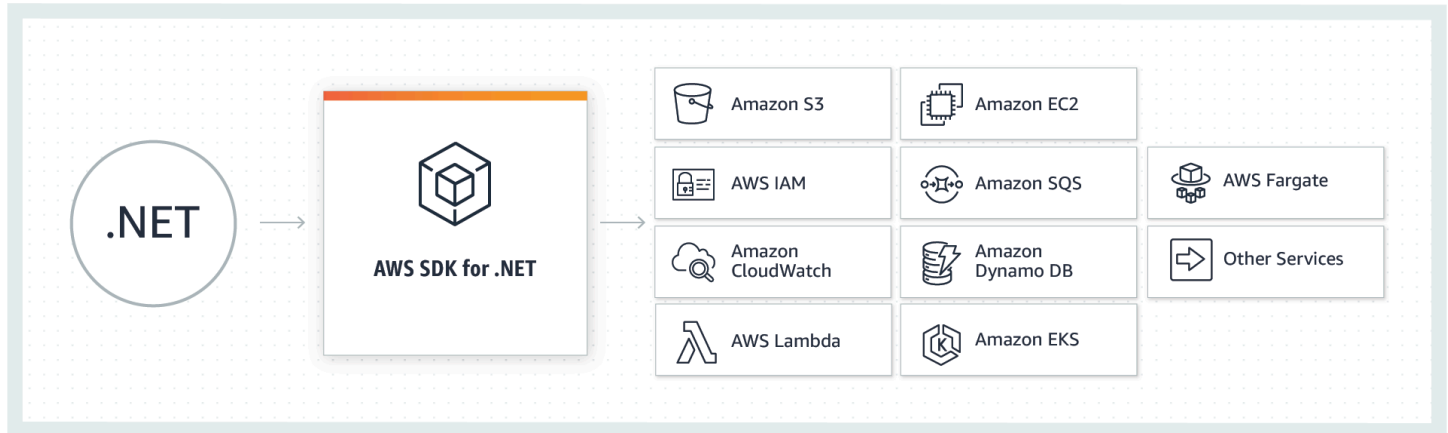
適用於 .NET 的 AWS SDK V3 已進入維護模式。

我們建議您遷移至 [適用於 .NET 的 AWS SDK V4](#)。如需如何遷移的其他詳細資訊和資訊，請參閱我們的[維護模式公告](#)。

本文為英文版的機器翻譯版本，如內容有任何歧義或不一致之處，概以英文版為準。

什麼是 適用於 .NET 的 AWS SDK

適用於 .NET 的 AWS SDK 可讓您更輕鬆地建置 .NET 應用程式，以利用經濟實惠、可擴展且可靠的 AWS 服務，例如 Amazon Simple Storage Service (Amazon S3) 和 Amazon Elastic Compute Cloud (Amazon EC2)。SDK 透過提供一組對 .NET 開發人員一致且熟悉的 AWS 程式庫，簡化服務的使用。



(好的，我知道了！我已準備好[設定](#)並[快速導覽](#)。)

關於此版本

目前和過去的文件

本文件適用於 第 3 版 (V3) 適用於 .NET 的 AWS SDK。V3 不是 SDK 的最新版本。如需 SDK 的最新版本，請參閱 [適用於 .NET 的 AWS SDK \(V4\) 開發人員指南](#)。

本文件主要以 .NET Core 和 ASP.NET Core 為中心，但也包含 .NET Framework 和 ASP.NET 4.x 的相關資訊。除了 Windows 和 Visual Studio 之外，它還提供了跨平台開發的相同考量。

如需從舊版 SDK 遷移的資訊，請參閱 [遷移您的專案](#)。

若要尋找舊版 SDK 的已棄用內容，請參閱下列項目（項目）：

- [適用於 .NET 的 AWS SDK（第 2 版，已棄用）開發人員指南](#)
- [已棄用的 API 參考 適用於 .NET 的 AWS SDK](#)

開發套件主要版本的維護與支援

如需開發套件主要版本及其基礎相依性之維護與支援的相關資訊，請參閱 [《AWS 開發套件及工具參考指南》](#) 中的以下內容：

- [AWS SDKs和工具維護政策](#)
- [AWS SDKs和工具版本支援矩陣](#)

常用案例

適用於 .NET 的 AWS SDK 可協助您實現數個令人信服的使用案例，包括下列項目：

- 使用 [AWS Identity and Access Management \(IAM\)](#) 管理使用者和角色。
- 存取 [Amazon Simple Storage Service \(Amazon S3\)](#) 以建立儲存貯體和存放物件。
- 管理主題的 [Amazon Simple Notification Service \(Amazon SNS\)](#) HTTP 訂閱。
- 使用 [S3 傳輸公程式](#)，將檔案從 Xamarin 應用程式傳輸到 Amazon S3。
- 使用 [Amazon Simple Queue Service \(Amazon SQS\)](#) 來處理系統中元件之間的訊息和工作流程。
- 透過將 SQL 陳述式傳送至 Amazon S3 [Select](#)，執行高效的 [Amazon S3](#) 傳輸。
- 建立和啟動 [Amazon EC2](#) 執行個體，以及設定和請求 Amazon EC2 [Spot 執行個體](#)。

本區段的其他主題

- [AWS 與 相關的 工具 適用於 .NET 的 AWS SDK](#)
- [支援的平台 適用於 .NET 的 AWS SDK](#)
- [AWS SDKs和工具參考指南](#)
- [修訂歷史記錄](#)
- [中的新功能 適用於 .NET 的 AWS SDK](#)
- [其他資源](#)

AWS 與 相關的 工具 適用於 .NET 的 AWS SDK

適用於 Windows PowerShell 的工具和適用於 PowerShell Core 的工具

AWS Tools for Windows PowerShell 和 AWS Tools for PowerShell Core 是建置在 公開功能上的 PowerShell 模組 適用於 .NET 的 AWS SDK。AWS PowerShell 工具可讓您從 PowerShell 提示字元編寫 AWS 資源操作的指令碼。雖然 cmdlet 會使用軟體開發套件的服務用戶端與方法來進行實作，但使用者可以享有 cmdlet 所提供的 PowerShell 體驗，進而採用慣常的方式來指定參數與處理結果。

若要開始使用，請參閱[AWS Tools for Windows PowerShell](#)。

適用於 VS 程式碼的工具組

[AWS Toolkit for Visual Studio Code](#) 是適用於 Visual Studio 程式碼 (VS 程式碼) 編輯器的外掛程式。此工具組可讓您更輕鬆地開發、除錯和部署使用 AWS 的應用程式。

透過此工具組，您可以執行下列操作：

- 建立包含 AWS Lambda 函數的無伺服器應用程式，然後將應用程式部署到 AWS CloudFormation 堆疊。
- 使用 Amazon EventBridge 結構描述。
- 使用 Amazon ECS 任務定義檔案時，請使用 IntelliSense。
- 視覺化 AWS Cloud Development Kit (AWS CDK) 應用程式。

適用於 Visual Studio 的 Toolkit

AWS Toolkit for Visual Studio 是 Visual Studio IDE 的外掛程式，可讓您更輕鬆地開發、偵錯和部署使用 Amazon Web Services 的 .NET 應用程式。Toolkit for Visual Studio 為 Lambda 和 Web 應用程式和無伺服器應用程式的部署精靈等服務提供 Visual Studio 範本。您可以使用 AWS Explorer 來管理 Amazon EC2 執行個體、使用 Amazon DynamoDB 資料表、將訊息發佈至 Amazon Simple Notification Service (Amazon SNS) 佇列等，全部都在 Visual Studio 中。

若要開始使用，請參閱[設定 AWS Toolkit for Visual Studio](#)。

Toolkit for Azure DevOps

新增 AWS Toolkit for Microsoft Azure DevOps 任務，以輕鬆啟用 Azure DevOps 和 Azure DevOps Server 中的建置和發行管道，以使用 AWS 服務。您可以使用 Amazon S3、AWS Elastic Beanstalk

AWS CodeDeploy、Lambda、AWS CloudFormation、Amazon Simple Queue Service (Amazon SQS) 和 Amazon SNS。您也可以使用 Windows PowerShell 模組和 AWS Command Line Interface () 執行命令 AWS CLI。

若要開始使用 AWS Toolkit for Azure DevOps，請參閱 [AWS Toolkit for Microsoft Azure DevOps 使用者指南](#)。

支援的平台 適用於 .NET 的 AWS SDK

為開發人員 適用於 .NET 的 AWS SDK 提供不同的組件群組，以鎖定不同的平台。不過，在這些平台上，並非所有開發套件的功能都相同。此主題說明每個平台支援的差異。

.NET Core

適用於 .NET 的 AWS SDK 支援針對 .NET Core (.NET Core 3.1、.NET 5、.NET 6 等) 撰寫的應用程式。AWS 服務用戶端僅支援 .NET 核心中的非同步呼叫模式。這也會影響在服務用戶端上建置的許多高階抽象概念，例如 Amazon S3TransferUtility，這只會支援 .NET Core 環境中的非同步呼叫。

.NET 標準 2.0

的非影格變化 適用於 .NET 的 AWS SDK 符合 [.NET Standard 2.0](#)。僅針對針對 .NET Standard 撰寫的應用程式 適用於 .NET 的 AWS SDK 提供非同步方法。

.NET Framework 4.5

Warning

從 2024 年 8 月 15 日開始，適用於 .NET 的 AWS SDK 將結束對 .NET Framework 3.5 的支援，並將最低 .NET Framework 版本變更為 4.7.2。如需詳細資訊，請參閱部落格文章 [.NET Framework 3.5 和 4.5 目標的重要變更 適用於 .NET 的 AWS SDK](#)。

此版本的 適用於 .NET 的 AWS SDK 是根據 .NET Framework 4.5 編譯，並在 .NET 4.0 Runtime. AWS service 用戶端中執行，支援同步和非同步呼叫模式，並使用 [非同步和等待 C# 5.0](#) 中介紹的關鍵字。

.NET Framework 3.5

Warning

從 2024 年 8 月 15 日開始，適用於 .NET 的 AWS SDK 將結束對 .NET Framework 3.5 的支援，並將最低 .NET Framework 版本變更為 4.7.2。如需詳細資訊，請參閱部落格文章 [.NET Framework 3.5 和 4.5 目標的重要變更 適用於 .NET 的 AWS SDK](#)。

此版本的 適用於 .NET 的 AWS SDK 會根據 .NET Framework 3.5 編譯，並在 .NET 2.0 或 .NET 4.0 Runtime. AWS service 用戶端中執行，支援同步和非同步呼叫模式，並使用較舊的開始和結束模式。

Note

當針對 CLR 2.0 版建置的應用程式使用時，適用於 .NET 的 AWS SDK 不符合聯邦資訊處理標準 (FIPS)。如需在該環境中如何替代 FIPS 相容實作，請參閱 Microsoft 部落格的 [CryptoConfig](#)，和在 Security.Cryptography.dll 中的 [CLR Security](#) 團隊的 HMACSHA256 類別 (HMACSHA256Cng)。

可攜式類別程式庫和 Xamarin

適用於 .NET 的 AWS SDK 也包含可攜式類別程式庫實作。可攜式類別程式庫實作可以鎖定多個平台，包括 iOS 和 Android 上的 Universal Windows Platform (UWP) 和 Xamarin。如需詳細資訊，請參閱適用於 [.NET 和 Xamarin 的 Mobile SDK](#)。AWS 服務用戶端僅支援非同步呼叫模式。

Unity 支援

如需 Unity 支援的詳細資訊，請參閱 [Unity 支援的特殊考量](#)。

其他資訊

[遷移至 3.5 版 適用於 .NET 的 AWS SDK](#)

AWS SDKs和工具參考指南

[AWS SDKs和工具參考指南](#) 包含許多 AWS SDKs 和工具組以及 相關且重要的資訊 AWS CLI。以下是參考包含的一些資訊範例：

- [共用 AWSconfig 和 credentials 檔案及其位置](#) 的相關資訊。
- [設定 AWS 帳戶、使用者和角色](#)
- [組態和身分驗證設定參考](#)
- [AWS 通用執行期 \(CRT\) 程式庫](#)
- [AWS SDKs 和工具維護政策](#)
- [AWS SDKs 和工具版本支援矩陣](#)

修訂歷史記錄

若要了解各種版本中的變更，請參閱以下內容：

- [SDK 變更日誌](#)
- [中的新功能 適用於 .NET 的 AWS SDK](#)
- [文件歷史紀錄](#)

中的新功能 適用於 .NET 的 AWS SDK

如需 相關新開發的高階資訊，適用於 .NET 的 AWS SDK 請參閱位於 <https://aws.amazon.com/sdk-for-net/> 的產品頁面和 [SDK 變更日誌](#)。

以下是 中的新功能 適用於 .NET 的 AWS SDK。

2025 年 10 月 17 日：AWS 部署工具的 2.0 版

適用於 .NET CLI 的 AWS 部署工具 2.0 版已發行。如需部署工具的相關資訊，請參閱 [將應用程式部署到 AWS](#)。如需有關部署工具 2.0 版的資訊，請參閱適用於 [.NET 的部署工具中的 AWS 部落格文章最新消息](#)。

2025 年 8 月 21 日：第 3 版即將 end-of-support 適用於 .NET 的 AWS SDK

適用於 .NET 的 AWS SDK 已宣布此版本 end-of-support。請參閱 [V4 遷移指南](#)，以遷移 V3 應用程式並避免中斷。如需詳細資訊，請參閱部落格文章 [宣布 適用於 .NET 的 AWS SDK v3 end-of-support](#)。

2025 年 5 月 5 日：適用於 .NET AWS 的訊息處理架構的一般可用性

[AWS 適用於 .NET 的訊息處理架構](#) 已全面推出！此架構是 AWS 原生架構，可簡化開發使用 Amazon Simple Queue Service (SQS)、Amazon Simple Notification Service (SNS) 和 Amazon EventBridge 等 AWS 服務的 .NET 訊息處理應用程式。

2025 年 4 月 28 日：第 4 版 適用於 .NET 的 AWS SDK

第 4 版 適用於 .NET 的 AWS SDK 已全面推出！如需詳細資訊，請參閱 [適用於 .NET 的 AWS SDK \(V4\) 開發人員指南](#)，特別是[遷移至第 4 版](#)的主題。

2025 年 2 月 15 日：與 .NET Aspire 整合

已發佈與 .NET Aspire 的整合，以改善內部開發迴圈。如需相關資訊，請參閱[在中 AWS 與 .NET ACache 整合 適用於 .NET 的 AWS SDK](#)。

2025 年 2 月 10 日：GA 發行以獲得可觀測性

可觀測性是從系統發出的資料推斷系統目前狀態的程度。可觀測性已新增至 適用於 .NET 的 AWS SDK，包括遙測供應商的實作。如需詳細資訊，請參閱本指南[可觀測性](#)中的 和部落格文章[宣布 AWS .NET OpenTelemetry 程式庫的一般可用性](#)。

2025 年 1 月 15 日：新的完整性保護預設行為

從 3.7.412.0 版開始 適用於 .NET 的 AWS SDK，軟體開發套件會自動計算上傳的CRC32檢查總和，以提供預設完整性保護。如需詳細資訊，請參閱 GitHub 上的公告，網址為 <https://github.com/aws/aws-sdk-net/issues/3610>。軟體開發套件也提供全域設定，用於外部設定的資料完整性保護，您可以在軟體[AWS SDKs和工具參考指南](#)中的[資料完整性保護](#)中閱讀。

2024 年 11 月 15 日：第 4 版預覽版的部落格文章

第 4 適用於 .NET 的 AWS SDK 版的預覽版 4 已於 2024 年 11 月 15 日發行。如需此預覽的詳細資訊，請參閱部落格文章 [Preview 4 of 適用於 .NET 的 AWS SDK V4](#)。

2024 年 8 月 16 日：第 4 版預覽版的部落格文章

第 4 適用於 .NET 的 AWS SDK 版已於 2024 年 8 月 16 日做為第一次預覽發行。如需此預覽的詳細資訊，請參閱部落格文章 [Preview 1 of 適用於 .NET 的 AWS SDK V4](#)。

2024 年 2 月 23 日：新增對 .NET 8 的支援

已將 .NET 8 的支援新增至 適用於 .NET 的 AWS SDK。使用最新的 [NuGet 套件](#)或[支援 .NET 8 和更新版本的組件](#)。您可以在部落格文章 [.NET 8 Support on](#) 中找到有關此支援的其他資訊，包括對 Lambda 的支援。 [AWS](#)

2024 年 2 月 18 日：即將推出的 .NET Framework 支援變更

從 2024 年 8 月 15 日開始，適用於 .NET 的 AWS SDK 將結束對 .NET Framework 3.5 的支援，並將最低 .NET Framework 版本變更為 4.7.2。如需詳細資訊，請參閱部落格文章 [.NET Framework 3.5 和 4.5 目標的重要變更 適用於 .NET 的 AWS SDK](#)。

2023-07-17：已針對一般可用性發佈 AWS Lambda 註釋架構

[AWS Lambda 註釋架構](#)可讓您使用 C# 來源產生器技術，讓 .NET 開發人員在 C# 中編寫 Lambda 函數的經驗更自然。現已正式推出。

2023-07-15：DynamoDB 的分散式快取提供者已在預覽版中發行

分散式快取提供者程式庫可讓 Amazon DynamoDB 做為 ASP.NET Core 分散式快取架構的儲存體。如需詳細資訊，請參閱部落格文章[介紹適用於 DynamoDB 的 AWS .NET 分散式快取提供者（預覽）](#)和 [GitHub 儲存庫](#)。

2022-07-13：已發行 AWS 部署工具

AWS 部署工具已發行。此工具是 .NET CLI 和 的互動式工具 AWS Toolkit for Visual Studio，可協助部署最低 AWS 知識的 .NET 應用程式，只需最少的按一下或命令。如需詳細資訊，請參閱[將應用程式部署到 AWS](#)。

2020-08-24：已發行 SDK 的 3.5 版

- 透過將 SDK 所有非架構變化的支援轉換為 .NET Standard 2.0，來標準化 .NET 體驗。如需詳細資訊，請參閱[遷移至 3.5 版](#)。
- 將分頁程式新增至許多服務用戶端，讓 API 結果的分頁更加方便。如需詳細資訊，請參閱[分頁程式](#)。

其他資源

支援的服務

適用於 .NET 的 AWS SDK 支援大多數 AWS 基礎設施產品，並經常新增更多服務。如需 SDK 支援 AWS 的服務清單，請參閱 [SDK README 檔案](#)。

的首頁 適用於 .NET 的 AWS SDK

如需 的詳細資訊 適用於 .NET 的 AWS SDK，請參閱 SDK 的首頁，網址為 <https://aws.amazon.com/sdk-for-net/>。

SDK 參考文件

軟體開發套件參考文件可讓您瀏覽和搜尋軟體開發套件隨附的所有程式碼。它提供完整的文件和使用範例。如需詳細資訊，請參閱 [適用於 .NET 的 AWS SDK API 參考](#)。

AWS re : Post (先前 AWS 為論壇)

請造訪 [AWS re : Post](#)，特別是 [的主題 適用於 .NET 的 AWS SDK](#)，以提出問題或提供意見回饋 AWS。每個文件頁面底部都有 Try AWS re : Post 連結，可帶您前往相關聯的 re : Post 主題。AWS 工程師會監控主題並回應問題、意見回饋和問題。

如果您已登入 re : Post，您也可以遵循主題。若要遵循 的主題 適用於 .NET 的 AWS SDK，請前往[所有主題頁面](#)，尋找開啟的「.NET AWS」，然後選取遵循按鈕。

工具組

- AWS Toolkit for Visual Studio：如果您使用 Microsoft Visual Studio IDE，您應該參閱 [AWS Toolkit for Visual Studio 使用者指南](#)。
- AWS Toolkit for Visual Studio Code：如果您使用 Microsoft Visual Studio IDE，您應該查看 [AWS Toolkit for Visual Studio Code 使用者指南](#)。

實用的程式庫、擴充功能和工具

請造訪 GitHub 網站上的 [aws/dotnet](#) 和 [aws/aws-sdk-net](#) 儲存庫，以取得可用於在 上建置 .NET 應用程式和服務之程式庫、工具和資源的連結 AWS。

下列是一些範例：

- [AWS Systems Manager 的 .NET 組態延伸模組](#)
- [AWS 延伸模組 .NET Core 設定](#)
- [AWS 記錄 .NET](#)
- [Amazon Cognito Authentication Extension Library](#)
- [適用於 .NET 的 AWS X-Ray SDK](#)

其他資源

以下是其他可能很有用的資源：

- [開發人員網路](#)
- [AWS 雲端上的 .NET 開發環境 - 快速入門參考部署](#)

- [您好，Cloud！部落格](#)
- AWS 白皮書：[在 上開發和部署 .NET 應用程式 AWS](#)
- [AWS Microservice Extractor for .NET](#)
- [適用於 .NET 的移植助理](#)
- [AWS SDKs和工具參考指南](#)

開始使用 適用於 .NET 的 AWS SDK

若要使用 適用於 .NET 的 AWS SDK，您需要安裝工具鏈並設定應用程式存取 AWS 服務所需的許多基本項目。其中包含：

- 適當的使用者帳戶或角色
- 該使用者帳戶或 擔任該角色的身分驗證資訊
- AWS 區域規格
- AWSSDK 套件或組件

本節中的某些主題提供如何設定這些基本物件的資訊。

本節和其他章節中的其他主題提供有關您可設定專案之更進階方式的資訊。

主題

- [安裝和設定您的工具鏈](#)
- [使用 設定 SDK 身分驗證 AWS](#)
- [快速瀏覽 適用於 .NET 的 AWS SDK](#)
- [啟動新的專案](#)
- [設定 AWS 區域](#)
- [使用 NuGet 安裝 AWSSDK 套件](#)
- [安裝不含 NuGet 的 AWSSDK 組件](#)
- [憑證和設定檔解析](#)
- [有關使用者和角色的其他資訊](#)
- [適用於 .NET 的 AWS SDK 專案的進階組態](#)
- [使用舊版憑證](#)

安裝和設定您的工具鏈

若要使用 適用於 .NET 的 AWS SDK，您必須安裝特定開發工具。

跨平台開發

在 Windows、Linux 或 macOS 上進行跨平台 .NET 開發時，需要下列項目：

- Microsoft [.NET Core 軟體開發套件](#) 2.1 版、3.1 版或更新版本，包括 .NET 命令列界面 (CLI) (**dotnet**) 以及 .NET Core 執行時間。
- 適合您作業系統和需求的程式碼編輯器或整合式開發環境 (IDE)。這通常是為 .NET Core 提供一些支援的項目。

舉例來說，包括 [Microsoft Visual Studio 程式碼 \(VS 程式碼\)](#)、[JetBrains Rider](#) 和 [Microsoft Visual Studio](#)。

- (選用) 如果 AWS 工具組適用於您選擇的編輯器和作業系統。

範例包括 [AWS Toolkit for Visual Studio Code](#)、[AWS Toolkit for JetBrains](#)和 [AWS Toolkit for Visual Studio](#)。

Windows 搭配 Visual Studio 和 .NET Core

在 Windows 上使用 Visual Studio 和 .NET Core 進行開發時需要下列項目：

- [Microsoft Visual Studio](#)
- Microsoft .NET Core 2.1、3.1 或更新版本

在安裝最新版本的 Visual Studio 時，這通常是預設包含的。

- (選用) AWS Toolkit for Visual Studio是一種外掛程式，提供使用者介面，用於從 Visual Studio 管理您的 AWS 資源和本機設定檔。若要安裝工具組，請參閱[設定 AWS Toolkit for Visual Studio](#)。

如需詳細資訊，請參閱《AWS Toolkit for Visual Studio 使用者指南》<https://docs.aws.amazon.com/toolkit-for-visual-studio/latest/user-guide/>。

下一步驟

[使用 設定 SDK 身分驗證 AWS](#)

使用 設定 SDK 身分驗證 AWS

在使用 進行開發 AWS 時，您必須建立程式碼向 進行身分驗證的方式 AWS 服務。視環境和您可用的存取權而定，您可以透過不同方式設定 AWS 資源的程式設計 AWS 存取。

若要查看 SDK 的各種身分驗證方法，請參閱 AWS SDKs和工具參考指南中的[身分驗證和存取](#)。

本主題假設新的使用者正在本機開發，其雇主尚未提供身分驗證方法，且將使用 AWS IAM Identity Center 取得臨時登入資料。如果您的環境不適用這些假設，則本主題中的有些資訊可能不適用您的環境，或者有些資訊可能已經提供給您。

設定此環境需要幾個步驟，總結如下：

1. [使用主控台登入資料登入](#)
2. [啟用和設定 IAM Identity Center](#)
3. [設定 SDK 以使用 IAM Identity Center。](#)
4. [啟動 AWS 存取入口網站工作階段](#)

使用主控台登入資料登入

您可以使用現有的 AWS 管理主控台登入憑證，以程式設計方式存取 AWS 服務。在瀏覽器型身分驗證流程之後，AWS 會產生臨時憑證，可用於 CLI AWS AWS Tools for PowerShell 和適用於 .NET v3 的 AWS SDK 等本機開發工具。

透過此程序，您可以使用在初始帳戶設定期間建立的根登入資料、IAM 使用者或來自身分提供者的聯合身分，以及 AWS CLI 進行身分驗證，或 AWS Tools for PowerShell 自動為您管理臨時登入資料。這種方法消除了在本機存放長期登入資料的需求，進而增強安全性。

當您從 AWS CLI 執行 `aws login` 命令時，您可以從作用中主控台工作階段中選取，或透過瀏覽器型身分驗證流程登入，這樣會自動產生臨時登入資料。臨時登入資料字符將在 15 分鐘內過期，但適用於 .NET v3 的 AWS SDK 會在請求期間視需要自動重新整理字符。

Warning

.NET Framework 目標不支援此功能。

⚠ Important

如果您使用主控台登入資料進行身分驗證，您的應用程式必須參考下列 NuGet 套件，才能進行 AWS 登入解析：

- AWSSDK.Signin

未參考這些套件將導致執行時間例外狀況。

- [使用 CLI AWS 使用主控台登入資料登入。](#)

按照 CLI AWS 上提供的步驟登入後，config 檔案看起來會像這樣。

```
[default]
login_session = arn:aws:iam::0123456789012:user/username
region = us-east-1

[my-dev-profile]
login_session = arn:aws:iam::0123456789012:user/username
region = us-east-1
```

啟用和設定 IAM Identity Center

若要使用 IAM Identity Center，必須先啟用和設定它。若要查看如何為 SDK 執行此操作的詳細資訊，請參閱 SDK 和工具參考指南中的 IAM Identity Center 身分驗證主題中的步驟 1。 <https://docs.aws.amazon.com/sdkref/latest/guide/access-ss.html> AWS SDKs 具體來說，請遵循我沒有透過 IAM Identity Center 建立存取權限下的任何必要說明。

設定 SDK 以使用 IAM Identity Center。

有關如何設定 SDK 以使用 IAM Identity Center 的資訊，請參閱 SDK AWS SDKs 和工具參考指南中 [IAM Identity Center 身分驗證](#) 主題的步驟 2。完成此組態之後，您的系統應該包含下列元素：

- 在執行應用程式之前 AWS CLI，您用來啟動 AWS 存取入口網站工作階段的。
- 包含 [\[default\] 設定檔](#) 的共用 AWS config 檔案，其中包含一組可從 SDK 參考的組態值。若要尋找此檔案的位置，請參閱 AWS SDK 和工具參考指南中的 [共用檔案位置](#)。適用於 .NET 的 AWS SDK 使用設定檔的 SSO 權杖提供者，在傳送請求至 之前取得登入資料 AWS。該 sso_role_name

值是連接到 IAM Identity Center 許可集合的 IAM 角色，應該允許存取應用程式中使用的 AWS 服務。

下列範例 config 檔案顯示使用 SSO 權杖提供者設定的預設設定檔。設定檔的 `sso_session` 設定是指已命名的 `sso-session` 區段。`sso-session` 區段包含啟動 AWS 存取入口網站工作階段的設定。

```
[default]
sso_session = my-sso
sso_account_id = 111122223333
sso_role_name = SampleRole
region = us-east-1
output = json

[sso-session my-sso]
sso_region = us-east-1
sso_start_url = https://provided-domain.awsapps.com/start
sso_registration_scopes = sso:account:access
```

Important

如果您使用 AWS IAM Identity Center 進行身分驗證，您的應用程式必須參考下列 NuGet 套件，以便 SSO 解析能夠運作：

- `AWSSDK.SSO`
- `AWSSDK.SSO0IDC`

未參考這些套件將導致執行時間例外狀況。

啟動 AWS 存取入口網站工作階段

在執行存取的應用程式之前 AWS 服務，您需要 SDK 的作用中 AWS 存取入口網站工作階段，才能使用 IAM Identity Center 身分驗證來解析登入資料。視您設定的工作階段長度而定，您的存取最終會過期，且 SDK 將遇到身分驗證錯誤。若要登入 AWS 存取入口網站，請在 中執行下列命令 AWS CLI。

```
aws sso login
```

由於您有預設的設定檔設定，因此您不需要使用 `--profile` 選項呼叫指令。如果您的 SSO 權杖提供者組態使用已命名的設定檔，則命令為 `aws sso login --profile named-profile`。

若要測試您是否已經有作用中的工作階段，請執行下列 AWS CLI 命令。

```
aws sts get-caller-identity
```

對此命令的回應，應報告共用 config 檔案中設定的 IAM Identity Center 帳戶和許可集合。

Note

如果您已有作用中的 AWS 存取入口網站工作階段並執行 `aws sso login`，則不需要提供登入資料。

登入程序可能會提示您允許 AWS CLI 存取您的資料。由於 AWS CLI 建置在適用於 Python 的 SDK 之上，因此許可訊息可能包含 `botocore` 名稱的變化。

其他資訊

- 如需在開發環境中使用 IAM Identity Center 和 SSO 的詳細資訊，請參閱 [進階身分驗證](#) 一節 [單一登入](#) 中的。此資訊包括替代和更進階的方法，以及向您展示如何使用這些方法的教學課程。
- 如需 SDK 身分驗證的更多選項，例如使用設定檔和環境變數，請參閱 AWS SDKs 和工具參考指南中的 [組態](#) 章節。
- 如需了解有關最佳實務的資訊，請參閱 IAM 使用者指南中的 [IAM 安全最佳實務](#)。
- 若要建立短期 AWS 登入資料，請參閱《IAM 使用者指南》中的 [暫時安全登入](#) 資料。
- 若要瞭解其他憑證提供者，請參閱 AWS SDK 和工具參考指南中的 [標準化憑證提供者](#)。

快速瀏覽 適用於 .NET 的 AWS SDK

本節為初次使用的開發人員提供基本教學課程 適用於 .NET 的 AWS SDK。

Note

使用這些教學課程之前，您必須先 [安裝工具鏈](#) 並 [設定 SDK 身分驗證](#)。

如需為特定 AWS 服務開發軟體以及程式碼範例的資訊，請參閱 [使用 AWS 服務](#)。如需其他程式碼範例，請參閱 [適用於 .NET 的 SDK 程式碼範例](#)。

主題

- [使用的簡單跨平台應用程式 適用於 .NET 的 AWS SDK](#)
- [使用的簡易 Windows 應用程式 適用於 .NET 的 AWS SDK](#)
- [後續步驟](#)

使用的簡單跨平台應用程式 適用於 .NET 的 AWS SDK

本教學課程使用 適用於 .NET 的 AWS SDK 和 .NET Core 進行跨平台開發。本教學課程說明如何使用 SDK 列出您擁有的 [Amazon S3 儲存貯體](#)，並選擇性地建立儲存貯體。

您將使用 .NET 命令列界面 (CLI) 等跨平台工具來執行此教學課程。如需設定開發環境的其他方式，請參閱 [安裝和設定您的工具鏈](#)。

在 Windows、Linux 或 macOS 上進行跨平台 .NET 開發時需要：

- Microsoft [.NET Core 軟體開發套件](#) 2.1 版、3.1 版或更新版本，包括 .NET 命令列界面 (CLI) (**dotnet**) 以及 .NET Core 執行時間。
- 適合您作業系統和需求的程式碼編輯器或整合式開發環境 (IDE)。這通常是為 .NET Core 提供一些支援的項目。

舉例來說，包括 [Microsoft Visual Studio 程式碼 \(VS 程式碼\)](#)、[JetBrains Rider](#) 和 [Microsoft Visual Studio](#)。

Note

使用這些教學課程之前，您必須先[安裝工具鏈](#)並[設定 SDK 身分驗證](#)。

步驟

- [建立專案](#)
- [建立程式碼](#)

- [執行應用程式](#)
- [清除](#)

建立專案

1. 開啟命令提示字元或終端機。尋找或建立可在其下建立 .NET 專案的作業系統資料夾。
2. 在該資料夾中，執行下列命令以建立 .NET 專案。

```
dotnet new console --name S3CreateAndList
```

3. 移至新建立的S3CreateAndList資料夾並執行下列命令：

```
dotnet add package AWSSDK.S3
dotnet add package AWSSDK.SecurityToken
dotnet add package AWSSDK.SSO
dotnet add package AWSSDK.SSO0IDC
```

上述命令會從 NuGet 套件[管理員安裝 NuGet 套件](#)。由於我們確切知道本教學課程所需的 NuGet 套件，因此現在可以執行此步驟。在開發期間，所需的套件也很常見。發生這種情況時，即可執行類似的命令。

建立程式碼

1. 在 S3CreateAndList 資料夾中，在程式碼編輯器中尋找並開啟 Program.cs。
2. 以下列程式碼取代內容，並儲存檔案。

```
using System;
using System.Threading.Tasks;

// NuGet packages: AWSSDK.S3, AWSSDK.SecurityToken, AWSSDK.SSO, AWSSDK.SSO0IDC
using Amazon.Runtime;
using Amazon.Runtime.CredentialManagement;
using Amazon.S3;
using Amazon.S3.Model;
using Amazon.SecurityToken;
using Amazon.SecurityToken.Model;

namespace S3CreateAndList
{
```

```
class Program
{
    // This code is part of the quick tour in the developer guide.
    // See https://docs.aws.amazon.com/sdk-for-net/v3/developer-guide/quick-start.html
    // for complete steps.
    // Requirements:
    // - An SSO profile in the SSO user's shared config file with sufficient
    //   privileges for
    //   STS and S3 buckets.
    // - An active SSO Token.
    //   If an active SSO token isn't available, the SSO user should do the
    //   following:
    //   In a terminal, the SSO user must call "aws sso login".

    // Class members.
    static async Task Main(string[] args)
    {
        // Get SSO credentials from the information in the shared config file.
        // For this tutorial, the information is in the [default] profile.
        var ssoCreds = LoadSsoCredentials("default");

        // Display the caller's identity.
        var ssoProfileClient = new AmazonSecurityTokenServiceClient(ssoCreds);
        Console.WriteLine($"\\nSSO Profile:\\n {await
ssoProfileClient.GetCallerIdentityArn()}");

        // Create the S3 client is by using the SSO credentials obtained
        // earlier.
        var s3Client = new AmazonS3Client(ssoCreds);

        // Parse the command line arguments for the bucket name.
        if (GetBucketName(args, out String bucketName))
        {
            // If a bucket name was supplied, create the bucket.
            // Call the API method directly
            try
            {
                Console.WriteLine($"\\nCreating bucket {bucketName}...");
                var createResponse = await s3Client.PutBucketAsync(bucketName);
                Console.WriteLine($"Result:
{createResponse.HttpStatusCode.ToString()}");
            }
            catch (Exception e)
            {
            }
        }
    }
}
```



```
        {
            Console.WriteLine("Caught exception when creating a bucket:");
            Console.WriteLine(e.Message);
        }
    }

    // Display a list of the account's S3 buckets.
    Console.WriteLine("\nGetting a list of your buckets...");
    var listResponse = await s3Client.ListBucketsAsync();
    Console.WriteLine($"Number of buckets: {listResponse.Buckets.Count}");
    foreach (S3Bucket b in listResponse.Buckets)
    {
        Console.WriteLine(b.BucketName);
    }
    Console.WriteLine();
}

//
// Method to parse the command line.
private static Boolean GetBucketName(string[] args, out String bucketName)
{
    Boolean retval = false;
    bucketName = String.Empty;
    if (args.Length == 0)
    {
        Console.WriteLine("\nNo arguments specified. Will simply list your
Amazon S3 buckets." +
            "\nIf you wish to create a bucket, supply a valid, globally
unique bucket name.");
        bucketName = String.Empty;
        retval = false;
    }
    else if (args.Length == 1)
    {
        bucketName = args[0];
        retval = true;
    }
    else
    {
        Console.WriteLine("\nToo many arguments specified." +
            "\n\n_dotnet_tutorials - A utility to list your Amazon S3 buckets
and optionally create a new one." +
            "\n\nUsage: S3CreateAndList [bucket_name]" +
            "\n - bucket_name: A valid, globally unique bucket name." +
```

```
        "\n - If bucket_name isn't supplied, this utility simply lists
your buckets.");
        Environment.Exit(1);
    }
    return retval;
}

//
// Method to get SSO credentials from the information in the shared config
file.
static AWSCredentials LoadSsoCredentials(string profile)
{
    var chain = new CredentialProfileStoreChain();
    if (!chain.TryGetAWSCredentials(profile, out var credentials))
        throw new Exception($"Failed to find the {profile} profile");
    return credentials;
}

// Class to read the caller's identity.
public static class Extensions
{
    public static async Task<string> GetCallerIdentityArn(this
IAmazonSecurityTokenService stsClient)
    {
        var response = await stsClient.GetCallerIdentityAsync(new
GetCallerIdentityRequest());
        return response.Arn;
    }
}
}
```

執行應用程式

1. 執行下列命令。

```
dotnet run
```

2. 檢查輸出以查看您擁有的 Amazon S3 儲存貯體數量，如果有的話，及其名稱。

3. 選擇新 Amazon S3 儲存貯體的名稱。使用「dotnet-quicktour-s3-1-cross-」作為基礎，並為其新增唯一項目，例如 GUID 或您的名稱。請務必遵循儲存貯體名稱的規則，如 [Amazon S3 使用者指南](#) 中的 [儲存貯體命名規則](#) 所述。
4. 執行下列命令，以您選擇的儲存貯體名稱取代 *amzn-s3-demo-bucket*。

```
dotnet run amzn-s3-demo-bucket
```

5. 檢查輸出以查看建立的新儲存貯體。

清除

執行本教學課程時，您建立了一些資源，此時可以選擇清除。

- 如果您不想保留應用程式在先前步驟中建立的儲存貯體，請使用 Amazon S3 主控台將其刪除，網址為 <https://console.aws.amazon.com/s3/>。
- 如果您不想保留 .NET 專案，請從開發環境中刪除該 S3CreateAndList 資料夾。

後續作業

返回 [快速導覽功能表](#) 或直接前往 [此快速導覽的結尾](#)。

使用的簡易 Windows 應用程式 適用於 .NET 的 AWS SDK

本教學課程使用 Windows 適用於 .NET 的 AWS SDK 上的 搭配 Visual Studio 和 .NET Core。本教學課程說明如何使用 SDK 列出您擁有的 [Amazon S3 儲存貯體](#)，並選擇性地建立儲存貯體。

您將使用 Visual Studio 和 .NET Core 在 Windows 上執行此教學課程。如需設定開發環境的其他方式，請參閱 [安裝和設定您的工具鏈](#)。

在 Windows 上使用 Visual Studio 和 .NET Core 進行開發時需要：

- [Microsoft Visual Studio](#)
- Microsoft .NET Core 2.1、3.1 或更新版本

在安裝最新版本的 Visual Studio 時，這通常是預設包含的。

 Note

使用這些教學課程之前，您必須先[安裝工具鏈](#)並[設定 SDK 身分驗證](#)。

步驟

- [建立專案](#)
- [建立程式碼](#)
- [執行應用程式](#)
- [清除](#)

建立專案

1. 開啟 Visual Studio 並建立新的專案，使用主控台應用程式範本的 C# 版本；亦即，描述為「...用於建立可在 .NET... 上執行的命令列應用程式」。命名專案 S3CreateAndList。

 Note

請勿選擇主控台應用程式範本的 .NET Framework 版本，或者，如果您選擇，請務必使用 .NET Framework 4.7.2 或更新版本。

2. 載入新建立的專案後，選擇工具、NuGet Package Manager、管理 NuGet Packages for Solution。
3. 瀏覽下列 NuGet 套件，並將其安裝到專案中：AWSSDK.S3、AWSSDK.SSO、AWSSDK.SecurityToken 和 AWSSDK.SSO0IDC

此程序會從 NuGet 套件[管理員安裝 NuGet 套件](#)。由於我們確切知道本教學課程所需的 NuGet 套件，因此現在可以執行此步驟。在開發期間，所需的套件也很常見。發生這種情況時，請按照類似的過程進行安裝。

4. 如果您打算從命令提示字元執行應用程式，請現在開啟命令提示字元，然後導覽至將包含建置輸出的資料夾。這通常類似 S3CreateAndList\S3CreateAndList\bin\Debug\net6.0，但取決於您的環境。

建立程式碼

1. 在 S3CreateAndList 專案中，尋找並在 IDE 中開啟 Program.cs。
2. 以下列程式碼取代內容，並儲存檔案。

```
using System;
using System.Threading.Tasks;

// NuGet packages: AWSSDK.S3, AWSSDK.SecurityToken, AWSSDK.SSO, AWSSDK.SSO0IDC
using Amazon.Runtime;
using Amazon.Runtime.CredentialManagement;
using Amazon.S3;
using Amazon.S3.Model;
using Amazon.SecurityToken;
using Amazon.SecurityToken.Model;

namespace S3CreateAndList
{
    class Program
    {
        // This code is part of the quick tour in the developer guide.
        // See https://docs.aws.amazon.com/sdk-for-net/v3/developer-guide/quick-start.html
        // for complete steps.
        // Requirements:
        // - An SSO profile in the SSO user's shared config file with sufficient
        //   privileges for
        //   STS and S3 buckets.
        // - An active SSO Token.
        //   If an active SSO token isn't available, the SSO user should do the
        //   following:
        //   In a terminal, the SSO user must call "aws sso login".

        // Class members.
        static async Task Main(string[] args)
        {
            // Get SSO credentials from the information in the shared config file.
            // For this tutorial, the information is in the [default] profile.
            var ssoCreds = LoadSsoCredentials("default");

            // Display the caller's identity.
            var ssoProfileClient = new AmazonSecurityTokenServiceClient(ssoCreds);
```

```
        Console.WriteLine($"\\nSSO Profile:\\n {await
ssoProfileClient.GetCallerIdentityArn()}");

        // Create the S3 client is by using the SSO credentials obtained
earlier.
        var s3Client = new AmazonS3Client(ssoCreds);

        // Parse the command line arguments for the bucket name.
        if (GetBucketName(args, out String bucketName))
        {
            // If a bucket name was supplied, create the bucket.
            // Call the API method directly
            try
            {
                Console.WriteLine($"\\nCreating bucket {bucketName}...");
                var createResponse = await s3Client.PutBucketAsync(bucketName);
                Console.WriteLine($"Result:
{createResponse.HttpStatusCode.ToString()}");
            }
            catch (Exception e)
            {
                Console.WriteLine("Caught exception when creating a bucket:");
                Console.WriteLine(e.Message);
            }
        }

        // Display a list of the account's S3 buckets.
        Console.WriteLine("\\nGetting a list of your buckets...");
        var listResponse = await s3Client.ListBucketsAsync();
        Console.WriteLine($"Number of buckets: {listResponse.Buckets.Count}");
        foreach (S3Bucket b in listResponse.Buckets)
        {
            Console.WriteLine(b.BucketName);
        }
        Console.WriteLine();
    }

    //
    // Method to parse the command line.
    private static Boolean GetBucketName(string[] args, out String bucketName)
    {
        Boolean retval = false;
        bucketName = String.Empty;
        if (args.Length == 0)
```

```

        {
            Console.WriteLine("\nNo arguments specified. Will simply list your
Amazon S3 buckets." +
                "\nIf you wish to create a bucket, supply a valid, globally
unique bucket name.");
            bucketName = String.Empty;
            retval = false;
        }
        else if (args.Length == 1)
        {
            bucketName = args[0];
            retval = true;
        }
        else
        {
            Console.WriteLine("\nToo many arguments specified." +
                "\n\ndotnet_tutorials - A utility to list your Amazon S3 buckets
and optionally create a new one." +
                "\n\nUsage: S3CreateAndList [bucket_name]" +
                "\n - bucket_name: A valid, globally unique bucket name." +
                "\n - If bucket_name isn't supplied, this utility simply lists
your buckets.");
            Environment.Exit(1);
        }
        return retval;
    }

    //
    // Method to get SSO credentials from the information in the shared config
    file.
    static AWSCredentials LoadSsoCredentials(string profile)
    {
        var chain = new CredentialProfileStoreChain();
        if (!chain.TryGetAWSCredentials(profile, out var credentials))
            throw new Exception($"Failed to find the {profile} profile");
        return credentials;
    }
}

// Class to read the caller's identity.
public static class Extensions
{
    public static async Task<string> GetCallerIdentityArn(this
IAmazonSecurityTokenService stsClient)

```

```
{
    var response = await stsClient.GetCallerIdentityAsync(new
    GetCallerIdentityRequest());
    return response.Arn;
}
}
```

3. 建置應用程式。

Note

如果您使用的是較舊版本的 Visual Studio，您可能會收到類似以下的建置錯誤：
C# 7.0 不提供「功能」非同步主節點」。請使用語言版本 7.1 或更新版本。」
如果您收到此錯誤，請將您的專案設定為使用較新版本的語言。這通常在專案屬性、建置、進階中完成。

執行應用程式

1. 執行沒有命令列引數的應用程式。在命令提示字元（如果您先前已開啟）或從 IDE 中執行此操作。
2. 檢查輸出以查看您擁有的 Amazon S3 儲存貯體數量，如果有的話，及其名稱。
3. 選擇新 Amazon S3 儲存貯體的名稱。使用「dotnet-quicktour-s3-1-winv-」作為基礎，並為其新增唯一項目，例如 GUID 或您的名稱。請務必遵循 [Amazon S3 使用者指南](#) 中 [儲存貯體命名規則中所述的儲存貯體名稱規則](#)。
4. 再次執行應用程式，這次提供儲存貯體名稱。

在命令列中，使用您選擇的儲存貯體名稱取代下列命令中的 *amzn-s3-demo-bucket*。

```
S3CreateAndList amzn-s3-demo-bucket
```

或者，如果您在 IDE 中執行應用程式，請選擇專案、S3CreateAndList 屬性、偵錯，然後在該處輸入儲存貯體名稱。

5. 檢查輸出以查看建立的新儲存貯體。

清除

執行本教學課程時，您建立了一些資源，此時可以選擇清除這些資源。

- 如果您不想保留應用程式在先前步驟中建立的儲存貯體，請使用 Amazon S3 主控台將其刪除，網址為 <https://console.aws.amazon.com/s3/>。
- 如果您不想保留 .NET 專案，請從開發環境中刪除該 S3CreateAndList 資料夾。

後續作業

返回[快速導覽功能表](#)或直接前往[此快速導覽的結尾](#)。

後續步驟

請務必清除您執行這些教學課程時所建立的剩餘資源。這些可能是開發環境中 AWS 的資源，例如檔案和資料夾。

現在您已瀏覽 適用於 .NET 的 AWS SDK，您可能想要[啟動專案](#)。

啟動新的專案

您可以使用多種技術來啟動新專案以存取 AWS 服務。以下是其中一些技術：

- 如果您是初次使用 上的 .NET 開發，AWS 或至少初次使用 適用於 .NET 的 AWS SDK，則可以在中查看完整的範例[快速導覽](#)。它為您提供 SDK 的簡介。
- 您可以使用 .NET CLI 啟動基本專案。若要查看此範例，請開啟命令提示字元或終端機、建立資料夾或目錄並導覽至其中，然後輸入以下內容。

```
dotnet new console --name [SOME-NAME]
```

建立空專案，您可以將程式碼和 NuGet 套件新增至其中。如需詳細資訊，請參閱 [.NET Core 指南](#)。

若要查看專案範本清單，請使用下列各項：`dotnet new --list`

- AWS Toolkit for Visual Studio 包含各種 AWS 服務的 C# 專案範本。在 Visual Studio 中[安裝工具組](#)後，您可以在建立新專案時存取範本。

若要查看，請前往[AWS Toolkit for Visual Studio 《使用者指南》](#)中的[使用 AWS 服務](#)。該區段中的數個範例會建立新專案。

- 如果您在 Windows 上使用 Visual Studio 進行開發，但沒有 AWS Toolkit for Visual Studio，請使用您的典型技術來建立新的專案。

若要查看範例，請開啟 Visual Studio，然後選擇檔案、新增、專案。搜尋 ".net core"，然後選擇主控台應用程式 (.NET Core) 或 WPF 應用程式 (.NET Core) 範本的 C# 版本。建立空專案，您可以將程式碼和 NuGet 套件新增至其中。

您可以找到一些如何在 中使用 AWS 服務的範例[含指引的程式碼範例](#)。

Important

如果您使用 AWS IAM Identity Center 進行身分驗證，您的應用程式必須參考下列 NuGet 套件，以便 SSO 解析能夠運作：

- AWSSDK.SSO
- AWSSDK.SSO0IDC

未參考這些套件將導致執行時間例外狀況。

設定 AWS 區域

AWS 區域可讓您存取 AWS 實際位於特定地理區域的服務。這對於備援以及讓您的資料和應用程式，在靠近您和您的使用者存取位置附近執行，都很有用。

若要檢視每個 AWS 服務所有支援的區域和端點的目前清單，請參閱 中的[服務端點和配額](#)AWS 一般參考。若要檢視現有區域端點的清單，請參閱 [AWS 服務端點](#)。若要查看區域的詳細資訊，請參閱[指定您的帳戶可以使用 AWS 的區域](#)。

您可以建立前往[特定區域的](#) AWS 服務用戶端。您也可以使用將用於[所有 AWS 服務用戶端](#)的區域來設定應用程式。接下來會說明這兩個案例。

使用特定區域建立服務用戶端

您可以為應用程式中的任何 AWS 服務用戶端指定 區域。以這種方式設定區域優先於該特定服務用戶端的任何全域設定。

現有區域

此範例說明如何在現有區域中執行個體化 [Amazon EC2 用戶端](#)。它使用定義的 [RegionEndpoint](#) 欄位。

```
using (AmazonEC2Client ec2Client = new AmazonEC2Client(RegionEndpoint.USSouth2))
{
    // Make a request to EC2 in the us-west-2 Region using ec2Client
}
```

使用 RegionEndpoint 類別的新區域

此範例說明如何使用 [RegionEndpoint.GetBySystemName](#) 建構新的區域端點。

```
var newRegion = RegionEndpoint.GetBySystemName("us-west-new");
using (var ec2Client = new AmazonEC2Client(newRegion))
{
    // Make a request to EC2 in the new Region using ec2Client
}
```

使用服務用戶端組態類別的新區域

此範例說明如何使用服務用戶端組態類別的 `ServiceURL` 屬性來指定 區域；在此情況下，請使用 [AmazonEC2Config](#) 類別。

即使區域端點未遵循一般區域端點模式，此技術仍然有效。

```
var ec2ClientConfig = new AmazonEC2Config
{
    // Specify the endpoint explicitly
    ServiceURL = "https://ec2.us-west-new.amazonaws.com"
};

using (var ec2Client = new AmazonEC2Client(ec2ClientConfig))
{
    // Make a request to EC2 in the new Region using ec2Client
}
```

```
}
```

為所有服務用戶端指定區域

您可以透過多種方式為您的應用程式建立的所有 AWS 服務用戶端指定區域。此區域用於未以特定區域建立的服務用戶端。

會依下列順序 適用於 .NET 的 AWS SDK 尋找區域值。

描述檔

在應用程式或 SDK 已載入的設定檔中設定。如需詳細資訊，請參閱[憑證和設定檔解析](#)。

環境變數

在AWS_REGION環境變數中設定。

在 Linux 或 macOS 上：

```
export AWS_REGION='us-west-2'
```

在 Windows 上：

```
set AWS_REGION=us-west-2
```

Note

如果您為整個系統（使用 export 或 setx）設定此環境變數，它會影響所有 SDKs 和工具組，而不只是適用於 .NET 的 AWS SDK。

AWSConfigs 類別

設定為 [AWSConfigs.AWSRegion](#) 屬性。

```
AWSConfigs.AWSRegion = "us-west-2";  
using (var ec2Client = new AmazonEC2Client())  
{  
    // Make request to Amazon EC2 in us-west-2 Region using ec2Client
```

```
}
```

區域解析度

如果上述方法都未用於指定 AWS 區域，則會適用於 .NET 的 AWS SDK 嘗試尋找 AWS 服務用戶端要操作的區域。

區域解析順序

1. 應用程式組態檔案，例如 `app.config` 和 `web.config`。
2. 環境變數 (`AWS_REGION` 和 `AWS_DEFAULT_REGION`)。
3. 描述檔，其名稱由 `AWSCONFIGS.AWSPROFILENAME` 中的值指定。
4. 具有 `AWS_PROFILE` 環境變數指定名稱的設定檔。
5. `[default]` 設定檔。
6. Amazon EC2 執行個體中繼資料（如果在 EC2 執行個體上執行）。

如果找不到區域，軟體開發套件會擲回例外狀況，指出 AWS 服務用戶端沒有設定的區域。

中國（北京）區域的特殊資訊

若要使用中國（北京）地區中的服務，您必須有專屬於中國（北京）地區的帳戶和憑證。其他 AWS 區域的帳戶和登入資料不適用於中國（北京）區域。同樣地，中國（北京）區域的帳戶和登入資料不適用於其他 AWS 區域。如需中國（北京）區域中可用端點和通訊協定的相關資訊，請參閱[北京區域端點](#)。

新 AWS 服務的特殊資訊

新的 AWS 服務最初可以在幾個區域中啟動，然後在其他區域中支援。在這些情況下，您不需要安裝最新的 SDK 即可存取該服務的新區域。您可以依用戶端或全域指定新增的區域，如先前所示。

使用 NuGet 安裝 AWSSDK 套件

[NuGet](#) 是適用於 .NET 平台的套件管理系統。使用 NuGet，您可以將 [AWSSDK 套件](#) 以及其他數個擴充功能安裝到您的專案。如需詳細資訊，請參閱 GitHub 網站上的 [aws/dotnet](#) 儲存庫。

NuGet 一律具有最新版本的 AWSSDK 套件，以及先前的版本。NuGet 知道套件之間的相依性，並自動安裝所有必要的套件。

⚠ Warning

NuGet 套件清單可能包含一個名為「AWSSDK」的套件（沒有附加識別符）。請勿安裝此 NuGet 套件；它是舊版的，不應用於新專案。

與 NuGet 一起安裝的套件會與您的專案一起存放，而不是存放在中央位置。這可讓您安裝給定應用程式的特定組件版本，無需為其他應用程式產生相容性問題。如需 NuGet 的詳細資訊，請參閱 [NuGet 說明文件](#)。

i Note

如果您無法或無法依專案下載並安裝 NuGet 套件，您可以取得 AWSSDK 組件並將其存放在本機（或內部部署）。

如果這適用於您，而且您尚未取得 AWSSDK 組件，請參閱 [取得 AWSSDK 組件](#)。若要了解如何使用本機存放的組件，請參閱 [安裝不含 NuGet 的 AWSSDK 組件](#)。

從命令提示字元或終端機使用 NuGet

1. 前往 [NuGet 上的 AWSSDK 套件](#)，並判斷專案中需要哪些套件；例如 [AWSSDK.S3](#)。
2. 從該套件的網頁複製 .NET CLI 命令，如下列範例所示。

```
dotnet add package AWSSDK.S3 --version 3.3.110.19
```

3. 在專案的目錄中，執行該 .NET CLI 命令。NuGet 也可以安裝任何的相依性，如 [AWSSDK.Core](#)。

i Note

如果您只想要最新版本的 NuGet 套件，您可以從命令中排除版本資訊，如下列範例所示。

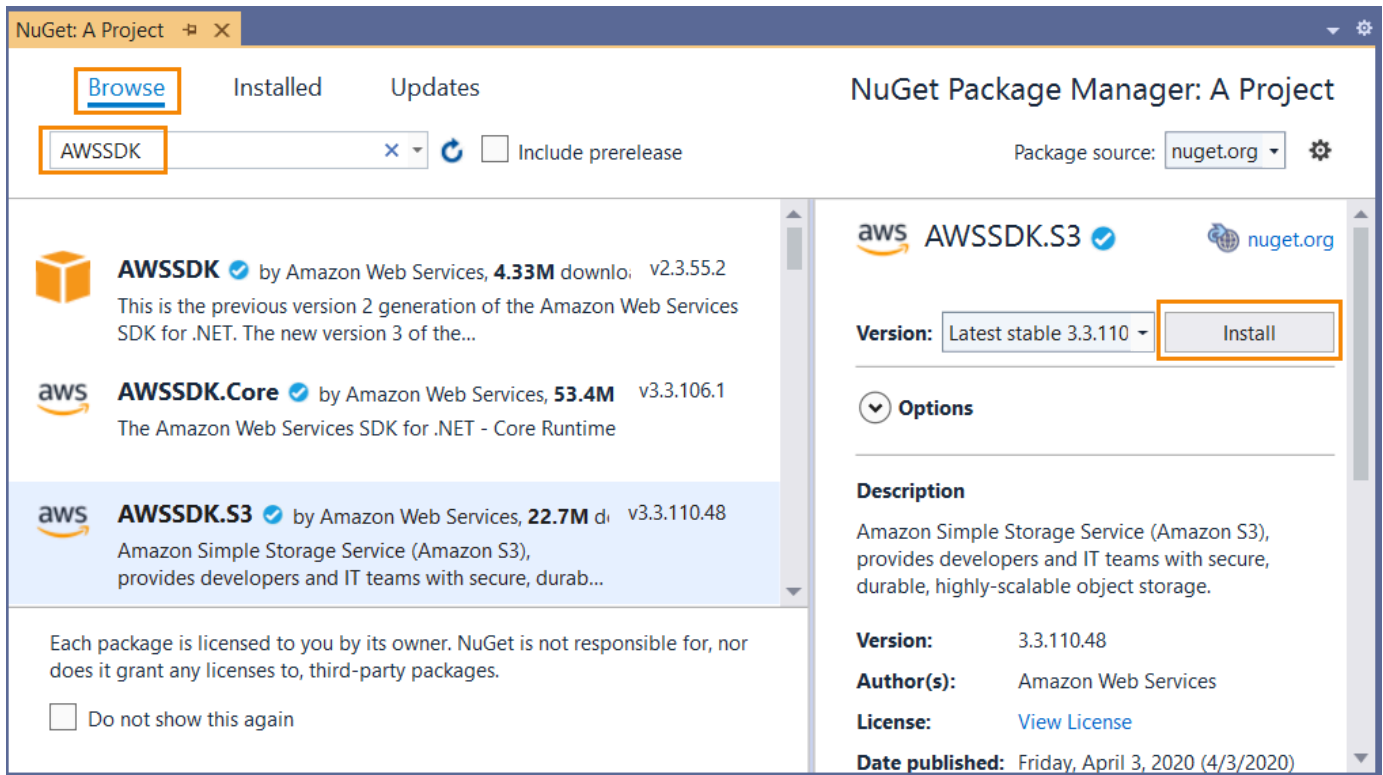
```
dotnet add package AWSSDK.S3
```

從 Visual Studio Solution Explorer 使用 NuGet

1. 在方案總管，按右鍵選取您的專案，從內容功能表中選擇管理 NuGet 套件。

- 在 NuGet Package Manager (NuGet 套件管理員) 的左窗格中，選擇 Browse (瀏覽)。然後，您可以使用搜尋方塊來搜尋要安裝的套件。NuGet 也可以安裝任何的相依性，如 [AWSSDK.Core](#)。

下圖顯示 AWSSDK.S3 套件的安裝。



使用套件管理員主控台的 NuGet

在 Visual Studio 中，選擇工具、NuGet 套件管理員、套件管理員主控台。

您可以使用 **Install-Package** 命令，從套件管理員主控台安裝您想要的 AWSSDK 套件。例如，若要安裝 [AWSSDK.S3](#)，請使用下列命令。

```
PM> Install-Package AWSSDK.S3
```

NuGet 也可以安裝任何的相依性，如 [AWSSDK.Core](#)。

如果您需要安裝舊版的套件，請使用 **-Version** 選項並指定您想要的套件版本，如下列範例所示。

```
PM> Install-Package AWSSDK.S3 -Version 3.3.106.6
```

如需套件管理員主控台命令的詳細資訊，請參閱 Microsoft [NuGet 文件](#) 中的 [PowerShell 參考](#)。

安裝不含 NuGet 的 AWSSDK 組件

本主題說明如何使用您在本機（或內部部署）取得和存放的 AWSSDK 組件，如中所述[取得 AWSSDK 組件](#)。這不是處理 SDK 參考的建議方法，但在某些環境中是必要的。

Note

處理 SDK 參考的建議方法是僅下載並安裝每個專案所需的 NuGet 套件。該方法如中所述[使用 NuGet 安裝 AWSSDK 套件](#)。

安裝 AWSSDK 組件

1. 在專案區域中為所需的 AWSSDK 組件建立資料夾。例如，您可以呼叫此資料夾 `AwsAssemblies`。
2. 如果您尚未這麼做，[請取得 AWSSDK 組件](#)，將組件放在一些本機下載或安裝資料夾中。將所需組件的 DLL 檔案從該下載資料夾複製到您的專案（在我們的範例中為 `AwsAssemblies` 資料夾）。

也請務必複製任何相依性。您可以在 [GitHub](#) 網站上找到相依性的相關資訊。

3. 請參考必要的組件，如下所示。

Cross-platform development

1. 開啟專案 `.csproj` 的檔案並新增 `<ItemGroup>` 元素。
2. 在 `<ItemGroup>` 元素中，為每個必要的組件新增具有 `Include` 屬性的 `<Reference>` 元素。

例如，對於 Amazon S3，您可以將以下幾行新增至專案的 `.csproj` 檔案。

在 Linux 和 macOS 上：

```
<ItemGroup>
  <Reference Include="./AwsAssemblies/AWSSDK.Core.dll" />
  <Reference Include="./AwsAssemblies/AWSSDK.S3.dll" />
</ItemGroup>
```

在 Windows 上：


```
<ItemGroup>
  <Reference Include="AwsAssemblies\AWSSDK.Core.dll" />
  <Reference Include="AwsAssemblies\AWSSDK.S3.dll" />
</ItemGroup>
```

3. 儲存專案.csproj的檔案。

Windows with Visual Studio and .NET Core

1. 在 Visual Studio 中，載入專案並開啟專案、新增參考。
2. 選擇對話方塊底部的瀏覽按鈕。導覽至專案的資料夾，以及您複製所需 DLL 檔案的子資料夾（例如AwsAssemblies）。
3. 選取所有 DLL 檔案，選擇新增，然後選擇確定。
4. 儲存您的專案。

憑證和設定檔解析

會依特定順序 適用於 .NET 的 AWS SDK 搜尋登入資料，並使用目前應用程式的第一個可用集合。

登入資料搜尋順序

1. 在 AWS 服務用戶端上明確設定的登入資料，如中所述[在應用程式中存取登入資料和設定檔](#)。

Note

該主題位於 [特殊考量](#) 區段中，因為它不是指定憑證的偏好方法。

2. 登入資料設定檔，其名稱由 [AWSConfigs.AWSProfileName](#) 中的值指定。
3. 登入資料設定檔，名為 AWS_PROFILE 環境變數所指定的名稱。
4. [default] 登入資料設定檔。
5. [SessionAWSCredentials](#) 是從 AWS_ACCESS_KEY_ID、AWS_SECRET_ACCESS_KEY 和 AWS_SESSION_TOKEN 環境變數建立的，如果它們都是非空的。
6. 從 AWS_ACCESS_KEY_ID 和 AWS_SECRET_ACCESS_KEY 環境變數建立的 [BasicAWSCredentials](#)，如果兩者都是非空的。
7. [容器憑證提供者](#)。
8. Amazon EC2 執行個體中繼資料。

如果您的應用程式在 Amazon EC2 執行個體上執行，例如在生產環境中，請使用 IAM 角色，如中所述[使用 IAM 角色授予存取權](#)。否則，例如在發行前測試中，將您的登入資料存放在使用您 Web 應用程式在伺服器上可存取之 AWS 登入資料檔案格式的檔案中。

設定檔解析

使用兩種不同的 憑證儲存機制，了解如何設定 適用於 .NET 的 AWS SDK 來使用它們非常重要。[AWSConfigs.AWSPProfilesLocation](#) 屬性控制 如何 適用於 .NET 的 AWS SDK 尋找登入資料設定檔。

AWSPProfilesLocation	設定檔解析行為
null (未設定) 或為空	如果平台支援 SDK Store，請搜尋 SDK Store，然後在 預設位置 搜尋共用 AWS 的登入資料檔案。如果設定檔不在這些位置，請搜尋 <code>~/.aws/config</code> (Linux 或 macOS) 或 <code>%USERPROFILE%\.aws\config</code> (Windows)。
AWS 登入資料檔案格式的檔案路徑	只 搜尋指定的檔案中是否有特定名稱的設定檔。

使用聯合使用者帳戶登入資料

使用 適用於 .NET 的 AWS SDK ([AWSSDK.Core](#) 3.1.6.0 版及更新版本) 的應用程式，可以透過 Active Directory 聯合服務 (AD FS) 使用聯合使用者帳戶，透過安全聲明標記語言 (SAML) 存取 AWS 服務。

聯合身分存取權支援表示使用者可以使用 Active Directory 進行身分驗證。自動授與臨時登入資料給使用者。這些臨時登入資料在一小時內有效，會在您的應用程式叫用 AWS 服務時使用。開發套件會管理臨時登入資料。對於網域加入的使用者帳戶，如果您的應用程式呼叫過期，則會自動重新對使用者進行身分驗證和重新整理授與登入資料。(對於非網域加入的帳戶，在重新進行身分驗證前，不會提示使用者輸入登入資料。)

若要在您的 .NET 應用程式中使用此支援，您必須先使用 PowerShell cmdlet 建立角色設定檔。若要了解如何操作，請參閱 [AWS Tools for Windows PowerShell 文件](#)。

設定角色描述檔之後，請在應用程式中參考描述檔。有多種方法可以執行此操作，其中一個方法是使用 [AWSConfigs.AWSProfileName](#) 屬性，就像使用其他登入資料描述檔一樣。

AWS Security Token Service 組件 ([AWSSDK.SecurityToken](#)) 提供 SAML 支援以取得 AWS 登入資料。若要使用聯合使用者帳戶登入資料，請確定您的應用程式可以使用此組件。

指定角色或臨時登入資料

對於在 Amazon EC2 執行個體上執行的應用程式，管理憑證的最安全方式是使用 IAM 角色，如 [中所述使用 IAM 角色授予存取權](#)。

對於可供組織外部使用者使用軟體可執行檔的應用程式案例，我們建議您設計軟體以使用臨時安全登入資料。除了提供對 AWS 資源的限制存取之外，這些登入資料還具有在指定期間後過期的好處。如需臨時安全登入資料的詳細資訊，請參閱以下：

- [暫時安全登入資料](#)
- [Amazon Cognito 身分集區](#)

使用代理憑證

如果您的軟體 AWS 透過代理與 通訊，您可以使用 服務Config類別的 ProxyCredentials 屬性來指定代理的登入資料。服務的Config類別通常是服務主要命名空間的一部分。範例包括：
Amazon.[AmazonCloudDirectoryConfig](#)中的 AmazonCloudDirectoryConfig 和 Amazon.GameLift 命名空間中的 [AmazonGameLiftConfig](#)。 [GameLift CloudDirectory](#)

例如，對於 [Amazon S3](#)，您可以使用類似以下的程式碼，其中 SecurelyStoredUserName和 SecurelyStoredPassword是 [NetworkCredential](#) 物件中指定的代理使用者名稱和密碼。

```
AmazonS3Config config = new AmazonS3Config();
config.ProxyCredentials = new NetworkCredential(SecurelyStoredUserName,
SecurelyStoredPassword);
```

Note

舊版的開發套件使用 ProxyUsername 和 ProxyPassword，但這些屬性都已停用。

有關使用者和角色的其他資訊

若要在上執行 .NET 開發 AWS 或在上執行 .NET 應用程式 AWS，您需要結合一些適合這些任務的使用者、許可集和服務角色。

您建立的特定使用者、許可集和服務角色，以及您使用這些角色的方式，將取決於應用程式的需求。以下提供一些額外的資訊，幫助您了解可能使用它們的原因，以及建立的方法。

使用者和許可集合

雖然可以使用具有長期憑證的 IAM 使用者帳戶來存取 AWS 服務，但這不再是最佳實務，應該避免使用。即使在開發期間，最佳實務是在中建立使用者和許可集，AWS IAM Identity Center 並使用身分來源提供的臨時憑證。

若是開發環境，您可以使用您在 [設定 SDK 身分驗證](#) 中建立或提供給您的使用者。如果您有適當的 AWS 管理主控台 許可，您也可以為該使用者建立具有最低權限的不同許可集，或為開發專案建立專門為開發專案建立新的使用者，以提供具有最低權限的許可集。您選擇的行動方式 (如有的話) 取決於您的情況。

如需有關這些使用者和許可集合，以及如何建立它們的詳細資訊，請參閱 AWS SDK 和工具參考指南中的 [身分驗證和存取](#) 和 AWS IAM Identity Center 使用者指南中的 [入門](#)。

服務角色

您可以設定 AWS 服務角色，以代表使用者存取 AWS 服務。如果有多人將遠端執行您的應用程式，則此類型的存取是適當的；例如，在您為此目的建立的 Amazon EC2 執行個體上。

建立服務角色的程序會根據情況而有所不同，但基本上如下所示。

1. 登入 AWS 管理主控台，並在 <https://console.aws.amazon.com/iam/> : //www. 開啟 IAM 主控台。
2. 選擇 Roles (角色)，然後選擇 Create role (建立角色)。
3. 選擇 AWS 服務，尋找並選取 EC2 (範例)，然後選擇 EC2 使用案例 (範例)。
4. 選擇下一步：許可，並為應用程式將使用 AWS 的服務選取 [適當的政策](#)。

Warning

請勿選擇 AdministratorAccess 政策，因為該政策會啟用您帳戶中幾乎所有內容的讀取和寫入許可。

5. 選擇下一步：標籤，然後輸入任何您想要的標籤。

您可以在《[IAM 使用者指南](#)》中找到[使用 AWS 資源標籤控制存取中標籤](#)的相關資訊。

6. 選擇下一步：檢閱並提供角色名稱和角色描述。然後選擇 Create role (建立角色)。

您可以在 IAM 使用者指南中的[身分（使用者、群組和角色）](#)中找到有關 [IAM](#) 角色的高階資訊。尋找該指南 [IAM](#) 角色主題中角色的詳細資訊。

角色的其他資訊

- 使用適用於 Amazon Elastic Container Service (Amazon ECS) 任務的[任務 IAM 角色](#)。
- 使用在 Amazon EC2 執行個體上執行的應用程式的 [IAM 角色](#)。

適用於 .NET 的 AWS SDK 專案的進階組態

本節中的主題包含您可能感興趣的其他組態任務和方法的相關資訊。

主題

- [使用 AWSSDK.Extensions.NETCore.Setup 和 IConfiguration 介面](#)
- [設定其他應用程式參數](#)
- [的組態檔案參考 適用於 .NET 的 AWS SDK](#)

使用 AWSSDK.Extensions.NETCore.Setup 和 IConfiguration 介面

(本主題先前標題為「適用於 .NET 的 AWS SDK 使用 .NET Core 設定」)

.NET Core 中最大的變更之一是移除 ConfigurationManager 以及與 .NET Framework app.config 和 ASP.NET 應用程式搭配使用的標準和 web.config 檔案。

.NET Core 中的組態是以組態提供者建立的鍵值對為基礎。組態提供者會將組態資料從各種組態來源讀入鍵/值組，包括命令列引數、目錄檔案、環境變數和設定檔案。

Note

如需詳細資訊，請參閱 [ASP.NET Core 中的組態](#)。

若要輕鬆適用於 .NET 的 AWS SDK 搭配 .NET Core 使用，您可以使用 [AWSSDK.Extensions.NETCore.Setup](#) NuGet 套件。與許多 .NET Core 程式庫一樣，它會將延伸方法新增至 `IConfiguration` 介面，讓 AWS 組態無縫取得。

此套件的原始碼位於 GitHub，網址為 <https://github.com/aws/aws-sdk-net/tree/aws-sdk-net-v3.7/extensions/src/AWSSDK.Extensions.NETCore.Setup>。

使用 AWSSDK.Extensions.NETCore.Setup

假設您建立 ASP.NET Core Model-View-Controller (MVC) 應用程式，這可以透過 Visual Studio 中的 ASP.NET Core Web 應用程式範本或在 .NET Core CLI `dotnet new mvc ...` 中執行來完成。當您建立這類應用程式時，的建構函數會透過從 `Startup.cs` 組態提供者讀取各種輸入來源來處理組態，例如 `appsettings.json`。

```
public Startup(IConfiguration configuration)
{
    Configuration = configuration;
}
```

若要使用 `Configuration` 物件來取得 AWS 選項，請先新增 `AWSSDK.Extensions.NETCore.Setup` NuGet 套件。然後，將您的選項新增至組態檔案，如下所述。

請注意，新增至專案的其中一個檔案是 `appsettings.Development.json`。這相當於 `EnvironmentName` 設定為開發。在開發期間，您會將組態放入此檔案中，此檔案只會在本機測試期間讀取。當您部署已 `EnvironmentName` 設定為生產的 Amazon EC2 執行個體時，會忽略此檔案，而適用於 .NET 的 AWS SDK 會回到為 Amazon EC2 執行個體設定的 IAM 登入資料和區域。

下列組態設定顯示您可以在專案的 `appsettings.Development.json` 檔案中新增以提供 AWS 設定的值範例。

```
{
  "AWS": {
    "Profile": "local-test-profile",
    "Region": "us-west-2"
  },
  "SupportEmail": "TechSupport@example.com"
}
```

若要存取 CSHTML 檔案中的設定，請使用 `Configuration` 指令。

```
@using Microsoft.Extensions.Configuration
@Inject IConfiguration Configuration

<h1>Contact</h1>

<p>
    <strong>Support:</strong> <a
    href='mailto:@Configuration["SupportEmail"]'>@Configuration["SupportEmail"]</a><br />
</p>
```

若要從程式碼存取檔案中設定 AWS 的選項，請呼叫新增至的 `GetAWSSOptions` 擴充功能方法 `IConfiguration`。

若要建構這些選項的服務用戶端，請呼叫 `CreateServiceClient`。下列範例示範如何建立 Amazon S3 服務用戶端。（請務必將 [AWSSDK.S3](#) NuGet 套件新增至您的專案。）

```
var options = Configuration.GetAWSSOptions();
IAmazonS3 client = options.CreateServiceClient<IAmazonS3>();
```

您也可以使用 `appsettings.Development.json` 檔案中的多個項目建立具有不相容設定的多個服務用戶端，如下列範例所示，其中的組態 `service1` 包含 `us-west-2` 區域，而的組態 `service2` 包含特殊端點 URL。

```
{
  "service1": {
    "Profile": "default",
    "Region": "us-west-2"
  },
  "service2": {
    "Profile": "default",
    "ServiceURL": "URL"
  }
}
```

然後，您可以使用 JSON 檔案中的項目，取得特定服務的選項。例如，若要取得的設定，`service1` 請使用下列項目。

```
var options = Configuration.GetAWSSOptions("service1");
```

Appsettings 檔案中允許的值

以下應用程式組態的值可以在 `appsettings.Development.json` 檔案中做設定。欄位名稱必須使用顯示的大小寫。如需這些設定的詳細資訊，請參閱 [AWS.Runtime.ClientConfig](#) 類別。

- 區域
- 設定檔
- ProfilesLocation
- SignatureVersion
- RegionEndpoint
- UseHttp
- ServiceURL
- AuthenticationRegion
- AuthenticationServiceName
- MaxErrorRetry
- LogResponse
- BufferSize
- ProgressUpdateInterval
- ResignRetries
- AllowAutoRedirect
- LogMetrics
- DisableLogging
- UseDualstackEndpoint

ASP.NET Core 相依性插入

AWSSDK.Extensions.NETCore.Setup NuGet 套件也能在 ASP.NET 核心中使用新的相依性注入系統。應用程式 `Startup` 類別中的 `ConfigureServices` 方法是新增 MVC 服務的位置。如果應用程式是使用實體架構，那麼這也會是初始化的位置。

```
public void ConfigureServices(IServiceCollection services)
{
    // Add framework services.
    services.AddMvc();
}
```



```
}
```

Note

.NET Core 文件網站提供 [.NET Core](#) 中相依性注入的背景。

AWSSDK.Extensions.NETCore.Setup NuGet 套件會將新的延伸方法新增至 `IServiceCollection`，您可用來將 AWS 服務新增至相依性插入。下列程式碼說明如何新增讀取自 AWS 的選項 `IConfiguration`，以將 Amazon S3 和 DynamoDB 新增至服務清單。（請務必將 [AWSSDK.S3](#) 和 [AWSSDK.DynamoDBv2](#) NuGet 套件新增至您的專案。）

```
public void ConfigureServices(IServiceCollection services)
{
    // Add framework services.
    services.AddMvc();

    services.AddDefaultAWSOptions(Configuration.GetAWSOptions());
    services.AddAWSService<IAmazonS3>();
    services.AddAWSService<IAmazonDynamoDB>();
}
```

現在，如果您的 MVC 控制器使用 `IAmazonS3` 或 `IAmazonDynamoDB` 參數做為建構函數裡的參數，相依性注入系統傳入這些服務。

```
public class HomeController : Controller
{
    IAmazonS3 S3Client { get; set; }

    public HomeController(IAmazonS3 s3Client)
    {
        this.S3Client = s3Client;
    }

    ...
}
```

設定其他應用程式參數

Note

本主題中的資訊專屬於以 .NET Framework 為基礎的專案。根據預設，App.config 和 Web.config 檔案不會出現在以 .NET Core 為基礎的專案中。

開啟以檢視 .NET Framework 內容

您可以設定許多應用程式參數：

- [AWSLogging](#)
- [AWSLogMetrics](#)
- [AWSRegion](#)
- [AWSResponseLogging](#)
- [AWS.DynamoDBContext.TableNamePrefix](#)
- [AWS.S3.UseSignatureVersion4](#)
- [AWSEndpointDefinition](#)
- [AWS 服務產生的端點](#)

這些參數可以在應用程式的 App.config 或 Web.config 檔案中設定。雖然您也可以使用適用於 .NET 的 AWS SDK API 設定這些項目，但我們建議您使用應用程式的 .config 檔案。兩種方法皆在這裡有所描述。

如需有關如本主題稍後所述使用 <aws> 元素的詳細資訊，請參閱 [的組態檔案參考 適用於 .NET 的 AWS SDK](#)。

AWSLogging

設定開發套件應如何記錄事件，如果有的話。例如，建議使用的方法是使用 <logging> 元素，此為 <aws> 元素的子元素：

```
<aws>
  <logging logTo="Log4Net"/>
</aws>
```

或使用：

```
<add key="AWSLogging" value="log4net"/>
```

可能值如下：

None

關閉 事件日誌。這是預設值。

log4net

使用 log4net 記錄。

SystemDiagnostics

使用 System.Diagnostics 類別記錄。

您可以為 logTo 屬性設定多個值，以逗號分隔即可。以下示範設定 .config 檔案的 log4net 和 System.Diagnostics 記錄在：

```
<logging logTo="Log4Net, SystemDiagnostics"/>
```

或使用：

```
<add key="AWSLogging" value="log4net, SystemDiagnostics"/>
```

或者，使用適用於 .NET 的 AWS SDK API，結合 [LoggingOptions](#) 列舉的值，並設定 [AWSConfigs.Logging](#) 屬性：

```
AWSConfigs.Logging = LoggingOptions.Log4Net | LoggingOptions.SystemDiagnostics;
```

此設定的變更僅適用於新的 AWS 用戶端執行個體。

AWSLogMetrics

指定開發套件是否應該記錄效能指標。若要在 .config 檔案裡設定指標記錄組態，請設定 <logging> 元素的 logMetrics 屬性值，此元素為 <aws> 元素的子元素：

```
<aws>
  <logging logMetrics="true"/>
</aws>
```

或者，在 <appSettings> 設定 AWSLogMetrics 金鑰：

```
<add key="AWSLogMetrics" value="true">
```

或者，若要使用 適用於 .NET 的 AWS SDK API 設定指標記錄，請設定 [AWSConfigs.LogMetrics](#) 屬性：

```
AWSConfigs.LogMetrics = true;
```

這個設定為所有用戶端/組態設定預設的 LogMetrics 屬性。此設定的變更僅適用於新的 AWS 用戶端執行個體。

AWSRegion

為未明確指定 AWS 區域之用戶端設定預設區域。若要在 .config 檔案中設定區域，建議的方法為設定 aws 元素裡的 region 屬性值：

```
<aws region="us-west-2"/>
```

或者，在 <appSettings> 區段中設定 AWSRegion 金鑰：

```
<add key="AWSRegion" value="us-west-2"/>
```

或者，若要使用 適用於 .NET 的 AWS SDK API 設定區域，請設定 [AWSConfigs.AWSRegion](#) 屬性：

```
AWSConfigs.AWSRegion = "us-west-2";
```

如需為特定區域建立 AWS 用戶端的詳細資訊，請參閱[AWS 區域選擇](#)。此設定的變更僅適用於新的 AWS 用戶端執行個體。

AWSResponseLogging

設定開發套件應何時記錄服務回應。可能值如下：

Never

永遠不用記錄服務回應。這是預設值。

Always

一直記錄服務回應。

OnError

只在發生錯誤時記錄服務回應。

若要在 `.config` 檔案裡設定服務記錄組態，建議方式為設定 `<logging>` 元素的 `logResponses` 屬性值，此元素為 `<aws>` 元素的子元素：

```
<aws>
  <logging logResponses="OnError"/>
</aws>
```

或者，在 `<appSettings>` 區段中設定 `AWSResponseLogging` 金鑰：

```
<add key="AWSResponseLogging" value="OnError"/>
```

或者，若要使用 適用於 .NET 的 AWS SDK API 設定服務記錄，請將 [AWSConfigs.ResponseLogging](#) 屬性設定為 [ResponseLoggingOption](#) 列舉的其中一個值：

```
AWSConfigs.ResponseLogging = ResponseLoggingOption.OnError;
```

這些設定的變更會立即生效。

AWS.DynamoDBContext.TableNamePrefix

設定預設 `TableNamePrefix` `DynamoDBContext` 將會在未手動設定的情況下。

若要設定 `.config` 檔案的表格的前綴名稱，建議的方法為設定 `<dynamoDB>` 元素的子元素 `<dynamoDBContext>` 元素之 `tableNamePrefix` 屬性值，此元素其本身又為 `<aws>` 的子元素：

```
<dynamoDBContext tableNamePrefix="Test-"/>
```

或者，在 `<appSettings>` 設定 `AWS.DynamoDBContext.TableNamePrefix` 金鑰：

```
<add key="AWS.DynamoDBContext.TableNamePrefix" value="Test-"/>
```

或者，若要使用 適用於 .NET 的 AWS SDK API 設定資料表名稱字首，請設定 [AWSConfigs.DynamoDBContextTableNamePrefix](#) 屬性：

```
AWSConfigs.DynamoDBContextTableNamePrefix = "Test-";
```

此設定的變更僅對 `DynamoDBContextConfig` 和 `DynamoDBContext` 新建立的執行個體生效。

AWS.S3.UseSignatureVersion4

設定 Amazon S3 用戶端是否應使用簽章第 4 版簽署請求。

若要在 `.config` 檔案中設定 Amazon S3 的簽章第 4 版簽署，建議方法是設定 `<s3>` 元素的 `useSignatureVersion4` 屬性，這是 `<aws>` 元素的子元素：

```
<aws>
  <s3 useSignatureVersion4="true"/>
</aws>
```

或者，`true` 在 `<appSettings>` 區段中將 `AWS.S3.UseSignatureVersion4` 金鑰設定為：

```
<add key="AWS.S3.UseSignatureVersion4" value="true"/>
```

或者，若要使用適用於 .NET 的 AWS SDK API 設定簽章第 4 版簽署，請將 [AWSConfigs.S3UseSignatureVersion4](#) 屬性設定為 `true`：

```
AWSConfigs.S3UseSignatureVersion4 = true;
```

在預設情況下，此設定為 `false`，但第四版的簽章可能在某些情況下或某些區域中會做為預設使用。當設定為 `true`，第四版的簽章將用於所有的請求。此設定的變更僅在新的 Amazon S3 用戶端執行個體上生效。

AWSEndpointDefinition

設定開發套件是否應開始用自訂組態檔案定義區域和端點。

若要設定 `.config` 檔案的端點定義檔案，我們建議設定 `<aws>` 元素的 `endpointDefinition` 屬性值。

```
<aws endpointDefinition="c:\config\endpoints.json"/>
```

或者，您可以在 `<appSettings>` 區段中設定 `AWSEndpointDefinition` 金鑰：

```
<add key="AWSEndpointDefinition" value="c:\config\endpoints.json"/>
```

或者，若要使用適用於 .NET 的 AWS SDK API 設定端點定義檔案，請設定 [AWSConfigs.EndpointDefinition](#) 屬性：

```
AWSConfigs.EndpointDefinition = @"c:\config\endpoints.json";
```

如果沒有提供檔案名稱，則無法使用自訂組態檔案。此設定的變更僅適用於新的 AWS 用戶端執行個體。endpoint.json 檔案可從取得<https://github.com/aws/aws-sdk-net/blob/aws-sdk-net-v3.7/sdk/src/Core/endpoints.json>。

AWS 服務產生的端點

有些 AWS 服務會產生自己的端點，而不是使用區域端點。這些服務的用戶端使用特定於該服務與特定於您的資源的服務 URL。這些服務的兩個範例是 Amazon CloudSearch 和 AWS IoT。以下範例說明如何取得這些服務的端點。

Amazon CloudSearch 端點範例

Amazon CloudSearch 用戶端用於存取 Amazon CloudSearch 組態服務。您可使用 Amazon CloudSearch 組態服務來建立、設定和管理搜尋網域。若要建立搜尋網域，請建立 [CreateDomainRequest](#) 物件並提供 DomainName 屬性。使用請求物件建立 [AmazonCloudSearchClient](#) 物件。呼叫 [CreateDomain](#) 方法。呼叫傳回的 [CreateDomainResponse](#) 物件包含 DomainStatus 屬性，同時具有 DocService 和 SearchService 端點。建立 [AmazonCloudSearchDomainConfig](#) 物件，並使用它來初始化 [AmazonCloudSearchDomainClient](#) 類別的 DocService 和 SearchService 執行個體。

```
// Create domain and retrieve DocService and SearchService endpoints
DomainStatus domainStatus;
using (var searchClient = new AmazonCloudSearchClient())
{
    var request = new CreateDomainRequest
    {
        DomainName = "testdomain"
    };
    domainStatus = searchClient.CreateDomain(request).DomainStatus;
    Console.WriteLine(domainStatus.DomainName + " created");
}

// Test the DocService endpoint
var docServiceConfig = new AmazonCloudSearchDomainConfig
{
    ServiceURL = "https://" + domainStatus.DocService.Endpoint
};
using (var domainDocService = new AmazonCloudSearchDomainClient(docServiceConfig))
{
```

```

    Console.WriteLine("Amazon CloudSearchDomain DocService client instantiated using
the DocService endpoint");
    Console.WriteLine("DocService endpoint = " + domainStatus.DocService.Endpoint);

    using (var docStream = new FileStream(@"C:\doc_source\XMLFile4.xml",
    FileMode.Open))
    {
        var upload = new UploadDocumentsRequest
        {
            ContentType = ContentType.ApplicationXml,
            Documents = docStream
        };
        domainDocService.UploadDocuments(upload);
    }
}

// Test the SearchService endpoint
var searchServiceConfig = new AmazonCloudSearchDomainConfig
{
    ServiceURL = "https://" + domainStatus.SearchService.Endpoint
};
using (var domainSearchService = new
    AmazonCloudSearchDomainClient(searchServiceConfig))
{
    Console.WriteLine("Amazon CloudSearchDomain SearchService client instantiated using
the SearchService endpoint");
    Console.WriteLine("SearchService endpoint = " +
    domainStatus.SearchService.Endpoint);

    var searchReq = new SearchRequest
    {
        Query = "Gambardella",
        Sort = "_score desc",
        QueryParser = QueryParser.Simple
    };
    var searchResp = domainSearchService.Search(searchReq);
}

```

AWS IoT 端點範例

若要取得 的端點 AWS IoT，請建立 [AmazonIoTClient](#) 物件並呼叫 [DescribeEndPoint](#) 方法。傳回的 [DescribeEndPointResponse](#) 物件包含 EndpointAddress。建立 [AmazonIoTDataConfig](#) 物件，設定 ServiceURL 屬性，並使用此物件執行個體化 [AmazonIoTDataClient](#) 類別。


```
string iotEndpointAddress;
using (var iotClient = new AmazonIoTClient())
{
    var endPointResponse = iotClient.DescribeEndpoint();
    iotEndpointAddress = endPointResponse.EndpointAddress;
}

var ioTdocServiceConfig = new AmazonIotDataConfig
{
    ServiceURL = "https://" + iotEndpointAddress
};
using (var dataClient = new AmazonIotDataClient(ioTdocServiceConfig))
{
    Console.WriteLine("AWS IoTData client instantiated using the endpoint from the
    IotClient");
}
```

的組態檔案參考 適用於 .NET 的 AWS SDK

Note

本主題中的資訊專屬於以 .NET Framework 為基礎的專案。根據預設，App.config 和 Web.config 檔案不會出現在以 .NET Core 為基礎的專案中。

開啟以檢視 .NET Framework 內容

您可以使用 .NET 專案的 App.config 或 Web.config 檔案來指定 AWS 設定，例如 AWS 登入資料、記錄選項、AWS 服務端點和 AWS 區域，以及一些 AWS 服務設定，例如 Amazon DynamoDB、Amazon EC2 和 Amazon S3。以下資訊說明如何正確地格式化 App.config 或 Web.config 檔案，以指定這些類型的設定。

Note

雖然您可以繼續使用 App.config 或 Web.config 檔案中的 <appSettings> 元素來指定 AWS 設定，但我們建議您如本主題稍後所述使用 <configSections> 和 <aws> 元素。如需 <appSettings> 元素的詳細資訊，請參閱 [設定 適用於 .NET 的 AWS SDK 應用程式](#) 中的 <appSettings> 元素範例。

 Note

雖然您可以繼續使用程式碼檔案中的下列 [AWSConfigs](#) 類別屬性來指定 AWS 設定，但下列屬性已棄用，未來版本可能不支援：

- DynamoDBContextTableNamePrefix
- EC2UseSignatureVersion4
- LoggingOptions
- LogMetrics
- ResponseLoggingOption
- S3UseSignatureVersion4

一般而言，建議您不要在程式碼檔案中使用 [AWSConfigs](#) 類別屬性來指定 AWS 設定，而是使用 `App.config` 或 `Web.config` 檔案中的 `<configSections>` 和 `<aws>` 元素來指定 AWS 設定，如本主題稍後所述。如需上述屬性的詳細資訊，請參閱 [設定 適用於 .NET 的 AWS SDK 應用程式](#) 中的 [AWSConfigs](#) 程式碼範例。

主題

- [宣告 AWS 設定區段](#)
- [允許的元素](#)
- [元素參考](#)

宣告 AWS 設定區段

您可以從 `<aws>` 元素的 `App.config` 或 `Web.config` 檔案中指定 AWS 設定。在您開始使用 `<aws>` 元素前，您必須建立一個 `<section>` 元素 (為 `<configSections>` 元素的子元素)，並設其本身的 `name` 屬性為 `aws`，其本身的 `type` 屬性為 `Amazon.AWSSection, AWSSDK.Core`，如以下範例所示：

```
<?xml version="1.0"?>
<configuration>
  ...
  <configSections>
    <section name="aws" type="Amazon.AWSSection, AWSSDK.Core"/>
  </configSections>
```

```
<aws>
  <!-- Add your desired AWS settings declarations here. -->
</aws>
...
</configuration>
```

Visual Studio 編輯器不提供 `<aws>` 元素或其子元素完成自動的程式碼 (IntelliSense)。

為了協助您建立 `<aws>` 元素的正確格式版本，請呼叫

`Amazon.AWSConfigs.GenerateConfigTemplate` 方法。此輸出 `<aws>` 元素的正式版本，適合列印字串的方式，可依您的需求調整。以下章節說明 `<aws>` 元素的屬性和子元素。

允許的元素

以下是設定區段中 AWS 允許元素之間的邏輯關係清單。您可以呼叫

`Amazon.AWSConfigs.GenerateConfigTemplate` 方法產生最新的版本，也會輸出 `<aws>` 元素的正式版本，以字串方式呈現，所以您可以依需求調整。

```
<aws
  endpointDefinition="string value"
  region="string value"
  profileName="string value"
  profilesLocation="string value">
  <logging
    logTo="None, Log4Net, SystemDiagnostics"
    logResponses="Never | OnError | Always"
    logMetrics="true | false"
    logMetricsFormat="Standard | JSON"
    logMetricsCustomFormatter="Namespace.Class, Assembly" />
  <dynamoDB
    conversionSchema="V1 | V2">
    <dynamoDBContext
      tableNamePrefix="string value">
      <tableAliases>
        <alias
          fromTable="string value"
          toTable="string value" />
      </tableAliases>
      <map
        type="Namespace.Class, Assembly"
        targetTable="string value">
        <property
          name="string value"
```

```
        attribute="string value"
        ignore="true | false"
        version="true | false"
        converter="Namespace.Class, Assembly" />
    </map>
</dynamoDBContext>
</dynamoDB>
<s3
    useSignatureVersion4="true | false" />
<ec2
    useSignatureVersion4="true | false" />
<proxy
    host="string value"
    port="1234"
    username="string value"
    password="string value" />
</aws>
```

元素參考

以下是 AWS 設定區段中允許的元素清單。允許每個元素的屬性和其父子元素都已列出。

主題

- [別名](#)
- [aws](#)
- [dynamoDB](#)
- [dynamoDBContext](#)
- [ec2](#)
- [日誌](#)
- [映射](#)
- [屬性](#)
- [proxy](#)
- [s3](#)

別名

<alias> 元素表示在一個或多個從表格 (from-table) 至到表格 (to-table) 對應的單一項目，為類型設定指定不同的表格。此元素會對應到 適用於 .NET 的 AWS SDK

之 `Amazon.AWSConfigs.DynamoDBConfig.Context.TableAliases` 屬性中 `Amazon.Util.TableAlias` 類別的執行個體。在套用表格的前綴名稱前，會完成重新對應。

這個元素可以包含下列屬性：

fromTable

從表格 (from-table) 至到表格 (to-table) 對應的從表格 (from-table) 部分。此屬性對應到 適用於 .NET 的 AWS SDK 中的 `Amazon.Util.TableAlias.FromTable` 屬性。

toTable

從表格 (from-table) 至到表格 (to-table) 對應的至表格 (to-table) 部分。此屬性對應到 適用於 .NET 的 AWS SDK 中的 `Amazon.Util.TableAlias.ToTable` 屬性。

`<alias>` 元素的父系為 `<tableAliases>` 元素。

`<alias>` 元素不含子元素。

以下為範例使用的 `<alias>` 元素：

```
<alias
  fromTable="Studio"
  toTable="Studios" />
```

aws

`<aws>` 元素代表 AWS 設定區段中最上層的元素。這個元素可以包含下列屬性：

endpointDefinition

自訂組態檔案的絕對路徑，定義要使用 AWS 的區域和端點。此屬性對應到 適用於 .NET 的 AWS SDK 中的 `Amazon.AWSConfigs.EndpointDefinition` 屬性。

profileName

用於進行服務呼叫之已儲存 AWS 登入資料的設定檔名稱。此屬性對應到 適用於 .NET 的 AWS SDK 中的 `Amazon.AWSConfigs.AWSProfileName` 屬性。

profilesLocation

與其他 AWS SDKs 共用的登入資料檔案位置的絕對路徑。預設情況下，登入資料檔案存放於目前使用者主目錄的 `.aws` 目錄中。此屬性對應到 適用於 .NET 的 AWS SDK 中的 `Amazon.AWSConfigs.AWSProfilesLocation` 屬性。

region

未明確指定 AWS 區域之用戶端的預設區域 ID。此屬性對應到 適用於 .NET 的 AWS SDK 中的 `Amazon.AWSConfigs.AWSRegion` 屬性。

<aws> 元素沒有父元素。

<aws> 元素可以含有以下的子元素：

- <dynamoDB>
- <ec2>
- <logging>
- <proxy>
- <s3>

以下為範例使用的 <aws> 元素：

```
<aws
  endpointDefinition="C:\Configs\endpoints.xml"
  region="us-west-2"
  profileName="development"
  profilesLocation="C:\Configs">
  <!-- ... -->
</aws>
```

dynamoDB

<dynamoDB> 元素代表 AmazonDynamoDB 設定的設定集合。這個元素可以包含 `conversionSchema` 屬性，這代表使用 .NET 和 DynamoDB 物件之間轉換。允許值包含 V1 和 V2。此屬性對應到 適用於 .NET 的 AWS SDK 中的 `Amazon.DynamoDBv2.DynamoDBEntryConversion` 類別。如需詳細資訊，請參閱 [DynamoDB 系列 - 轉換結構描述](#)。

<dynamoDB> 元素的父系為 <aws> 元素。

<dynamoDB> 元素可以含有 <dynamoDBContext> 子元素。

以下為範例使用的 <dynamoDB> 元素：

```
<dynamoDB
  conversionSchema="V2">
```

```
<!-- ... -->
</dynamoDB>
```

dynamoDBContext

`<dynamoDBContext>` 元素代表 Amazon DynamoDB 內容專屬的設定集合。這個元素可以包含 `tableNamePrefix` 屬性，這代表 DynamoDB 內容將使用預設的表格的前綴名稱，如果未手動設定的話。此屬性從適用於 .NET 的 AWS SDK 中的 `Amazon.AWSConfigs.DynamoDBConfig.Context.TableNamePrefix` 屬性對應到 `Amazon.Util.DynamoDBContextConfig.TableNamePrefix` 屬性。如需詳細資訊，請參閱 [DynamoDB 開發套件的增強功能](#)。

`<dynamoDBContext>` 元素的父系為 `<dynamoDB>` 元素。

`<dynamoDBContext>` 元素可以含有以下的子元素：

- `<alias>` (一個或多個執行個體)
- `<map>` (一個或多個執行個體)

以下為範例使用的 `<dynamoDBContext>` 元素：

```
<dynamoDBContext
  tableNamePrefix="Test-">
  <!-- ... -->
</dynamoDBContext>
```

ec2

`<ec2>` 元素代表 Amazon EC2 設定的集合。這個元素可以包含 `useSignatureVersion4` 屬性，指定第四版的簽章簽署將用於所有請求 (true) 或第四版的簽章簽署將不會用於所有請求 (false，預設)。此屬性從適用於 .NET 的 AWS SDK 中的 `Amazon.AWSConfigs.EC2Config.UseSignatureVersion4` 屬性對應到 `Amazon.Util.EC2Config.UseSignatureVersion4` 屬性。

`<ec2>` 的父系為此元素。

`<ec2>` 元素不含子元素。

以下為範例使用的 `<ec2>` 元素：

```
<ec2
  useSignatureVersion4="true" />
```

日誌

<logging> 元素表示回應日誌記錄和效能指標記錄的設定集合。這個元素可以包含下列屬性：

logMetrics

無論效能指標記錄是否適用於所有用戶端和組態 (true)，否則 false。此屬性從 適用於 .NET 的 AWS SDK 中的 `Amazon.AWSConfigs.LoggingConfig.LogMetrics` 屬性對應到 `Amazon.Util.LoggingConfig.LogMetrics` 屬性。

logMetricsCustomFormatter

用於記錄指標的自訂格式化之資料類型和組件名稱。此屬性從 適用於 .NET 的 AWS SDK 中的 `Amazon.AWSConfigs.LoggingConfig.LogMetricsCustomFormatter` 屬性對應到 `Amazon.Util.LoggingConfig.LogMetricsCustomFormatter` 屬性。

logMetricsFormat

記錄指標的顯示格式 (從 適用於 .NET 的 AWS SDK 中的 `Amazon.AWSConfigs.LoggingConfig.LogMetricsFormat` 屬性對應到 `Amazon.Util.LoggingConfig.LogMetricsFormat` 屬性)。

允許數值包括：

JSON

使用 JSON 格式。

Standard

使用預設格。

logResponses

日誌服務回應的時機 (從 適用於 .NET 的 AWS SDK 中的 `Amazon.AWSConfigs.LoggingConfig.LogResponses` 屬性對應到 `Amazon.Util.LoggingConfig.LogResponses` 屬性)。

允許數值包括：

Always

一直記錄服務回應。

Never

永遠不用記錄服務回應。

OnError

只在發生錯誤時，記錄服務回應。

logTo

登入位置（從中的 LogTo 屬性映射至 Amazon.AWSConfigs.LoggingConfig.LogTo 屬性適用於 .NET 的 AWS SDK）。

允許的值包含一個或多個：

Log4Net

記錄到 log4net。

None

停用日誌記錄。

SystemDiagnostics

記錄到 System.Diagnostics。

<logging> 元素的父系為 <aws> 元素。

<logging> 元素不含子元素。

以下為範例使用的 <logging> 元素：

```
<logging
  logTo="SystemDiagnostics"
  logResponses="OnError"
  logMetrics="true"
  logMetricsFormat="JSON"
  logMetricsCustomFormatter="MyLib.Util.MyMetricsFormatter, MyLib" />
```

映射

<map> 元素表示從 .NET 類型對應到 DynamoDB 資料表 (從適用於 .NET 的 AWS SDK 中的 Amazon.AWSConfigs.DynamoDBConfig.Context.TypeMappings 屬性對應到 TypeMapping 類別的執行個體) 之類型到資料表 (type-to-table) 對應集合中的單一項目，如需詳細資訊，請參閱 [DynamoDB 開發套件的增強功能](#)。

這個元素可以包含下列屬性：

targetTable

對應套用的 DynamoDB 表格。此屬性對應到 適用於 .NET 的 AWS SDK 中的 `Amazon.Util.TypeMapping.TargetTable` 屬性。

type

對應套用的類型和組件名稱。此屬性對應到 適用於 .NET 的 AWS SDK 中的 `Amazon.Util.TypeMapping.Type` 屬性。

<map> 元素的父系為 <dynamoDBContext> 元素。

<map> 元素可以包含 <property> 子元素的一個或多個執行個體。

以下為範例使用的 <map> 元素：

```
<map
  type="SampleApp.Models.Movie, SampleDLL"
  targetTable="Movies">
  <!-- ... -->
</map>
```

屬性

<property> 元素表示 DynamoDB 屬性。(此元素對應至 `AddProperty` 方法的 `Amazon.Util.PropertyConfig` 類別執行個體 適用於 .NET 的 AWS SDK) 如需詳細資訊，請參閱 [DynamoDB SDK 和 DynamoDB 屬性的增強功能](#)。 [DynamoDB](#)

這個元素可以包含下列屬性：

attribute

屬性的屬性名稱，例如範圍金鑰的名稱。此屬性對應到 適用於 .NET 的 AWS SDK 中的 `Amazon.Util.PropertyConfig.Attribute` 屬性。

converter

此屬性應使用的轉換器類型。此屬性對應到 適用於 .NET 的 AWS SDK 中的 `Amazon.Util.PropertyConfig.Converter` 屬性。

ignore

此關聯的屬性是否應該被忽略 (true)；否則為 false。此屬性對應到 適用於 .NET 的 AWS SDK 中的 `Amazon.Util.PropertyConfig.Ignore` 屬性。

name

屬性的名稱。此屬性對應到 適用於 .NET 的 AWS SDK 中的 `Amazon.Util.PropertyConfig.Name` 屬性。

version

此屬性是否應該存放項目版本編號 (true) ; 否則為 false。此屬性對應到 適用於 .NET 的 AWS SDK 中的 `Amazon.Util.PropertyConfig.Version` 屬性。

<property> 元素的父系為 <map> 元素。

<property> 元素不含子元素。

以下為範例使用的 <property> 元素：

```
<property
  name="Rating"
  converter="SampleApp.Models.RatingConverter, SampleDLL" />
```

proxy

<proxy> 元素表示用於設定 適用於 .NET 的 AWS SDK 要使用之代理程式的設定。這個元素可以包含下列屬性：

託管

代理伺服器的主機名稱或 IP 地址。此屬性從 適用於 .NET 的 AWS SDK 中的 `Amazon.AWSConfigs.ProxyConfig.Host` 屬性對應到 `Amazon.Util.ProxyConfig.Host` 屬性。

密碼

此密碼使用代理伺服器的進行身分驗證。此屬性從 適用於 .NET 的 AWS SDK 中的 `Amazon.AWSConfigs.ProxyConfig.Password` 屬性對應到 `Amazon.Util.ProxyConfig.Password` 屬性。

port

此代理的連接埠號碼。此屬性從 適用於 .NET 的 AWS SDK 中的 `Amazon.AWSConfigs.ProxyConfig.Port` 屬性對應到 `Amazon.Util.ProxyConfig.Port` 屬性。

使用者名稱

使用代理伺服器進行身分驗證的使用者名稱。此屬性從適用於 .NET 的 AWS SDK 中的 `Amazon.AWSConfigs.ProxyConfig.Username` 屬性對應到 `Amazon.Util.ProxyConfig.Username` 屬性。

`<proxy>` 元素的父系為 `<aws>` 元素。

`<proxy>` 元素不含子元素。

以下為範例使用的 `<proxy>` 元素：

```
<proxy
  host="192.0.2.0"
  port="1234"
  username="My-Username-Here"
  password="My-Password-Here" />
```

s3

`<s3>` 元素代表 Amazon S3 設定的集合。這個元素可以包含 `useSignatureVersion4` 屬性，指定第四版的簽章簽署將用於所有請求 (`true`) 或第四版的簽章簽署將不會用於所有請求 (`false`，預設)。此屬性對應到適用於 .NET 的 AWS SDK 中的 `Amazon.AWSConfigs.S3Config.UseSignatureVersion4` 屬性。

`<s3>` 元素的父系為 `<aws>` 元素。

`<s3>` 元素不含子元素。

以下為範例使用的 `<s3>` 元素：

```
<s3 useSignatureVersion4="true" />
```

使用舊版憑證

本節中的主題提供有關在不使用 AWS IAM Identity Center 的情況下使用長期或短期憑證資訊。

⚠ Warning

為避免安全風險，在開發專用軟體或使用真實資料時，請勿使用 IAM 使用者進行身分驗證。相反地，搭配使用聯合功能和身分提供者，例如 [AWS IAM Identity Center](#)。

📘 Note

本主題中的資訊適用於您需要手動取得及管理短期或長期憑證的情況。有關短期和長期憑證的其他資訊，請參閱 AWS SDK 和工具參考指南中的 [其他驗證方法](#)。

如需最佳實務，請使用 AWS IAM Identity Center，如 中所述 [設定 SDK 身分驗證](#)。

憑證的重要警告和指引

憑證警告

- 請勿使用您帳戶的根登入資料來存取 AWS 資源。這些登入資料可讓未管制的帳戶存取和很難撤銷這些帳戶。
- 請勿在應用程式檔案中放置常值存取金鑰或憑證資訊。如果您不小心這麼做了，則會有暴露您登入資料的風險，例如，當您上傳專案到公有儲存庫時。
- 請勿在您的專案區域中放入包含憑證的檔案。
- 請注意，存放在共用 AWS credentials 檔案中的任何登入資料都會以純文字儲存。

安全管理憑證的其他指引

如需如何安全管理 AWS 登入資料的一般討論，請參閱《》中的 [AWS 安全登入資料](#) [AWS 一般參考](#) 和 [《IAM 使用者指南》](#) 中的 [安全最佳實務和使用案例](#)。除了這些討論之外，請考慮下列事項：

- 建立其他使用者 (例如 IAM Identity Center 中的使用者)，並使用其憑證，而不是使用您的 AWS 根使用者憑證。如有必要，其他使用者的憑證可以被撤銷，或本質上是臨時的。此外，您可以將政策套用至每個使用者，以便僅存取特定資源和動作，從而採取最低權限許可的立場。
- 使用適用於 Amazon Elastic Container Service (Amazon ECS) 任務的 [任務 IAM 角色](#)。
- 使用在 Amazon EC2 執行個體上執行的應用程式的 [IAM 角色](#)。

- 為組織外部使用者可用的應用程式使用[臨時登入](#)資料或環境變數。

主題

- [使用共用 AWS 登入資料檔案](#)
- [使用 SDK 存放區 \(僅限 Windows\)](#)

使用共用 AWS 登入資料檔案

(請務必檢閱[登入資料的重要警告和指引](#)。)

為您的應用程式提供登入資料的一種方法是在共用 AWS 登入資料檔案中建立設定檔，然後將登入資料存放在這些設定檔中。此檔案可供其他 AWS SDKs 使用。它也可以由 [AWS CLI](#)、和適用於 [Visual Studio](#) [AWS Tools for Windows PowerShell](#)、[JetBrains](#) 和 [VS 程式碼](#) AWS 的工具組使用。

Warning

為避免安全風險，在開發專用軟體或使用真實資料時，請勿使用 IAM 使用者進行身分驗證。相反地，搭配使用聯合功能和身分提供者，例如 [AWS IAM Identity Center](#)。

Note

本主題中的資訊適用於您需要手動取得及管理短期或長期憑證的情況。有關短期和長期憑證的其他資訊，請參閱 AWS SDK 和工具參考指南中的[其他驗證方法](#)。
如需最佳實務，請使用 AWS IAM Identity Center，如中所述[設定 SDK 身分驗證](#)。

一般資訊

根據預設，共用的 AWS 登入資料檔案位於主 .aws 目錄中的 目錄中，並命名為 `credentials`；也就是 `~/.aws/credentials` (Linux 或 macOS) 或 `%USERPROFILE%\aws\credentials` (Windows)。如需有關替代位置的資訊，請參閱 [AWS SDKs 和工具參考指南](#) 中的 [共用檔案的位置](#)。另請參閱[在應用程式中存取登入資料和設定檔](#)。

共用的 AWS 登入資料檔案是純文字檔案，並遵循特定格式。如需 AWS 登入資料檔案格式的資訊，請參閱 AWS SDKs 和工具參考指南中的[登入資料檔案格式](#)。

您可以透過多種方式管理共用 AWS 登入資料檔案中的設定檔。

- 使用任何文字編輯器來建立和更新共用的 AWS 登入資料檔案。
- 使用 適用於 .NET 的 AWS SDK API 的 [Amazon.Runtime.CredentialManagement](#) 命名空間，如本主題稍後所示。
- 使用適用於 [Visual Studio](#)、[JetBrains](#) 和 VS Code 的 [AWS Tools for PowerShell](#)和 AWS 工具組命令和程序。 <https://docs.aws.amazon.com/toolkit-for-vscode/latest/userguide/setup-credentials.html>
- 使用 [AWS CLI](#) 命令，例如 `aws configure set aws_access_key_id`和 `aws configure set aws_secret_access_key`。

設定檔管理的範例

下列各節顯示共用 AWS 登入資料檔案中的設定檔範例。部分範例顯示結果，可透過上述任何登入資料管理方法取得。其他範例示範如何使用特定方法。

預設設定檔

共用的 AWS 登入資料檔案幾乎一律會有名為預設值的設定檔。如果未定義其他設定檔，則 會在這裡適用於 .NET 的 AWS SDK 尋找登入資料。

[default] 設定檔通常如下所示。

```
[default]
aws_access_key_id = AKIAIOSFODNN7EXAMPLE
aws_secret_access_key = wJalrXUtnFEMI/K7MDENG/bPxrFiCYEXAMPLEKEY
```

以程式設計方式建立設定檔

此範例說明如何建立設定檔，並以程式設計方式將其儲存至共用的 AWS 登入資料檔案。它使用下列類別的 [Amazon.Runtime.CredentialManagement](#) 命名空間：[CredentialProfileOptions](#)、[CredentialProfile](#) 和 [SharedCredentialsFile](#)。

```
using Amazon.Runtime.CredentialManagement;
...

// Do not include credentials in your code.
WriteProfile("my_new_profile", SecurelyStoredKeyId, SecurelyStoredSecretAccessKey);
...

void WriteProfile(string profileName, string keyId, string secret)
```

```
{
    Console.WriteLine($"Create the [{profileName}] profile...");
    var options = new CredentialProfileOptions
    {
        AccessKey = keyId,
        SecretKey = secret
    };
    var profile = new CredentialProfile(profileName, options);
    var sharedFile = new SharedCredentialsFile();
    sharedFile.RegisterProfile(profile);
}
```

Warning

這類程式碼通常不應在您的應用程式中。如果您將其包含在應用程式中，請採取適當的預防措施，以確保無法在程式碼中、透過網路或甚至電腦記憶體中看到純文字金鑰。

以下是此範例建立的設定檔。

```
[my_new_profile]
aws_access_key_id=AKIAIOSFODNN7EXAMPLE
aws_secret_access_key=wJalrXUtnFEMI/K7MDENG/bPxRfiCYEXAMPLEKEY
```

以程式設計方式更新現有的設定檔

此範例說明如何以程式設計方式更新先前建立的設定檔。它使用下列類別的

[Amazon.Runtime.CredentialManagement](#) 命名空間：[CredentialProfile](#) 和 [SharedCredentialsFile](#)。它也會使用 [Amazon](#) 命名空間的 [RegionEndpoint](#) 類別。

```
using Amazon.Runtime.CredentialManagement;
...

AddRegion("my_new_profile", RegionEndpoint.USWest2);
...

void AddRegion(string profileName, RegionEndpoint region)
{
    var sharedFile = new SharedCredentialsFile();
    CredentialProfile profile;
    if (sharedFile.TryGetProfile(profileName, out profile))
```



```
{
    profile.Region = region;
    sharedFile.RegisterProfile(profile);
}
```

以下是更新的設定檔。

```
[my_new_profile]
aws_access_key_id=AKIAIOSFODNN7EXAMPLE
aws_secret_access_key=wJalrXUtnFEMI/K7MDENG/bPxrFiCYEXAMPLEKEY
region=us-west-2
```

Note

您也可以使用其他方法在其他位置設定 AWS 區域。如需詳細資訊，請參閱[設定 AWS 區域](#)。

使用 SDK 存放區（僅限 Windows）

（請務必檢閱[重要的警告和指導方針](#)。）

在 Windows 上，SDK Store 是另一個為您的適用於 .NET 的 AWS SDK 應用程式建立設定檔和存放加密登入資料的地方。它位於中%USERPROFILE%\AppData\Local\AWSToolkit\RegisteredAccounts.json。您可以在開發期間使用 SDK Store 做為[共用 AWS 登入資料檔案](#)的替代方案。

Warning

為避免安全風險，在開發專用軟體或使用真實資料時，請勿使用 IAM 使用者進行身分驗證。相反地，搭配使用聯合功能和身分提供者，例如 [AWS IAM Identity Center](#)。

Note

本主題中的資訊適用於您需要手動取得及管理短期或長期憑證的情況。有關短期和長期憑證的其他資訊，請參閱 AWS SDK 和工具參考指南中的[其他驗證方法](#)。

如需最佳實務，請使用 AWS IAM Identity Center，如中所述[設定 SDK 身分驗證](#)。

一般資訊

開發套件存放區提供下列優點：

- 軟體開發套件存放區中的登入資料會加密，而軟體開發套件存放區位於使用者的主目錄中。此可限制意外暴露您的登入資料的風險。
- 軟體開發套件存放區也提供登入資料給 [AWS Tools for Windows PowerShell](#)和 [AWS Toolkit for Visual Studio](#)。

軟體開發套件存放區設定檔是特定主機上特定使用者特有的。您無法複製它們給其他的主機或其他的使用者。這表示您無法為其他主機或開發人員機器重複使用開發機器上的 SDK Store 設定檔。這也表示您無法在生產應用程式中使用 SDK Store 設定檔。

您可以透過下列方式管理 SDK Store 中的設定檔：

- 使用 中的圖形使用者介面 (GUI)[AWS Toolkit for Visual Studio](#)。
- 使用 適用於 .NET 的 AWS SDK API 的 [Amazon.Runtime.CredentialManagement](#) 命名空間，如本主題稍後所示。
- 使用來自 的命令[AWS Tools for Windows PowerShell](#)，例如 Set-AWSCredential和 Remove-AWSCredentialProfile。

設定檔管理的範例

下列範例示範如何在 SDK Store 中以程式設計方式建立和更新設定檔。

以程式設計方式建立設定檔

此範例說明如何建立設定檔，並以程式設計方式將其儲存至 SDK 存放區。它使用下列類別的 [Amazon.Runtime.CredentialManagement](#) 命名空間：[CredentialProfileOptions](#)、[CredentialProfile](#) 和 [NetSDKCredentialsFile](#)。

```
using Amazon.Runtime.CredentialManagement;
...

// Do not include credentials in your code.
WriteProfile("my_new_profile", SecurelyStoredKeyId, SecurelyStoredSecretAccessKey);
...

void WriteProfile(string profileName, string keyId, string secret)
```

```
{
    Console.WriteLine($"Create the [{profileName}] profile...");
    var options = new CredentialProfileOptions
    {
        AccessKey = keyId,
        SecretKey = secret
    };
    var profile = new CredentialProfile(profileName, options);
    var netSdkStore = new NetSDKCredentialsFile();
    netSdkStore.RegisterProfile(profile);
}
```

Warning

這類程式碼通常不應在您的應用程式中。如果您的應用程式包含 `keyId` 和 `secret`，請採取適當的預防措施，以確保無法在程式碼中、透過網路或甚至電腦記憶體中看到純文字金鑰。

以下是此範例建立的設定檔。

```
"[generated GUID]" : {
    "AWSAccessKey" : "01000000D08...[etc., encrypted access key ID]",
    "AWSSecretKey" : "01000000D08...[etc., encrypted secret access key]",
    "ProfileType" : "AWS",
    "DisplayName" : "my_new_profile",
}
```

以程式設計方式更新現有的設定檔

此範例說明如何以程式設計方式更新先前建立的設定檔。它使用下列類別的

[Amazon.Runtime.CredentialManagement](#) 命名空間：[CredentialProfile](#) 和 [NetSDKCredentialsFile](#)。它也會使用 [Amazon](#) 命名空間的 [RegionEndpoint](#) 類別。

```
using Amazon.Runtime.CredentialManagement;
...

AddRegion("my_new_profile", RegionEndpoint.USWest2);
...

void AddRegion(string profileName, RegionEndpoint region)
{
```

```
var netSdkStore = new NetSDKCredentialsFile();
CredentialProfile profile;
if (netSdkStore.TryGetProfile(profileName, out profile))
{
    profile.Region = region;
    netSdkStore.RegisterProfile(profile);
}
```

以下是更新的設定檔。

```
"[generated GUID]" : {
  "AWSAccessKey" : "01000000D08...[etc., encrypted access key ID]",
  "AWSSecretKey" : "01000000D08...[etc., encrypted secret access key]",
  "ProfileType" : "AWS",
  "DisplayName" : "my_new_profile",
  "Region" : "us-west-2"
}
```

Note

您也可以使用其他方法在其他位置設定 AWS 區域。如需詳細資訊，請參閱[設定 AWS 區域](#)。

的功能 適用於 .NET 的 AWS SDK

本節提供有關建立應用程式時 適用於 .NET 的 AWS SDK 可能需要考慮的 功能的資訊。

請確定您已先[設定專案](#)。

如需為特定 AWS 服務開發軟體以及程式碼範例的資訊，請參閱 [使用 AWS 服務](#)。如需其他程式碼範例，請參閱 [適用於 .NET 的 SDK 程式碼範例](#)。

主題

- [AWS 適用於 .NET 的非同步 APIs](#)
- [重試和逾時](#)
- [分頁程式](#)
- [可觀測性](#)
- [其他工具](#)

AWS 適用於 .NET 的非同步 APIs

適用於 .NET 的 AWS SDK 使用任務型非同步模式 (TAP) 進行非同步實作。若要進一步了解 TAP，請參閱 <https://docs.microsoft.com> 上的[任務型非同步模式 \(TAP\)](#)。

本主題概述如何在呼叫 AWS 服務用戶端時使用 TAP。

適用於 .NET 的 AWS SDK API 中的非同步方法是根據 Task 類別或 Task<TResult>類別的操作。如需這些類別的相關資訊，請參閱 [docs.microsoft.com : <https://docs.microsoft.com/learn.microsoft.com/en-us/dotnet/api/system.threading.tasks.taskTResult>](https://docs.microsoft.com/learn.microsoft.com/en-us/dotnet/api/system.threading.tasks.taskTResult)。

當您的程式碼中呼叫這些 API 方法時，它們必須在使用 async 關鍵字宣告的函數內呼叫，如下列範例所示。

```
static async Task Main(string[] args)
{
    ...
    // Call the function that contains the asynchronous API method.
    // Could also call the asynchronous API method directly from Main
    // because Main is declared async
    var response = await ListBucketsAsync();
    Console.WriteLine($"Number of buckets: {response.Buckets.Count}");
    ...
}
```

```
}

// Async method to get a list of Amazon S3 buckets.
private static async Task<ListBucketsResponse> ListBucketsAsync()
{
    ...
    var response = await s3Client.ListBucketsAsync();
    return response;
}
```

如上述程式碼片段所示，`async`宣告的偏好範圍是 `Main` 函數。設定此 `async` 範圍可確保對 AWS 服務用戶端的所有呼叫都必須是非同步的。如果您因為某些原因而無法宣告 `Main` 為非同步，您可以在 以外的函數上使用 `async` 關鍵字，`Main` 然後從該處呼叫 API 方法，如下列範例所示。

```
static void Main(string[] args)
{
    ...
    Task<ListBucketsResponse> response = ListBucketsAsync();
    Console.WriteLine($"Number of buckets: {response.Result.Buckets.Count}");
    ...
}

// Async method to get a list of Amazon S3 buckets.
private static async Task<ListBucketsResponse> ListBucketsAsync()
{
    ...
    var response = await s3Client.ListBucketsAsync();
    return response;
}
```

請注意，當您使用此模式 `Main` 時，中需要的特殊 `Task<>` 語法。此外，您必須使用回應 **Result** 的成員來取得資料。

您可以在 [快速導覽](#) 區段 ([簡單的跨平台應用程式](#) 和 [簡單的 Windows 型應用程式](#)) 和 中查看非同步呼叫 AWS 服務用戶端的完整範例 [含指引的程式碼範例](#)。

重試和逾時

適用於 .NET 的 AWS SDK 可讓您設定對 AWS 服務的 HTTP 請求的重試次數和逾時值。如果重試和逾時的預設不適用於您的應用程式，您可以將它們兩者適時調整以配合您的需求，但請務必了解如此一來對應用程式產生的影響程度。

若要判斷哪些值用於重試和逾時，請考慮以下資訊：

- 當網路連線降級或 AWS 服務無法連線時，適用於 .NET 的 AWS SDK 和您的應用程式應如何回應？您是否希望快速呼叫失敗，還是應該呼叫保持重試？
- 您的應用程式是使用者接觸應用程式，或是必須要有所回應的網站，或者是對延長的延遲時間具有更高容忍力的背景執行工作？
- 應用程式是部署在低延遲的可靠網路上，還是部署在連線不可靠的遠端位置？

重試

概觀

適用於 .NET 的 AWS SDK 可以重試因伺服器端限流或連線中斷而失敗的請求。服務組態類別有兩個屬性，可用來指定服務用戶端的重試行為。服務組態類別會從 [適用於 .NET 的 AWS SDK API 參考](#) 的抽象 [Amazon.Runtime.ClientConfig](#) 類別繼承這些屬性：

- `RetryMode` 指定三種重試模式之一，這些模式在 [Amazon.Runtime.RequestRetryMode](#) 列舉中定義。

您可以使用 `AWS_RETRY_MODE` 環境變數或共用組態檔案中的 `retry_mode` AWS 設定來控制應用程式的預設值。

- `MaxErrorRetry` 指定服務用戶端層級允許的重試次數；軟體開發套件會在失敗和擲回例外狀況之前，以指定的次數重試操作。

您可以使用 `AWS_MAX_ATTEMPTS` 環境變數或共用組態檔案中的 `max_attempts` AWS 設定來控制應用程式的預設值。

您可以在 [適用於 .NET 的 AWS SDK API 參考](#) 的摘要 [Amazon.Runtime.ClientConfig](#) 類別中找到這些屬性的詳細說明。根據預設，的每個值都會 `RetryMode` 對應至 的特定值 `MaxErrorRetry`，如下表所示。

RetryMode	Corresponding MaxErrorRetry (Amazon DynamoDB)	Corresponding MaxErrorRetry (all others)
Legacy	10	4

RetryMode	Corresponding MaxErrorRetry (Amazon DynamoDB)	Corresponding MaxErrorRetry (all others)
Standard	10	2
Adaptive (experimental)	10	2

Behavior (行為)

您的應用程式啟動時

當您的應用程式啟動時，軟體開發套件MaxErrorRetry會設定 RetryMode和 的預設值。除非您指定其他值，否則建立服務用戶端時會使用這些預設值。

- 如果您的環境中未設定屬性，則 的預設值RetryMode會設定為 Legacy，而 的預設值MaxErrorRetry會設定為上表中的對應值。
- 如果您的環境中已設定重試模式，則該值會用作 的預設值RetryMode。除非已在您的環境中設定最大錯誤的值（接下來說明），否則 的預設值MaxErrorRetry會使用上表中的對應值進行設定。
- 如果您的環境中已設定最大錯誤的值，則該值會用作 的預設值MaxErrorRetry。Amazon DynamoDB 是此規則的例外狀況； 的預設 DynamoDB 值一律MaxErrorRetry是上表中的值。

當您的應用程式執行時

建立服務用戶端時，您可以使用 RetryMode和 的預設值MaxErrorRetry，如先前所述，也可以指定其他值。若要指定其他值，請在建立服務用戶端時建立並包含服務組態物件，例如 [AmazonDynamoDBConfig](#) 或 [AmazonSQSConfig](#)。

建立服務用戶端之後，就無法變更這些值。

考量

重試時，請求的延遲會增加。您應該設定您的重試，依據您的應用程式限制總請求延遲和錯誤率而設定。

逾時

適用於 .NET 的 AWS SDK 可讓您在服務用戶端層級和每個方法呼叫設定請求逾時。設定逾時有兩種機制，涵蓋於後續章節：

- 如果您使用的是[非同步呼叫](#)，則可以使用 方法的 `CancellationToken` 參數。
- 如果您在 [.NET Framework 中使用同步呼叫](#)，則可以使用抽象 [Amazon.Runtime.ClientConfig](#) 類別的 `Timeout`和 `ReadWriteTimeout` 屬性。

針對逾時使用 `CancellationToken` 參數

適用於 .NET 的 AWS SDK 可讓您使用 `CancellationToken` 參數設定非同步呼叫的請求逾時。下列程式碼片段顯示範例。`System.Threading.Tasks.TaskCanceledException` 如果未在 10 秒內完成請求，程式碼會擲回。

```
string bucketName = "amzn-s3-demo-bucket";
string path = "pathToBucket";
using (var amazonS3Client = new AmazonS3Client(new AmazonS3Config()))
{
    // Cancel request after 10 seconds
    CancellationTokenSource cancellationTokenSource = new
    CancellationTokenSource(TimeSpan.FromMilliseconds(10000));
    CancellationToken cancellationToken = cancellationTokenSource.Token;
    ListObjectsV2Request listRequestV2 = new()
    {
        BucketName = bucketName,
        Prefix = path,
    };

    ListObjectsV2Response listResponseV2 = await
    amazonS3Client.ListObjectsV2Async(listRequestV2, cancellationToken);
}
```

將 `Timeout`和 `ReadWriteTimeout` 屬性用於逾時

Note

`Timeout` 屬性不會影響非同步呼叫。如果您使用的是非同步呼叫，請[針對逾時使用 `CancellationToken` 參數](#)改為參閱。

適用於 .NET 的 AWS SDK 可讓您在服務用戶端層級設定請求逾時和通訊端讀取/寫入逾時值。這些值是在抽象 [Amazon.Runtime.ClientConfig](#) 類別的 `Timeout`和 `ReadWriteTimeout` 屬性中指定。這些值會做為 AWS 服務用戶端物件所建立 [HttpWebRequest](#) 物件的 `Timeout`和 `ReadWriteTimeout` 屬性傳遞。在預設情況下，`Timeout` 值為 100 秒，`ReadWriteTimeout` 值為 300 秒。

當您的網路有高延遲或存在會造成操作重試的條件，使用長逾時值和次數高的重試，會導致某些開發套件的操作看起來沒有回應。

Note

以可攜式類別程式庫 (PCL) 適用於 .NET 的 AWS SDK 為目標的版本使用 [HttpClient](#) 類別而非 [HttpWebRequest](#) 類別，並且僅支援[逾時](#)屬性。

以下為例外狀況的預設逾時值。這些值時在您明確設定逾時值時會被覆寫。

- Timeout 如果呼叫的方法上傳串流，例如 [AmazonS3Client.PutObjectAsync\(\)](#)、[AmazonS3Client.UploadPartAsync\(\)](#)、[AmazonGlacierClient.UploadA](#) 等，則和 [ReadWriteTimeout](#) 會設定為最大值。
- 適用於 .NET 的 AWS SDK 目標為 .NET Framework 設定的版本 [ReadWriteTimeout](#)，[Timeout](#) 以及所有 [AmazonS3Client](#) 和 [AmazonGlacierClient](#) 物件的最大值。
- 適用於 .NET 的 AWS SDK 將可攜式類別程式庫 (PCL) 和 .NET Core 設為所有 [AmazonS3Client](#) 和 [AmazonGlacierClient](#) 物件 [Timeout](#) 最大值的版本。

下列範例說明如何指定標準重試模式、最多 3 次重試、逾時 10 秒，以及讀取/寫入逾時 10 秒（如適用）。[AmazonS3Client](#) 建構函數會獲得 [AmazonS3Config](#) 物件。

```
var s3Client = new AmazonS3Client(  
    new AmazonS3Config  
    {  
        Timeout = TimeSpan.FromSeconds(10),  
        // NOTE: The following property is obsolete for  
        // versions of the AWS SDK for .NET that target .NET Core.  
        ReadWriteTimeout = TimeSpan.FromSeconds(10),  
        RetryMode = RequestRetryMode.Standard,  
        MaxErrorRetry = 3  
    });
```

分頁程式

有些 AWS 服務會收集和存放大量資料，您可以使用的 API 呼叫來擷取這些資料適用於 .NET 的 AWS SDK。如果您想要擷取的資料量對於單一 API 呼叫變得太大，您可以透過使用分頁將結果分成更易於管理的部分。

為了讓您能夠執行分頁，軟體開發套件中許多服務用戶端的請求和回應物件會提供接續字符（通常名為 `NextToken`）。其中一些服務用戶端也提供分頁程式。

分頁程式可讓您避免接續字符的額外負荷，這可能涉及迴圈、狀態變數、多個 API 呼叫等。當您使用分頁程式時，您可以透過迴圈 `foreach` 的宣告單行程式碼從 AWS 服務擷取資料。如果需要多個 API 呼叫來擷取資料，分頁器會為您處理。

在哪裡可以找到分頁程式？

並非所有服務都提供分頁程式。判斷服務是否為特定 API 提供分頁器的一種方法是查看 [適用於 .NET 的 AWS SDK API 參考](#) 中服務用戶端類別的定義。

例如，如果您檢查 [AmazonCloudWatchLogsClient](#) 類別的定義，您會看到 `PaginateLogs` 屬性。這是為 Amazon CloudWatch Logs 提供分頁器的屬性。

分頁程式提供什麼？

分頁程式包含可讓您查看完整回應的屬性。它們通常也包含一或多個屬性，可讓您存取最有趣的回應部分，我們將呼叫關鍵結果。

例如，在先前 `AmazonCloudWatchLogsClient` 提到的中，`Paginator` 物件包含具有 API 呼叫中完整 [DescribeLogGroupsResponse](#) 物件的 `Responses` 屬性。此 `Responses` 屬性包含日誌群組的集合。

`Paginator` 物件也包含一個名為 `LogGroups` 的金鑰結果。此屬性只會保留回應的日誌群組部分。擁有此金鑰結果可讓您在許多情況下減少和簡化程式碼。

同步與非同步分頁

分頁程式提供同步和非同步的分頁機制。同步分頁可在 .NET Framework 4.7.2（或更新版本）專案中使用。 .NET Core 專案（.NET Core 3.1、.NET 5 等）提供非同步分頁。

由於建議使用非同步操作和 .NET Core，接下來的範例會顯示非同步分頁。有關如何使用同步分頁和 .NET Framework 4.7.2（或更新版本）執行相同任務的資訊會顯示在 中的範例之後。 [分頁程式的其他考量事項](#)

範例

下列範例示範如何使用 適用於 .NET 的 AWS SDK 來顯示日誌群組的清單。反之，此範例示範如何使用和不使用分頁程式來執行此操作。在查看稍後顯示的完整程式碼之前，請考慮下列程式碼片段。

在沒有分頁器的情況下取得 CloudWatch 日誌群組

```
// Loop as many times as needed to get all the log groups
var request = new DescribeLogGroupsRequest{Limit = LogGroupLimit};
do
{
    Console.WriteLine($"Getting up to {LogGroupLimit} log groups...");
    var response = await cwClient.DescribeLogGroupsAsync(request);
    foreach(var logGroup in response.LogGroups)
    {
        Console.WriteLine($"{logGroup.LogGroupName}");
    }
    request.NextToken = response.NextToken;
} while(!string.IsNullOrEmpty(request.NextToken));
```

使用分頁器取得 CloudWatch 日誌群組

```
// No need to loop to get all the log groups--the SDK does it for us behind the
scenes
var paginatorForLogGroups =
    cwClient.Paginators.DescribeLogGroups(new DescribeLogGroupsRequest());
await foreach(var logGroup in paginatorForLogGroups.LogGroups)
{
    Console.WriteLine(logGroup.LogGroupName);
}
```

這兩個程式碼片段的結果完全相同，因此使用分頁器的優勢可以清楚地看到。

Note

在您嘗試建置並執行完整程式碼之前，請確定您已[設定環境和專案](#)。
您可能還需要 [Microsoft.Bcl.AsyncInterfaces](#) NuGet 套件，因為非同步分頁程式使用 `IAsyncEnumerable` 介面。

完成程式碼

本節顯示此範例的相關參考和完整程式碼。

開發套件參考

NuGet 套件：

- [AWSSDK.CloudWatch](#)

程式設計元素：

- 命名空間 [Amazon.CloudWatch](#)
[AmazonCloudWatchLogsClient](#) 類別
- 命名空間 [Amazon.CloudWatchLogs.Model](#)
類別 [DescribeLogGroupsRequest](#)
類別 [DescribeLogGroupsResponse](#)
類別 [LogGroup](#)

完整程式碼

```
using System;
using System.Threading.Tasks;
using Amazon.CloudWatchLogs;
using Amazon.CloudWatchLogs.Model;

namespace CWGetLogGroups
{
    class Program
    {
        // A small limit for demonstration purposes
        private const int LogGroupLimit = 3;

        //
        // Main method
        static async Task Main(string[] args)
        {
            var cwClient = new AmazonCloudWatchLogsClient();
```

```

        await DisplayLogGroupsWithoutPaginators(cwClient);
        await DisplayLogGroupsWithPaginators(cwClient);
    }

    //
    // Method to get CloudWatch log groups without paginators
    private static async Task DisplayLogGroupsWithoutPaginators(IAmazonCloudWatchLogs
cwClient)
    {
        Console.WriteLine("\nGetting list of CloudWatch log groups without using
paginators...");

        Console.WriteLine("-----");

        // Loop as many times as needed to get all the log groups
        var request = new DescribeLogGroupsRequest{Limit = LogGroupLimit};
        do
        {
            Console.WriteLine($"Getting up to {LogGroupLimit} log groups...");
            DescribeLogGroupsResponse response = await
cwClient.DescribeLogGroupsAsync(request);
            foreach(LogGroup logGroup in response.LogGroups)
            {
                Console.WriteLine($"{logGroup.LogGroupName}");
            }
            request.NextToken = response.NextToken;
        } while(!string.IsNullOrEmpty(request.NextToken));
    }

    //
    // Method to get CloudWatch log groups by using paginators
    private static async Task DisplayLogGroupsWithPaginators(IAmazonCloudWatchLogs
cwClient)
    {
        Console.WriteLine("\nGetting list of CloudWatch log groups by using
paginators...");

        Console.WriteLine("-----");

        // Access the key results; i.e., the log groups
        // No need to loop to get all the log groups--the SDK does it for us behind the
scenes

```

```

    Console.WriteLine("\nFrom the key results...");
    Console.WriteLine("-----");
    IDescribeLogGroupsPaginator paginatorForLogGroups =
        cwClient.Paginators.DescribeLogGroups(new DescribeLogGroupsRequest());
    await foreach(LogGroup logGroup in paginatorForLogGroups.LogGroups)
    {
        Console.WriteLine(logGroup.LogGroupName);
    }

    // Access the full response
    // Create a new paginator, do NOT reuse the one from above
    Console.WriteLine("\nFrom the full response...");
    Console.WriteLine("-----");
    IDescribeLogGroupsPaginator paginatorForResponses =
        cwClient.Paginators.DescribeLogGroups(new DescribeLogGroupsRequest());
    await foreach(DescribeLogGroupsResponse response in
paginatorForResponses.Responses)
    {
        Console.WriteLine($"Content length: {response.ContentLength}");
        Console.WriteLine($"HTTP result: {response.HttpStatusCode}");
        Console.WriteLine($"Metadata: {response.ResponseMetadata}");
        Console.WriteLine("Log groups:");
        foreach(LogGroup logGroup in response.LogGroups)
        {
            Console.WriteLine($"\\t{logGroup.LogGroupName}");
        }
    }
}
}
}
}

```

分頁程式的其他考量事項

- 分頁程式無法多次使用

如果您需要程式碼中多個位置的特定 AWS 分頁器結果，則不得多次使用分頁器物件。反之，請在每次需要時建立新的分頁器。此概念顯示在 `DisplayLogGroupsWithPaginators` 方法中的上述範例程式碼中。

- 同步分頁

同步分頁適用於 .NET Framework 4.7.2（或更新版本）專案。

⚠ Warning

自 2024 年 8 月 15 日起，適用於 .NET 的 AWS SDK 將終止對 .NET Framework 3.5 的支援，並將最低 .NET Framework 版本變更為 4.7.2。如需詳細資訊，請參閱部落格文章 [.NET Framework 3.5 和 4.5 目標的重要變更 適用於 .NET 的 AWS SDK](#)。

若要查看，請建立 .NET Framework 4.7.2（或更新版本）專案，並將上述程式碼複製到其中。然後，只需從兩個foreach分頁器呼叫中移除await關鍵字，如下列範例所示。

```
/*await*/ foreach(var logGroup in paginatorForLogGroups.LogGroups)
{
    Console.WriteLine(logGroup.LogGroupName);
}
```

建置並執行專案，以查看與非同步分頁相同的結果。

可觀測性

可觀測性是從系統發出的資料推斷系統目前狀態的程度。發出的資料通常稱為遙測。

適用於 .NET 的 AWS SDK 可以提供兩種常見的遙測訊號、指標和追蹤以及記錄。您可以連接 [TelemetryProvider](#)，將遙測資料傳送至可觀測性後端（例如 [AWS X-Ray](#) 或 [Amazon CloudWatch](#)），然後對其採取行動。

根據預設，軟體開發套件中會停用遙測訊號。本主題說明如何啟用和設定遙測輸出。

其他資源

如需啟用和使用可觀測性的詳細資訊，請參閱下列資源：

- [OpenTelemetry](#)
- 部落格文章 [適用於 .NET 的 AWS SDK 使用 OpenTelemetry 在中增強可觀測性](#)。
- 部落格文章 [宣布 AWS .NET OpenTelemetry 程式庫的一般可用性](#)。
- [OpenTelemetry 的匯出工具](#)
- 如需 中可觀測性的範例 AWS Tools for PowerShell，請參閱《[Tools for PowerShell 使用者指南](#)》中的 [可觀測性](#)。

設定 TelemetryProvider

您可以針對所有服務用戶端或個別用戶端 TelemetryProvider，在應用程式中全域設定，如下列範例所示。[the section called “遙測供應商”](#) 本節包含遙測實作的相關資訊，包括 SDK 隨附的實作相關資訊。

設定預設全域遙測供應商

根據預設，每個服務用戶端都會嘗試使用全球可用的遙測提供者。如此一來，您可以設定一次提供者，所有用戶端都會使用它。在您建立任何服務用戶端之前，這應該只完成一次。

下列程式碼片段說明如何設定全域遙測供應商。然後，它會建立 Amazon S3 服務用戶端，並嘗試執行失敗的操作。程式碼會將追蹤和指標同時新增至應用程式。此程式碼使用以下 NuGet 套件：OpenTelemetry.Exporter.Console 和 OpenTelemetry.Instrumentation.AWS。

Note

如果您使用 AWS IAM Identity Center 進行身分驗證，請務必同時新增 AWSSDK.SSO 和 AWSSDK.SSO0IDC。

```
using Amazon.S3;
using OpenTelemetry;
using OpenTelemetry.Metrics;
using OpenTelemetry.Resources;
using OpenTelemetry.Trace;

Sdk.CreateTracerProviderBuilder()
    .ConfigureResource(e => e.AddService("Demo0tel"))
    .AddAWSInstrumentation()
    .AddConsoleExporter()
    .Build();

Sdk.CreateMeterProviderBuilder()
    .ConfigureResource(e => e.AddService("Demo0tel"))
    .AddAWSInstrumentation()
    .AddConsoleExporter()
    .Build();

var s3Client = new AmazonS3Client();
```

```
try
{
    var listBucketsResponse = await s3Client.ListBucketsAsync();
    // Attempt to delete a bucket that doesn't exist.
    var deleteBucketResponse = await s3Client.DeleteBucketAsync("amzn-s3-demo-bucket");
}
catch (Exception ex)
{
    Console.WriteLine(ex.Message);
}

Console.Read();
```

為特定服務用戶端設定遙測供應商

您可以使用特定的遙測提供者（全域提供者除外）來設定個別服務用戶端。若要這樣做，請使用服務用戶端建構函數的 Config 物件 `TelemetryProvider` 類別。例如，請參閱 [AmazonS3Config](#) 並尋找 `TelemetryProvider` 屬性。如需自訂遙測實作的相關資訊 [the section called “遙測供應商”](#)，請參閱。

主題

- [指標](#)
- [遙測供應商](#)

指標

下表列出 SDK 發出的遙測指標。 [設定遙測提供者](#)，讓指標可被觀察。

發出哪些指標？

指標名稱	單位	Type	Attributes	描述
client.call.duration	s	直方圖	rpc.service、rpc.method	整體通話持續時間（包括傳送或接收請求和回應內文的重試次數和時間）
client.uptime	s	直方圖	rpc.service	自建立用戶端以來的時間
client.call.attempts	{attempt}	Monoton Counter	rpc.service、rpc.method	個別操作的嘗試次數

指標名稱	單位	Type	Attributes	描述
client.call.errors	{error}	Monoton Counter	rpc.service、rpc.method、exception.type	操作的錯誤數目
client.call.attempt_duration	s	直方圖	rpc.service、rpc.method	連線到服務、傳送請求，以及取回 HTTP 狀態碼和標頭所需的時間（包括排入佇列等待傳送的時間）
client.call.resolve_endpoint_duration	s	直方圖	rpc.service、rpc.method	解析請求的端點（端點解析程式，而非 DNS）所需的時間
client.call.serialization_duration	s	直方圖	rpc.service、rpc.method	序列化訊息內文所需的時間
client.call.deserialization_duration	s	直方圖	rpc.service、rpc.method	還原序列化訊息內文所需的時間
client.call.auth.signing_duration	s	直方圖	rpc.service、rpc.method	簽署請求所需的時間
client.call.auth.resolve_identity_duration	s	直方圖	rpc.service、rpc.method	從身分提供者取得身分（例如 AWS 憑證或承載字符）所需的時間
client.http.bytes_sent	根據	Monoton Counter	server.address	HTTP 用戶端傳送的位元組總數
client.http.bytes_received	根據	Monoton Counter	server.address	HTTP 用戶端收到的位元組總數

以下是欄描述：

- 指標名稱 – 發出的指標名稱。

- 單位 – 指標的度量單位。單位以區分<https://unitsofmeasure.org/ucum>大小寫 ("c/s") 表示法表示。
- 類型 – 用來擷取指標的 檢測類型。
- 屬性 – 指標發出一組屬性（維度）。
- 描述 – 指標測量內容的描述。

遙測供應商

開發套件提供 [OpenTelemetry](#) 做為遙測提供者的實作，[下一節](#)將說明。

如果您有特定的遙測需求、已考慮遙測解決方案，或需要精細控制遙測資料的擷取和處理方式，您也可以實作自己的遙測供應商。

向 [TelemetryProvider](#) 類別註冊您自己的實作。以下是如何註冊您自己的 `TracerProvider`和 的簡單範例`MeterProvider`。

```
using Amazon;
using Amazon.Runtime.Telemetry;
using Amazon.Runtime.Telemetry.Metrics;
using Amazon.Runtime.Telemetry.Tracing;

public class CustomTracerProvider : TracerProvider
{
    // Implement custom tracing logic here
}

public class CustomMeterProvider : MeterProvider
{
    // Implement custom metrics logic here
}

// Register custom implementations
AWSConfigs.TelemetryProvider.RegisterTracerProvider(new CustomTracerProvider());
AWSConfigs.TelemetryProvider.RegisterMeterProvider(new CustomMeterProvider());
```

主題

- [設定 OpenTelemetry 型遙測供應商](#)

設定 OpenTelemetry 型遙測供應商

適用於 .NET 的 AWS SDK 包含 OpenTelemetry 型遙測供應商的實作。如需如何將此提供者設定為全域遙測提供者的詳細資訊，請參閱 [設定 TelemetryProvider](#)。若要使用此遙測提供者，您需要專案中的下列資源：

- [OpenTelemetry.Instrumentation.AWS](#) NuGet 套件。
- 遙測匯出工具，例如 OTLP 或 主控台。如需詳細資訊，請參閱 OpenTelemetry 文件中的 [匯出工具](#)。

開發套件隨附的 OpenTelemetry 實作可設定為減少 HTTPS 請求、登入資料和壓縮的追蹤量。若要這樣做，請將 SuppressDownstreamInstrumentation 選項設定為 true，如下所示：

```
Sdk.CreateTracerProviderBuilder()  
    .ConfigureResource(e => e.AddService("DemoOtel"))  
    .AddAWSInstrumentation(options => options.SuppressDownstreamInstrumentation = true)  
    .AddConsoleExporter()  
    .Build();
```

如需此提供者的其他資訊，請參閱 中的部落格文章 [適用於 .NET 的 AWS SDK 使用 OpenTelemetry 增強可觀測性](#)。

其他工具

以下是一些額外的工具，您可以用來簡化開發、部署和維護 .NET 應用程式的工作。

AWS 部署工具

在開發機器上開發雲端原生 .NET Core 應用程式之後，您可以使用適用於 .NET CLI 的 AWS 部署工具，更輕鬆地將應用程式部署到 AWS。

如需詳細資訊，請參閱 [將應用程式部署到 AWS](#)。

AWS 適用於 .NET 的訊息處理架構

如果您使用的是 Amazon SQS、Amazon SNS 或 Amazon EventBridge 等服務，您可以利用適用於 .NET AWS 的訊息處理架構。如需詳細資訊，請參閱 [AWS 適用於 .NET 的訊息處理架構](#)。

與 .NET Acover 整合

您可以利用與 .NET Aspire 整合的優勢來改善內部開發迴圈。如需詳細資訊，請參閱[在 中 AWS 與 .NET ACache 整合 適用於 .NET 的 AWS SDK](#)。

使用 進行進階身分驗證和授權 適用於 .NET 的 AWS SDK

本節中的主題提供有關 適用於 .NET 的 AWS SDK 應用程式中身分驗證和授權的進階技術資訊。

主題

- [使用的單一登入 適用於 .NET 的 AWS SDK](#)

使用的單一登入 適用於 .NET 的 AWS SDK

AWS IAM Identity Center 是一種雲端型單一登入 (SSO) 服務，可讓您輕鬆集中管理對所有 AWS 帳戶和雲端應用程式的 SSO 存取。如需完整詳細資訊，請參閱 [IAM Identity Center 使用者指南](#)。

如果您不熟悉 SDK 與 IAM Identity Center 的互動方式，請參閱下列資訊。

高階互動模式

在高階，SDKs 會以類似下列模式的方式與 IAM Identity Center 互動：

1. 通常透過 IAM Identity Center [主控台設定 IAM Identity Center](#)，並邀請 SSO 使用者參與。
2. 使用者電腦上的共用 AWS config 檔案會更新為 SSO 資訊。
3. 使用者透過 IAM Identity Center 登入，並取得已為其設定的 AWS Identity and Access Management (IAM) 許可的短期憑證。此登入可以透過非 SDK 工具啟動，例如 AWS CLI，或透過 .NET 應用程式以程式設計方式啟動。
4. 使用者繼續執行其工作。當他們執行其他使用 SSO 的應用程式時，不需要再次登入即可開啟應用程式。

本主題的其餘部分提供設定和使用的參考資訊 AWS IAM Identity Center。它提供補充和比 中基本 SSO 設定更進階的資訊 [設定 SDK 身分驗證](#)。如果您是 SSO on 的新手 AWS，建議您先查看該主題以取得基本資訊，然後在下列教學課程中查看 SSO 實際運作：

- [教學課程：僅限 .NET 應用程式](#)
- [教學課程：AWS CLI 和 .NET 應用程式](#)

本主題包含下列章節：

- [先決條件](#)

- [設定 SSO 設定檔](#)
- [產生和使用 SSO 權杖](#)
- [其他資源](#)
- [教學課程](#)

先決條件

使用 IAM Identity Center 之前，您必須執行特定任務，例如選擇身分來源和設定相關 AWS 帳戶 和 應用程式。如需其他資訊，請參閱以下內容：

- 如需這些任務的一般資訊，請參閱《IAM Identity Center 使用者指南》中的[入門](#)。
- 如需特定任務範例，請參閱本主題結尾的教學課程清單。不過，請務必先檢閱本主題中的資訊，再嘗試教學課程。

設定 SSO 設定檔

在相關中[設定](#) IAM Identity Center 之後 AWS 帳戶，必須將 SSO 的具名設定檔新增至使用者的共用 AWS config 檔案。此設定檔用於連線至[AWS 存取入口網站](#)，這會針對已為使用者設定的 IAM 許可傳回短期憑證。

共用 config 檔案通常 %USERPROFILE%\aws\config 在 Windows 和 Linux 和 macOS ~/.aws/config 中命名。您可以使用您偏好的文字編輯器來新增 SSO 的新設定檔。或者，您可以使用 `aws configure sso` 命令。如需此命令的詳細資訊，請參閱 AWS Command Line Interface 《使用者指南》中的[設定 AWS CLI 以使用 IAM Identity Center](#)。

新的設定檔類以下列內容：

```
[profile my-sso-profile]
sso_start_url = https://my-sso-portal.awsapps.com/start
sso_region = us-west-2
sso_account_id = 123456789012
sso_role_name = SSORedOnlyRole
```

新設定檔的設定定義如下。前兩個設定定義 AWS 存取入口網站。其他兩個設定是一對組合，可定義已為使用者設定的許可。需要這四個設定。

sso_start_url

指向組織[AWS 存取入口網站](#)的 URL。若要尋找此值，請開啟 [IAM Identity Center 主控台](#)，選擇設定，然後尋找入口網站 URL。

sso_region

AWS 區域 包含存取入口網站主機的 。這是在您啟用 IAM Identity Center 時選取的區域。它可以不同於您用於其他任務的區域。

如需 AWS 區域 及其代碼的完整清單，請參閱《》中的[區域端點](#)Amazon Web Services 一般參考。

sso_account_id

透過 AWS Organizations 服務 AWS 帳戶 新增的 ID。若要查看可用帳戶的清單，請前往 [IAM Identity Center 主控台](#)並開啟AWS 帳戶頁面。您為此設定選擇的帳戶 ID 將對應至您計劃提供給sso_role_name設定的值，如下所示。

sso_role_name

IAM Identity Center 許可集的名稱。此許可集定義使用者透過 IAM Identity Center 獲得的許可。

下列程序是尋找此設定值的一種方式。

1. 前往 [IAM Identity Center 主控台](#)並開啟AWS 帳戶頁面。
2. 選擇帳戶以顯示其詳細資訊。您選擇的帳戶將包含您要為其提供 SSO 許可的 SSO 使用者或群組。
3. 查看指派給帳戶的使用者和群組清單，並尋找感興趣的使用者或群組。您在設定中指定的許可集sso_role_name是與此使用者或群組相關聯的其中一個集。

將值提供給此設定時，請使用許可集的名稱，而不是 Amazon Resource Name (ARN)。

許可集已連接 IAM 政策和自訂許可政策。如需詳細資訊，請參閱《IAM Identity Center 使用者指南》中的[許可集](#)。

產生和使用 SSO 權杖

若要使用 SSO，使用者必須先產生臨時字符，然後使用該字符存取適當的 AWS 應用程式和資源。對於 .NET 應用程式，您可以使用下列方法來產生和使用這些臨時字符：

- 視需要先建立產生字符的 .NET 應用程式，然後使用字符。

- 使用 產生字符，AWS CLI 然後在 .NET 應用程式中使用該字符。

這些方法會在下列各節中說明，並在[教學](#)課程中示範。

 Important

您的應用程式必須參考下列 NuGet 套件，SSO 解析才能運作：

- AWSSDK.SSO
- AWSSDK.SSO0IDC

未參考這些套件將導致執行時間例外狀況。

僅限 .NET 應用程式

本節說明如何建立 .NET 應用程式，在必要時產生臨時 SSO 字符，然後使用該字符。如需此程序的完整教學課程，請參閱 [僅使用 .NET 應用程式的 SSO 教學課程](#)。

以程式設計方式產生和使用 SSO 字符

除了使用 之外 AWS CLI，您也可以透過程式設計方式產生 SSO 字符。

若要這樣做，您的應用程式會為 SSO 設定檔建立 [AWSCredentials](#) 物件，如果有臨時登入資料，則會載入臨時登入資料。然後，您的應用程式必須將AWSCredentials物件轉換為[SSOAWSCredentials](#)物件，並設定一些[選項](#)屬性，包括在必要時用來提示使用者登入資訊的回呼方法。

此方法會顯示在下列程式碼片段中。

 Important

您的應用程式必須參考下列 NuGet 套件，SSO 解析才能運作：

- AWSSDK.SSO
- AWSSDK.SSO0IDC

未參考這些套件將導致執行時間例外狀況。

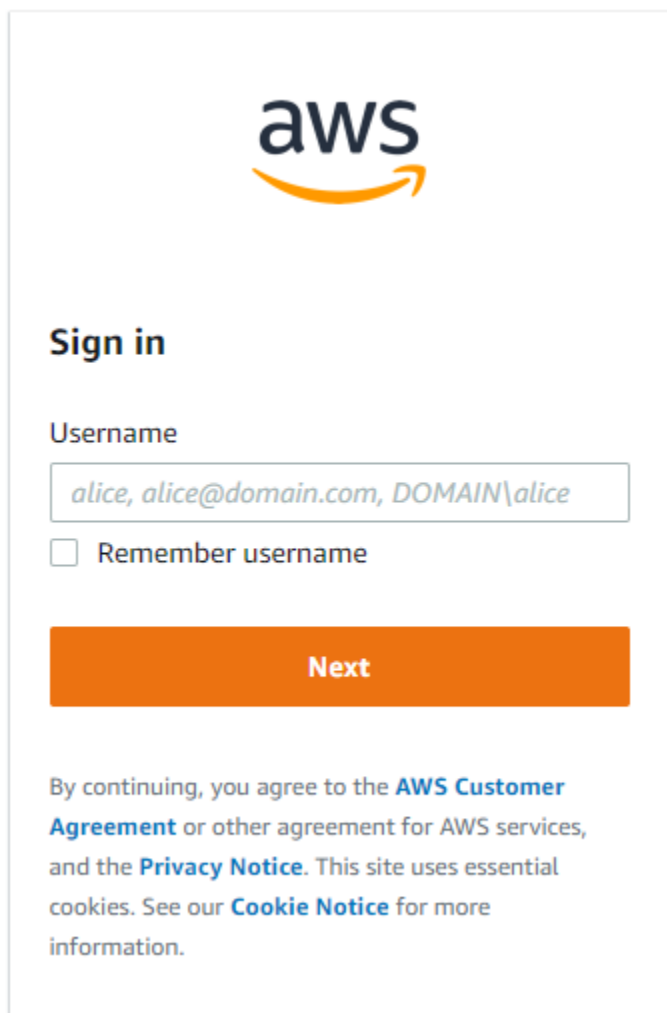
```
static AWSCredentials LoadSsoCredentials()
{
    var chain = new CredentialProfileStoreChain();
    if (!chain.TryGetAWSCredentials("my-sso-profile", out var credentials))
        throw new Exception("Failed to find the my-sso-profile profile");

    var ssoCredentials = credentials as SSOWSCredentials;

    ssoCredentials.Options.ClientName = "Example-SSO-App";
    ssoCredentials.Options.SsoVerificationCallback = args =>
    {
        // Launch a browser window that prompts the SSO user to complete an SSO sign-
in.
        // This method is only invoked if the session doesn't already have a valid SSO
token.
        // NOTE: Process.Start might not support launching a browser on macOS or Linux.
If not,
        //      use an appropriate mechanism on those systems instead.
        Process.Start(new ProcessStartInfo
        {
            FileName = args.VerificationUriComplete,
            UseShellExecute = true
        });
    };

    return ssoCredentials;
}
```

如果無法使用適當的 SSO 字符，則會啟動預設瀏覽器視窗，並開啟適當的登入頁面。例如，如果您使用 IAM Identity Center 做為身分來源，使用者會看到類似以下的登入頁面：



The image shows the AWS sign-in page. At the top is the AWS logo. Below it is the heading "Sign in". There is a "Username" label followed by a text input field containing the placeholder text "alice, alice@domain.com, DOMAIN\alice". Below the input field is a checkbox labeled "Remember username". A large orange button labeled "Next" is positioned below the checkbox. At the bottom, there is a paragraph of text: "By continuing, you agree to the [AWS Customer Agreement](#) or other agreement for AWS services, and the [Privacy Notice](#). This site uses essential cookies. See our [Cookie Notice](#) for more information."

Note

您提供的文字字串 `SSOAWSCredentials.Options.ClientName` 不能有空格。如果字串有空格，您會收到執行時間例外狀況。

僅使用 .NET 應用程式的 SSO 教學課程

AWS CLI 和 .NET 應用程式

本節說明如何使用 產生臨時 SSO 字符 AWS CLI，以及如何在應用程式中使用該字符。如需此程序的完整教學課程，請參閱 [使用 AWS CLI 和 .NET 應用程式的 SSO 教學課程](#)。

使用 產生 SSO 字符 AWS CLI

除了以程式設計方式產生臨時 SSO 字符之外，您還可以使用 AWS CLI 來產生字符。下列資訊說明如何進行。

使用者建立已啟用 SSO 的設定檔後，如[上一節](#)所示，他們會從執行 `aws sso login` 命令 AWS CLI。它們必須確實包含具有啟用 SSO 設定檔名稱的 `--profile` 參數。下列範例顯示這種情況：

```
aws sso login --profile my-sso-profile
```

如果使用者想要在目前的臨時權杖過期後產生新的臨時權杖，則可以再次執行相同的命令。

在 .NET 應用程式中使用產生的 SSO 字符

以下資訊說明如何使用已產生的臨時字符。

Important

您的應用程式必須參考下列 NuGet 套件，SSO 解析才能運作：

- AWSSDK.SSO
- AWSSDK.SSO0IDC

未參考這些套件將導致執行時間例外狀況。

您的應用程式會為 SSO 設定檔建立 [AWSCredentials](#) 物件，這會載入 先前產生的臨時登入資料 AWS CLI。這類似於 中顯示的方法 [在應用程式中存取登入資料和設定檔](#)，且格式如下：

```
static AWSCredentials LoadSsoCredentials()
{
    var chain = new CredentialProfileStoreChain();
    if (!chain.TryGetAWSCredentials("my-sso-profile", out var credentials))
        throw new Exception("Failed to find the my-sso-profile profile");

    return credentials;
}
```

AWSCredentials 物件接著會傳遞至服務用戶端的建構函式。例如：

```
var S3Client_SSO = new AmazonS3Client(LoadSsoCredentials());
```

Note

如果您的應用程式已建置AWSCredentials為使用 SSO 的[default]設定檔，則不需要使用 載入臨時憑證。在這種情況下，應用程式可以建立沒有參數 AWS 的服務用戶端，類似於「var client = new AmazonS3Client();」。

[使用 AWS CLI 和 .NET 應用程式的 SSO 教學課程](#)

其他資源

如需其他說明，請參閱下列資源。

- [什麼是 IAM Identity Center ?](#)
- [設定 AWS CLI 以使用 IAM Identity Center](#)
- [在 中使用 IAM Identity Center 登入資料 AWS Toolkit for Visual Studio](#)

教學課程

主題

- [僅使用 .NET 應用程式的 SSO 教學課程](#)
- [使用 AWS CLI 和 .NET 應用程式的 SSO 教學課程](#)

僅使用 .NET 應用程式的 SSO 教學課程

本教學課程說明如何為基本應用程式和測試 SSO 使用者啟用 SSO。它會設定應用程式以程式設計方式產生臨時 SSO 字符，而不是[使用 AWS CLI](#)。

本教學課程顯示 中一小部分的 SSO 功能 適用於 .NET 的 AWS SDK。如需搭配 使用 IAM Identity Center 的完整詳細資訊 適用於 .NET 的 AWS SDK，請參閱具有[背景資訊](#)的主題。在該主題中，請參閱名為 的子區段中此案例的高階描述[僅限 .NET 應用程式](#)。

Note

本教學中的數個步驟可協助您設定 AWS Organizations 和 IAM Identity Center 等服務。如果您已經執行該組態，或者只對程式碼感興趣，您可以使用[範例程式碼](#)跳到 區段。

先決條件

- 如果您尚未設定開發環境，請進行設定。這會在 [安裝和設定您的工具鏈](#)和 等章節中說明[開始使用](#)。
- 識別或建立至少一個可用於測試 SSO AWS 帳戶 的 。基於本教學課程的目的，這稱為測試 AWS 帳戶或僅測試帳戶。
- 識別可為您測試 SSO 的 SSO 使用者。這是將使用 SSO 和您建立的基本應用程式的人員。在本教學課程中，該人員可能是您（開發人員）或其他人。我們也建議 SSO 使用者在不在開發環境中的電腦上運作的設定。不過，這不是絕對必要的。
- SSO 使用者的電腦必須安裝與您用來設定開發環境的架構相容的 .NET 架構。

設定 AWS

本節說明如何設定本教學課程的各種 AWS 服務。

若要執行此設定，請先以管理員 AWS 帳戶 身分登入測試。然後，執行下列動作：

Amazon S3

前往 [Amazon S3 主控台](#)並新增一些無害的儲存貯體。在本教學課程稍後，SSO 使用者將擷取這些儲存貯體的清單。

AWS IAM

前往 [IAM 主控台](#)並新增幾個 IAM 使用者。如果您授予 IAM 使用者許可，請將許可限制為幾個無害的唯讀許可。在本教學稍後，SSO 使用者將擷取這些 IAM 使用者的清單。

AWS Organizations

前往 [AWS Organizations 主控台](#)並啟用 Organizations。如需詳細資訊，請參閱《AWS Organizations 使用者指南》<https://docs.aws.amazon.com/organizations/latest/userguide/>中的[建立組織](#)。

此動作會將測試新增至 AWS 帳戶 組織做為管理帳戶。如果您有其他測試帳戶，您可以邀請他們加入組織，但此教學課程不需要這麼做。

IAM Identity Center

前往 [IAM Identity Center 主控台](#) 並啟用 SSO。視需要執行電子郵件驗證。如需詳細資訊，請參閱 [《IAM Identity Center 使用者指南》中的啟用 IAM Identity Center](#)。

然後，執行下列組態。

設定 IAM Identity Center

1. 前往設定頁面。尋找「存取入口網站 URL」，並記錄 值以供稍後在 `sso_start_url` 設定中使用。
2. 在 橫幅中 AWS 管理主控台，尋找在您啟用 SSO AWS 區域 時設定的 。這是 AWS 帳戶 ID 左側的下拉式選單。記錄區域碼以供稍後在 `sso_region` 設定中使用。此程式碼將類似於 `us-east-1`。
3. 建立 SSO 使用者，如下所示：
 - a. 前往使用者頁面。
 - b. 選擇新增使用者，然後輸入使用者的使用者名稱、電子郵件地址、名字和姓氏。然後選擇下一步。
 - c. 在 頁面上選擇群組的下一步，然後檢閱資訊，然後選擇新增使用者。
4. 建立群組，如下所示：
 - a. 前往群組頁面。
 - b. 選擇建立群組，然後輸入群組的群組名稱和描述。
 - c. 在新增使用者至群組區段中，選取您先前建立的測試 SSO 使用者。然後，選取建立群組。
5. 建立許可集，如下所示：
 - a. 前往許可集頁面，然後選擇建立許可集。
 - b. 在許可集類型下，選取自訂許可集，然後選擇下一步。
 - c. 開啟內嵌政策並輸入下列政策：

JSON

```
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Sid": "VisualEditor0",
```



```
        "Effect": "Allow",
        "Action": [
            "s3:ListAllMyBuckets",
            "iam:ListUsers"
        ],
        "Resource": "*"
    }
}
```

- d. 在此教學課程中，輸入 `SSOReadOnlyRole` 做為許可集名稱。如果需要，請新增描述，然後選擇下一步。
 - e. 檢閱資訊，然後選擇建立。
 - f. 記錄許可集的名稱，以供稍後在 `sso_role_name` 設定中使用。
6. 前往 AWS 帳戶頁面，然後選擇您先前新增至組織的 AWS 帳戶。
 7. 在該頁面的概觀區段中，尋找帳戶 ID 並將其記錄在 `sso_account_id` 設定中，以供稍後使用。
 8. 選擇使用者和群組索引標籤，然後選擇指派使用者或群組。
 9. 在指派使用者和群組頁面上，選擇群組索引標籤，選取您先前建立的群組，然後選擇下一步。
 10. 選取您先前建立的許可集，然後選擇下一步，然後選擇提交。組態需要一些時間。

建立範例應用程式

建立下列應用程式。它們將在 SSO 使用者的電腦上執行。

列出 Amazon S3 儲存貯體

除了 `AWSSDK.SSO` 和 `AWSSDK.SSO0IDC` 之外，`AWSSDK.SSO0IDC` 還包含 NuGet 套件 `AWSSDK.S3` 和 `AWSSDK.SecurityToken`。

```
using System;
using System.Threading.Tasks;
using System.Diagnostics;

// NuGet packages: AWSSDK.S3, AWSSDK.SecurityToken, AWSSDK.SSO, AWSSDK.SSO0IDC
using Amazon.Runtime;
using Amazon.Runtime.CredentialManagement;
using Amazon.S3;
using Amazon.S3.Model;
using Amazon.SecurityToken;
```

```
using Amazon.SecurityToken.Model;

namespace SS0Example.S3.Programmatic_login
{
    class Program
    {
        // Requirements:
        // - An SS0 profile in the SS0 user's shared config file.

        // Class members.
        private static string profile = "my-sso-profile";

        static async Task Main(string[] args)
        {
            // Get SS0 credentials from the information in the shared config file.
            var ssoCreds = LoadSsoCredentials(profile);

            // Display the caller's identity.
            var ssoProfileClient = new AmazonSecurityTokenServiceClient(ssoCreds);
            Console.WriteLine($"\\nSS0 Profile:\\n {await
ssoProfileClient.GetCallerIdentityArn()}");

            // Display a list of the account's S3 buckets.
            // The S3 client is created using the SS0 credentials obtained earlier.
            var s3Client = new AmazonS3Client(ssoCreds);
            Console.WriteLine("\\nGetting a list of your buckets...");
            var listResponse = await s3Client.ListBucketsAsync();
            Console.WriteLine($"Number of buckets: {listResponse.Buckets.Count}");
            foreach (S3Bucket b in listResponse.Buckets)
            {
                Console.WriteLine(b.BucketName);
            }
            Console.WriteLine();
        }

        // Method to get SS0 credentials from the information in the shared config
file.
        static AWSCredentials LoadSsoCredentials(string profile)
        {
            var chain = new CredentialProfileStoreChain();
            if (!chain.TryGetAWSCredentials(profile, out var credentials))
                throw new Exception($"Failed to find the {profile} profile");

            var ssoCredentials = credentials as SS0AWSCredentials;
```

```

        ssoCredentials.Options.ClientName = "Example-SSO-App";
        ssoCredentials.Options.SsoVerificationCallback = args =>
        {
            // Launch a browser window that prompts the SSO user to complete an SSO
login.
            // This method is only invoked if the session doesn't already have a
valid SSO token.
            // NOTE: Process.Start might not support launching a browser on macOS
or Linux. If not,
            //     use an appropriate mechanism on those systems instead.
            Process.Start(new ProcessStartInfo
            {
                FileName = args.VerificationUriComplete,
                UseShellExecute = true
            });
        };

        return ssoCredentials;
    }

}

// Class to read the caller's identity.
public static class Extensions
{
    public static async Task<string> GetCallerIdentityArn(this
IAmazonSecurityTokenService stsClient)
    {
        var response = await stsClient.GetCallerIdentityAsync(new
GetCallerIdentityRequest());
        return response.Arn;
    }
}
}

```

列出 IAM 使用者

除了 AWSSDK.SSO和 之外，AWSSDK.SSO0IDC還包含 NuGet 套件 AWSSDK.IdentityManagement和 AWSSDK.SecurityToken。

```

using System;
using System.Threading.Tasks;

```

```
using System.Diagnostics;

// NuGet packages: AWSSDK.IdentityManagement, AWSSDK.SecurityToken, AWSSDK.SSO,
// AWSSDK.SSO0IDC
using Amazon.Runtime;
using Amazon.Runtime.CredentialManagement;
using Amazon.IdentityManagement;
using Amazon.IdentityManagement.Model;
using Amazon.SecurityToken;
using Amazon.SecurityToken.Model;

namespace SSOExample.IAM.Programmatic_login
{
    class Program
    {
        // Requirements:
        // - An SSO profile in the SSO user's shared config file.

        // Class members.
        private static string profile = "my-sso-profile";

        static async Task Main(string[] args)
        {
            // Get SSO credentials from the information in the shared config file.
            var ssoCreds = LoadSsoCredentials(profile);

            // Display the caller's identity.
            var ssoProfileClient = new AmazonSecurityTokenServiceClient(ssoCreds);
            Console.WriteLine($"\\nSSO Profile:\\n {await
ssoProfileClient.GetCallerIdentityArn()}");

            // Display a list of the account's IAM users.
            // The IAM client is created using the SSO credentials obtained earlier.
            var iamClient = new AmazonIdentityManagementServiceClient(ssoCreds);
            Console.WriteLine("\\nGetting a list of IAM users...");
            var listResponse = await iamClient.ListUsersAsync();
            Console.WriteLine($"Number of IAM users: {listResponse.Users.Count}");
            foreach (User u in listResponse.Users)
            {
                Console.WriteLine(u.UserName);
            }
            Console.WriteLine();
        }
    }
}
```

```

        // Method to get SSO credentials from the information in the shared config
        file.
        static AWSCredentials LoadSsoCredentials(string profile)
        {
            var chain = new CredentialProfileStoreChain();
            if (!chain.TryGetAWSCredentials(profile, out var credentials))
                throw new Exception($"Failed to find the {profile} profile");

            var ssoCredentials = credentials as SS0AWSCredentials;

            ssoCredentials.Options.ClientName = "Example-SS0-App";
            ssoCredentials.Options.SsoVerificationCallback = args =>
            {
                // Launch a browser window that prompts the SSO user to complete an SSO
                login.
                // This method is only invoked if the session doesn't already have a
                valid SSO token.
                // NOTE: Process.Start might not support launching a browser on macOS
                or Linux. If not,
                //      use an appropriate mechanism on those systems instead.
                Process.Start(new ProcessStartInfo
                {
                    FileName = args.VerificationUriComplete,
                    UseShellExecute = true
                });
            };

            return ssoCredentials;
        }

    }

    // Class to read the caller's identity.
    public static class Extensions
    {
        public static async Task<string> GetCallerIdentityArn(this
        IAmazonSecurityTokenService stsClient)
        {
            var response = await stsClient.GetCallerIdentityAsync(new
            GetCallerIdentityRequest());
            return response.Arn;
        }
    }
}

```

```
}
```

除了顯示 Amazon S3 儲存貯體和 IAM 使用者的清單之外，這些應用程式也會顯示啟用 SSO 之設定檔的使用者身分 ARN，這在本教學 `my-sso-profile` 課程中。

這些應用程式會透過在 `SSOAWSCredentials` 物件 [的選項](#) 屬性中提供回呼方法來執行 SSO 登入任務。
[SSOAWSCredentials](#)

指示 SSO 使用者

要求 SSO 使用者檢查其電子郵件並接受 SSO 邀請。系統會提示他們設定密碼。訊息可能需要幾分鐘的時間才能送達 SSO 使用者的收件匣。

將先前建立的應用程式提供給 SSO 使用者。

然後，讓 SSO 使用者執行下列動作：

1. 如果包含共用 AWS config 檔案的資料夾不存在，請建立它。如果資料夾確實存在且具有名為 `.sso` 的子資料夾，請刪除該子資料夾。

此資料夾的位置通常 `%USERPROFILE%\ .aws` 位於 Windows 和 Linux 和 macOS `~/ .aws` 中。

2. 視需要在該資料夾中建立共用 AWS config 檔案，並將設定檔新增至其中，如下所示：

```
[default]
region = <default Region>

[profile my-sso-profile]
sso_start_url = <user portal URL recorded earlier>
sso_region = <Region code recorded earlier>
sso_account_id = <account ID recorded earlier>
sso_role_name = SSOReadOnlyRole
```

3. 執行 Amazon S3 應用程式。
4. 在產生的 Web 登入頁面中，登入。使用邀請訊息中的使用者名稱，以及為回應訊息而建立的密碼。
5. 登入完成時，應用程式會顯示 S3 儲存貯體的清單。
6. 執行 IAM 應用程式。應用程式會顯示 IAM 使用者的清單。即使未執行第二次登入，也是如此。IAM 應用程式使用先前建立的臨時權杖。

清除

如果您不想保留在本教學課程中建立的資源，請清除它們。這些可能是開發環境中 AWS 的資源，例如檔案和資料夾。

使用 AWS CLI 和 .NET 應用程式的 SSO 教學課程

本教學課程說明如何為基本 .NET 應用程式和測試 SSO 使用者啟用 SSO。它使用 AWS CLI 來產生臨時 SSO 權杖，而不是[以程式設計方式產生權杖](#)。

本教學課程顯示 中一小部分的 SSO 功能 適用於 .NET 的 AWS SDK。如需搭配 使用 IAM Identity Center 的完整詳細資訊 適用於 .NET 的 AWS SDK，請參閱具有[背景資訊](#)的主題。在該主題中，請參閱名為 的子區段中此案例的高階描述[AWS CLI 和 .NET 應用程式](#)。

Note

本教學中的數個步驟可協助您設定 AWS Organizations 和 IAM Identity Center 等服務。如果您已經執行這些組態，或者只對程式碼感興趣，您可以使用[範例程式碼](#)跳到 區段。

先決條件

- 如果您尚未設定開發環境，請進行設定。這會在 [安裝和設定您的工具鏈](#)和 等章節中說明[開始使用](#)。
- 識別或建立至少一個可用於測試 SSO AWS 帳戶 的 。基於本教學課程的目的，這稱為測試 AWS 帳戶或僅測試帳戶。
- 識別可為您測試 SSO 的 SSO 使用者。這是將使用 SSO 和您建立的基本應用程式的人員。在本教學課程中，該人員可能是您（開發人員）或其他人。我們也建議 SSO 使用者在不在開發環境中的電腦上運作的設定。不過，這不是絕對必要的。
- SSO 使用者的電腦必須安裝與您用來設定開發環境的架構相容的 .NET 架構。
- 請確定 AWS CLI 版本 2 [已安裝](#)在 SSO 使用者的電腦上。您可以在命令提示字元或終端機 `aws --version` 中執行 來檢查此問題。

設定 AWS

本節說明如何設定本教學課程的各種 AWS 服務。

若要執行此設定，請先以管理員 AWS 帳戶 身分登入測試。然後，執行下列動作：

Amazon S3

前往 [Amazon S3 主控台](#) 並新增一些無害的儲存貯體。在本教學課程稍後，SSO 使用者將擷取這些儲存貯體的清單。

AWS IAM

前往 [IAM 主控台](#) 並新增一些 IAM 使用者。如果您授予 IAM 使用者許可，請將許可限制為幾個無害的唯讀許可。在本教學稍後，SSO 使用者將擷取這些 IAM 使用者的清單。

AWS Organizations

前往 [AWS Organizations 主控台](#) 並啟用 Organizations。如需詳細資訊，請參閱《AWS Organizations 使用者指南》<https://docs.aws.amazon.com/organizations/latest/userguide/> 中的 [建立組織](#)。

此動作會將測試新增至 AWS 帳戶 組織做為管理帳戶。如果您有其他測試帳戶，您可以邀請他們加入組織，但此教學課程不需要這麼做。

IAM Identity Center

前往 [IAM Identity Center 主控台](#) 並啟用 SSO。視需要執行電子郵件驗證。如需詳細資訊，請參閱《[IAM Identity Center 使用者指南](#)》中的啟用 [IAM Identity Center](#)。

然後，執行下列組態。

設定 IAM Identity Center

1. 前往設定頁面。尋找「存取入口網站 URL」，並記錄 值以供稍後在 `sso_start_url` 設定中使用。
2. 在 橫幅中 AWS 管理主控台，尋找在您啟用 SSO AWS 區域 時設定的 。這是 AWS 帳戶 ID 左側的下拉式選單。記錄區域碼以供稍後在 `sso_region` 設定中使用。此程式碼將類似於 `us-east-1`。
3. 建立 SSO 使用者，如下所示：
 - a. 前往使用者頁面。
 - b. 選擇新增使用者，然後輸入使用者的使用者名稱、電子郵件地址、名字和姓氏。然後選擇下一步。
 - c. 在 頁面上選擇群組的下一步，然後檢閱資訊，然後選擇新增使用者。

4. 建立群組，如下所示：
 - a. 前往群組頁面。
 - b. 選擇建立群組，然後輸入群組的群組名稱和描述。
 - c. 在新增使用者至群組區段中，選取您先前建立的測試 SSO 使用者。然後，選取建立群組。
5. 建立許可集，如下所示：
 - a. 前往許可集頁面，然後選擇建立許可集。
 - b. 在許可集類型下，選取自訂許可集，然後選擇下一步。
 - c. 開啟內嵌政策並輸入下列政策：

JSON

```
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Sid": "VisualEditor0",
      "Effect": "Allow",
      "Action": [
        "s3:ListAllMyBuckets",
        "iam:ListUsers"
      ],
      "Resource": "*"
    }
  ]
}
```

- d. 在本教學課程中，輸入 SS0ReadOnlyRole 做為許可集名稱。如果需要，請新增描述，然後選擇下一步。
 - e. 檢閱資訊，然後選擇建立。
 - f. 記錄許可集的名稱，以供稍後在 sso_role_name 設定中使用。
6. 前往 AWS 帳戶頁面，然後選擇您先前新增至組織的 AWS 帳戶。
7. 在該頁面的概觀區段中，尋找帳戶 ID，並記錄在 sso_account_id 設定中以供日後使用。
8. 選擇使用者和群組索引標籤，然後選擇指派使用者或群組。
9. 在指派使用者和群組頁面上，選擇群組索引標籤，選取您先前建立的群組，然後選擇下一步。
10. 選取您先前建立的許可集，然後選擇下一步，然後選擇提交。組態需要一些時間。

建立範例應用程式

建立下列應用程式。它們將在 SSO 使用者的電腦上執行。

列出 Amazon S3 儲存貯體

除了 AWSSDK.SSO 和 之外，AWSSDK.SSO0IDC 還包含 NuGet 套件 AWSSDK.S3 和 AWSSDK.SecurityToken。

```
using System;
using System.Threading.Tasks;

// NuGet packages: AWSSDK.S3, AWSSDK.SecurityToken, AWSSDK.SSO, AWSSDK.SSO0IDC
using Amazon.Runtime;
using Amazon.Runtime.CredentialManagement;
using Amazon.S3;
using Amazon.S3.Model;
using Amazon.SecurityToken;
using Amazon.SecurityToken.Model;

namespace SS0Example.S3.CLI_login
{
    class Program
    {
        // Requirements:
        // - An SSO profile in the SSO user's shared config file.
        // - An active SSO Token.
        //   If an active SSO token isn't available, the SSO user should do the
        following:
        //   In a terminal, the SSO user must call "aws sso login --profile my-sso-
        profile".

        // Class members.
        private static string profile = "my-sso-profile";
        static async Task Main(string[] args)
        {
            // Get SSO credentials from the information in the shared config file.
            var ssoCreds = LoadSsoCredentials(profile);

            // Display the caller's identity.
            var ssoProfileClient = new AmazonSecurityTokenServiceClient(ssoCreds);
            Console.WriteLine($"\\nSSO Profile:\\n {await
            ssoProfileClient.GetCallerIdentityArn()}");
        }
    }
}
```

```

        // Display a list of the account's S3 buckets.
        // The S3 client is created using the SSO credentials obtained earlier.
        var s3Client = new AmazonS3Client(ssoCreds);
        Console.WriteLine("\nGetting a list of your buckets...");
        var listResponse = await s3Client.ListBucketsAsync();
        Console.WriteLine($"Number of buckets: {listResponse.Buckets.Count}");
        foreach (S3Bucket b in listResponse.Buckets)
        {
            Console.WriteLine(b.BucketName);
        }
        Console.WriteLine();
    }

    // Method to get SSO credentials from the information in the shared config
    file.
    static AWSCredentials LoadSsoCredentials(string profile)
    {
        var chain = new CredentialProfileStoreChain();
        if (!chain.TryGetAWSCredentials(profile, out var credentials))
            throw new Exception($"Failed to find the {profile} profile");
        return credentials;
    }

    // Class to read the caller's identity.
    public static class Extensions
    {
        public static async Task<string> GetCallerIdentityArn(this
        IAmazonSecurityTokenService stsClient)
        {
            var response = await stsClient.GetCallerIdentityAsync(new
            GetCallerIdentityRequest());
            return response.Arn;
        }
    }
}

```

列出 IAM 使用者

除了 AWSSDK.SSO 和 之外，AWSSDK.SSO0IDC 還包含 NuGet 套件 AWSSDK.IdentityManagement 和 AWSSDK.SecurityToken。

```
using System;
```

```
using System.Threading.Tasks;

// NuGet packages: AWSSDK.IdentityManagement, AWSSDK.SecurityToken, AWSSDK.SSO,
// AWSSDK.SSO0IDC
using Amazon.Runtime;
using Amazon.Runtime.CredentialManagement;
using Amazon.IdentityManagement;
using Amazon.IdentityManagement.Model;
using Amazon.SecurityToken;
using Amazon.SecurityToken.Model;

namespace SSOExample.IAM.CLI_login
{
    class Program
    {
        // Requirements:
        // - An SSO profile in the SSO user's shared config file.
        // - An active SSO Token.
        //   If an active SSO token isn't available, the SSO user should do the
        following:
        //   In a terminal, the SSO user must call "aws sso login --profile my-sso-
        profile".

        // Class members.
        private static string profile = "my-sso-profile";
        static async Task Main(string[] args)
        {
            // Get SSO credentials from the information in the shared config file.
            var ssoCreds = LoadSsoCredentials(profile);

            // Display the caller's identity.
            var ssoProfileClient = new AmazonSecurityTokenServiceClient(ssoCreds);
            Console.WriteLine($"\\nSSO Profile:\\n {await
            ssoProfileClient.GetCallerIdentityArn()}");

            // Display a list of the account's IAM users.
            // The IAM client is created using the SSO credentials obtained earlier.
            var iamClient = new AmazonIdentityManagementServiceClient(ssoCreds);
            Console.WriteLine("\\nGetting a list of IAM users...");
            var listResponse = await iamClient.ListUsersAsync();
            Console.WriteLine($"Number of IAM users: {listResponse.Users.Count}");
            foreach (User u in listResponse.Users)
            {
                Console.WriteLine(u.UserName);
            }
        }
    }
}
```

```

    }
    Console.WriteLine();
}

// Method to get SSO credentials from the information in the shared config
file.
static AWSCredentials LoadSsoCredentials(string profile)
{
    var chain = new CredentialProfileStoreChain();
    if (!chain.TryGetAWSCredentials(profile, out var credentials))
        throw new Exception($"Failed to find the {profile} profile");
    return credentials;
}

// Class to read the caller's identity.
public static class Extensions
{
    public static async Task<string> GetCallerIdentityArn(this
IAmazonSecurityTokenService stsClient)
    {
        var response = await stsClient.GetCallerIdentityAsync(new
GetCallerIdentityRequest());
        return response.Arn;
    }
}
}

```

除了顯示 Amazon S3 儲存貯體和 IAM 使用者的清單之外，這些應用程式也會顯示啟用 SSO 之設定檔的使用者身分 ARN，這在本教學 `my-sso-profile` 課程中。

指示 SSO 使用者

要求 SSO 使用者檢查其電子郵件並接受 SSO 邀請。系統會提示他們設定密碼。訊息可能需要幾分鐘的時間才能送達 SSO 使用者的收件匣。

將先前建立的應用程式提供給 SSO 使用者。

然後，讓 SSO 使用者執行下列動作：

1. 如果包含共用 AWS config 檔案的資料夾不存在，請建立它。如果資料夾確實存在且具有名為 `子資料夾.sso` 的子資料夾，請刪除該子資料夾。

此資料夾的位置通常%USERPROFILE%\aws位於 Windows 和 Linux 和 macOS ~/aws中。

- 視需要在該資料夾中建立共用 AWS config 檔案，並將設定檔新增至其中，如下所示：

```
[default]
region = <default Region>

[profile my-sso-profile]
sso_start_url = <user portal URL recorded earlier>
sso_region = <Region code recorded earlier>
sso_account_id = <account ID recorded earlier>
sso_role_name = SSOReadOnlyRole
```

- 執行 Amazon S3 應用程式。出現執行時間例外狀況。
- 執行下列 AWS CLI 命令：

```
aws sso login --profile my-sso-profile
```

- 在產生的 Web 登入頁面中，登入。使用邀請訊息中的使用者名稱，以及為回應訊息而建立的密碼。
- 再次執行 Amazon S3 應用程式。應用程式現在會顯示 S3 儲存貯體的清單。
- 執行 IAM 應用程式。應用程式會顯示 IAM 使用者的清單。即使未執行第二次登入，也是如此。IAM 應用程式使用先前建立的臨時權杖。

清除

如果您不想保留在本教學課程中建立的資源，請清除它們。這些可能是開發環境中 AWS 的資源，例如檔案和資料夾。

將應用程式部署到 AWS

在開發機器上開發雲端原生 .NET Core 應用程式或服務之後，您會想要將其部署到 AWS。您可以使用 AWS 管理主控台 或 等特定服務來執行此操作 CloudFormation AWS Cloud Development Kit (AWS CDK)。您也可以使用為部署目的而建立 AWS 的工具。透過使用這些工具，您可以執行下列動作。

從 .NET CLI 部署

您可以使用下列適用於 .NET CLI AWS 的工具，將您的應用程式部署到 AWS：

- [AWS 部署適用於 .NET CLI 的工具](#) - 支援部署至 [AWS App Runner](#)、[Amazon Elastic Container Service \(Amazon ECS\)](#) 和 [AWS Elastic Beanstalk](#)。
- [AWS Lambda 適用於 .NET CLI 的工具](#) - 支援部署 AWS Lambda 專案。

從 IDE 工具組部署

您可以使用 AWS 工具組直接從您選擇的 IDE 部署應用程式：

- [AWS Toolkit for Visual Studio](#)

Note

工具組中的「發佈至 AWS」功能會公開與適用於 .NET CLI 的 AWS 部署工具相同的功能。若要進一步了解，請前往 AWS Toolkit for Visual Studio 《使用者指南》中的 [發佈至 AWS](#)。

- [AWS Toolkit for JetBrains](#)

請參閱 [使用無 AWS 伺服器應用程式](#) 和 [使用 AWS App Runner](#)。

- [AWS 適用於 VS 程式碼的工具組](#)

請參閱 [使用無伺服器應用程式](#) 和 [使用 AWS App Runner](#)。

- [AWS Toolkit for Azure DevOps](#)

使用案例

下列各節包含特定應用程式類型的使用案例，包括有關如何使用 .NET CLI 部署這些應用程式的資訊。

- [ASP.NET Core 應用程式](#)
- [.NET 主控台應用程式](#)
- [Blazor WebAssembly 應用程式](#)
- [AWS Lambda 專案](#)

ASP.NET Core 應用程式

.NET CLI 的[AWS 部署工具](#)可協助您部署 ASP.NET 應用程式，並引導您完成部署程序。這是 .NET CLI 的互動式工具，可協助部署最低 AWS 知識的 .NET 應用程式。

部署工具具有下列功能：

- 應用程式的運算建議 - 取得運算建議，並了解哪個 AWS 運算最適合您的應用程式。
- 產生 Dockerfile - 工具會視需要產生 Dockerfile，或使用現有的 Dockerfile。
- 自動封裝和部署 – 此工具會建置部署成品、使用產生的 AWS CDK 部署專案佈建基礎設施，並將您的應用程式部署到所選的 AWS 運算。
- 可重複且可共用的部署 – 您可以產生和修改 AWS CDK 部署專案，以符合您的特定使用案例。您也可以控制專案的版本，並與您的團隊共用，以進行可重複的部署。
- 協助學習 AWS CDK .NET - 此工具可協助您逐步學習其建置的基礎 AWS 工具，例如 AWS CDK。

[AWS 部署工具](#)支援將 ASP.NET Core 應用程式部署至下列 AWS 服務：

- 使用的 [Amazon ECS Service](#) [AWS Fargate](#) - 支援使用無 AWS Fargate 伺服器運算引擎管理的運算能力，將 Web 應用程式部署至 Amazon Elastic Container Service (Amazon ECS)。
- [AWS App Runner](#) - 支援部署至全受管服務，可讓開發人員輕鬆大規模部署容器化 Web 應用程式和 APIs。不需要先前的基礎設施體驗。
- [AWS Elastic Beanstalk](#) - 支援部署至 服務，可讓開發人員輕鬆大規模將 Web 應用程式和 APIs 部署至全受管環境。不需要先前的基礎設施體驗。

若要進一步了解，請參閱[工具概觀](#)。若要從那裡開始，請導覽至文件、入門，然後選擇[如何安裝](#)以取得安裝指示。

.NET 主控台應用程式

.NET CLI 的 [AWS 部署工具](#) 可協助您將 .NET 主控台應用程式部署為服務或排程任務部署為 Linux 上的容器映像，並引導您完成部署程序。如果您的應用程式沒有 Dockerfile，工具會自動產生它。否則，會使用現有的 Dockerfile。

部署工具具有下列功能：

- 應用程式的運算建議 - 取得運算建議，並了解哪個 AWS 運算最適合您的應用程式。
- 產生 Dockerfile - 工具會視需要產生 Dockerfile，或使用現有的 Dockerfile。
- 自動封裝和部署 - 此工具會建置部署成品、使用產生的 AWS CDK 部署專案佈建基礎設施，並將您的應用程式部署到所選的 AWS 運算。
- 可重複且可共用的部署 - 您可以產生和修改 AWS CDK 部署專案，以符合您的特定使用案例。您也可以控制專案的版本，並與您的團隊共用，以進行可重複的部署。
- 協助學習 AWS CDK .NET - 此工具可協助您逐步學習其建置的基礎 AWS 工具，例如 AWS CDK。

[AWS 部署工具](#) 支援將 .NET 主控台應用程式部署至下列 AWS 服務：

- 使用的 [Amazon ECS Service AWS Fargate](#) - 支援將 .NET 應用程式部署為服務（例如背景處理器）到 Amazon Elastic Container Service (Amazon ECS)，其運算能力由無 AWS Fargate 伺服器運算引擎管理。
- 使用的 [Amazon ECS 排程任務 AWS Fargate](#) - 支援使用無 AWS Fargate 伺服器運算引擎管理的運算能力，將 .NET 應用程式部署為排程任務（例如 end-of-day 程序）到 Amazon ECS。

若要進一步了解，請參閱 [工具概觀](#)。若要從那裡開始，請導覽至文件、入門，然後選擇 [如何安裝](#) 以取得安裝指示。

Blazor WebAssembly 應用程式

.NET CLI 的 [AWS 部署工具](#) 可協助您使用 Amazon CloudFront 在 Amazon S3 中託管 Blazor WebAssembly 應用程式，以進行內容網路交付。您的應用程式會部署到 S3 儲存貯體以進行 Web 託管。此工具會建立和設定 S3 儲存貯體，然後將您的 Blazor 應用程式上傳至儲存貯體。

部署工具具有下列功能：

- 自動封裝和部署 - 此工具會建置部署成品、使用產生的 AWS CDK 部署專案佈建基礎設施，並將您的應用程式部署到所選的 AWS 運算。

- 可重複且可共用的部署 – 您可以產生和修改 AWS CDK 部署專案，以符合您的特定使用案例。您也可以控制專案的版本，並與您的團隊共用，以進行可重複的部署。
- 協助學習 AWS CDK .NET - 此工具可協助您逐步學習其建置的基礎 AWS 工具，例如 AWS CDK。

若要進一步了解，請參閱[工具概觀](#)。若要從那裡開始，請導覽至文件、入門，然後選擇[如何安裝](#)以取得安裝指示。

AWS Lambda 專案

AWS Lambda 是一種運算服務，可讓您執行程式碼，而無需佈建或管理伺服器。它會在高可用性運算基礎設施上執行程式碼，並執行運算資源的所有管理。如需 Lambda 的詳細資訊，請參閱《AWS Lambda 開發人員指南》中的[什麼是 AWS Lambda？](#)。

您可以使用 .NET 命令列界面 (CLI) 部署 Lambda 函數。

主題

- [先決條件](#)
- [可用的 Lambda 命令](#)
- [部署步驟](#)

先決條件

開始使用 .NET CLI 部署 Lambda 函數之前，您必須符合下列先決條件：

- 確認您已安裝 .NET CLI。例如：`dotnet --version`。如有需要，請前往 <https://dotnet.microsoft.com/download> 進行安裝。
- 設定 .NET CLI 以使用 Lambda。如需如何執行此操作的描述，請參閱《AWS Lambda 開發人員指南》中的[.NET Core CLI](#)。在該程序中，以下是 部署命令：

```
dotnet lambda deploy-function MyFunction --function-role role
```

如果您不確定如何為此練習建立 IAM 角色，請不要包含 `--function-role role` 部分。此工具將協助您建立新的角色。

可用的 Lambda 命令

若要列出可透過 .NET CLI 使用的 Lambda 命令，請開啟命令提示字元或終端機，然後輸入 `dotnet lambda --help`。命令輸出將類似於以下內容：

```
Amazon Lambda Tools for .NET applications
Project Home: https://github.com/aws/aws-extensions-for-dotnet-cli, https://github.com/
aws/aws-lambda-dotnet

Commands to deploy and manage AWS Lambda functions:

    deploy-function      Command to deploy the project to AWS Lambda
    ...
    (etc.)

To get help on individual commands execute:
    dotnet lambda help <command>
```

輸出會列出目前可用的所有命令。

部署步驟

下列指示假設您已建立 AWS Lambda .NET 專案。基於此程序的目的，專案名為 `DotNetCoreLambdaTest`。

1. 開啟命令提示字元或終端機，然後導覽至包含 .NET Lambda 專案檔案的資料夾。
2. 輸入 `dotnet lambda deploy-function`。
3. 如果出現提示，請輸入 AWS 區域（將部署 Lambda 函數的區域）。
4. 出現提示時，輸入要部署的函數名稱，例如 `DotNetCoreLambdaTest`。它可以是 中已存在的函數名稱，AWS 帳戶 或尚未部署的函數名稱。
5. 出現提示時，選取或建立 Lambda 在執行函數時將擔任的 IAM 角色。

成功完成後，會顯示建立的新 Lambda 函數訊息。

```
Executing publish command
...
(etc.)
New Lambda function created
```

如果您部署的函數已存在於您的帳戶中，則部署函數只會要求 AWS 區域（如有必要）。在此情況下，命令輸出結尾為 Updating code for existing function。

部署 Lambda 函數之後，即可開始使用。如需詳細資訊，請參閱[如何使用 AWS Lambda 的範例](#)。

Lambda 會自動為您監控 Lambda 函數，並透過 Amazon CloudWatch 報告指標。若要監控 Lambda 函數並進行疑難排解，請參閱[監控 Lambda 應用程式並進行疑難排解](#)。

遷移的專案 適用於 .NET 的 AWS SDK

本節提供有關可能適用於您的遷移任務的資訊，以及如何執行這些任務的說明。

主題

- [遷移至 第 3 版 適用於 .NET 的 AWS SDK](#)
- [遷移至 3.5 版 適用於 .NET 的 AWS SDK](#)
- [遷移至 3.7 版 適用於 .NET 的 AWS SDK](#)
- [從 .NET Standard 1.3 遷移](#)

遷移至 第 3 版 適用於 .NET 的 AWS SDK

本主題說明 第 3 版的變更，適用於 .NET 的 AWS SDK 以及如何將程式碼遷移至此版本的 SDK。

關於 適用於 .NET 的 AWS SDK 版本

適用於 .NET 的 AWS SDK 最初於 2009 年 11 月發行，專為 .NET Framework 2.0 而設計。由於該版本發佈，.NET 使用 .NET Framework 4.0 和 .NET Framework 4.5，和新增新的目標平台：WinRT 和 Windows Phone。

適用於 .NET 的 AWS SDK 第 2 版已更新，以利用 .NET 平台的新功能，並以 WinRT 和 Windows Phone 為目標。

適用於 .NET 的 AWS SDK 第 3 版已更新，使組件模組化。

適用於開發套件的架構重新設計

整個 第 3 版 適用於 .NET 的 AWS SDK 已重新設計為模組化。每個服務都在自己的組件內實作，而不是一個全球組件內。您不再需要將整個 新增至 適用於 .NET 的 AWS SDK 您的應用程式。您現在可以僅為應用程式使用 AWS 的服務新增組件。

突破性變更

以下章節說明 適用於 .NET 的 AWS SDK 版本 3 的變更。

移除 AWSClientFactory

已移除 `Amazon.AWSClientFactory` 類別。現在，請使用服務用戶端建構函數建立服務用戶端。例如，建立 `AmazonEC2Client`：

```
var ec2Client = new Amazon.EC2.AmazonEC2Client();
```

移除 Amazon.Runtime.AssumeRoleAWSCredentials

`Amazon.Runtime.AssumeRoleAWSCredentials` 類別已移除，因為它位於核心命名空間中，但相依於 AWS Security Token Service，而且因為在 SDK 中已過時。改用 `Amazon.SecurityToken.AssumeRoleAWSCredentials` 類別。

移除 S3Link 的 SetACL 方法

`S3Link` 類別是 `Amazon.DynamoDBv2` 套件的一部分，用於在 Amazon S3 中存放做為 DynamoDB 項目中參考的物件。這是有用的功能，但我們不想在 DynamoDB 的 `Amazon.S3` 套件上建立編譯相依性。因此，我們簡化 `S3Link` 類別裡公開的 `Amazon.S3` 方法，我們用 `MakeS3ObjectPublic` 方法取代 `SetACL` 方法。如需更多物件的控制存取控制清單 (ACL) 的控制權，請直接使用 `Amazon.S3` 套件。

移除已淘汰的結果類別

對於中的大多數服務 適用於 .NET 的 AWS SDK，操作會傳回包含操作中繼資料的回應物件，例如請求 ID 和結果物件。額外擁有單獨回應和結果類別，並為開發人員建立額外輸入。在 第 2 版中 適用於 .NET 的 AWS SDK，我們會將結果類別中的所有資訊放入回應類別。同時，我們也標示已淘汰的結果類別，建議不再使用。在 第 3 版中 適用於 .NET 的 AWS SDK，我們移除了這些已淘汰的結果類別，以協助減少 SDK 的大小。

AWS 組態區段變更

您可以透過 適用於 .NET 的 AWS SDK `App.config` 或 `Web.config` 檔案執行 的進階組態。您可透過 `<aws>` config，如下列所提參考的開發套件組件名稱，來完成此項作業。

```
<configuration>
  <configSections>
    <section name="aws" type="Amazon.AWSSection, AWSSDK"/>
  </configSections>
  <aws region="us-west-2">
    <logging logTo="Log4Net"/>
  </aws>
</configuration>
```

```
</aws>
</configuration>
```

在 第 3 版中 適用於 .NET 的 AWS SDK，AWSSDK 組件不再存在。我們將常見程式碼放入 AWSSDK.Core 組件中。所以，您將需要您的 App.config 或 Web.config 檔案中對 AWSSDK 組件的參考更改為 AWSSDK.Core 組件，如下所示：

```
<configuration>
  <configSections>
    <section name="aws" type="Amazon.AWSSection, AWSSDK.Core"/>
  </configSections>
  <aws region="us-west-2">
    <logging logTo="Log4Net"/>
  </aws>
</configuration>
```

您也可以利用 Amazon.AWSConfigs 類別操作組態設定。在 第 3 版中 適用於 .NET 的 AWS SDK，我們將 DynamoDB 的組態設定從 Amazon.AWSConfigs 類別移至 Amazon.AWSConfigsDynamoDB 類別。

遷移至 3.5 版 適用於 .NET 的 AWS SDK

3.5 版透過將 SDK 所有非架構變化的支援轉換為 .NET Standard 2.0，適用於 .NET 的 AWS SDK 進一步標準化 .NET 體驗。<https://docs.microsoft.com/en-us/dotnet/standard/net-standard> 視環境和程式碼基底而定，若要利用第 3.5 版功能，您可能需要執行某些遷移作業。

本主題說明第 3.5 版中的變更，以及您在從第 3 版遷移環境或程式碼時可能需要執行的作業。

3.5 版的變更

以下說明 3.5 適用於 .NET 的 AWS SDK 版中已變更或尚未變更的內容。

.NET Framework 和 .NET Core

.NET Framework 和 .NET Core 支援並未變更。

Xamarin

Xamarin 專案 (全新和現有) 必須將目標鎖定於 .NET Standard 2.0。請參閱[Xamarin.Forms 中的 .NET Standard 2.0 支援](#)和[.NET 實作支援](#)。

Unity

Unity 應用程式必須將目標鎖定於使用 Unity 2018.1 或更新版本的 .NET Standard 2.0 或 .NET 4.x 描述檔。如需詳細資訊，請參閱 [.NET 描述檔支援](#)。此外，如果您使用 IL2CPP 進行建置，則必須新增 link.xml 檔案來停用程式碼分割，如[從 Unity、Xamarin 或 UWP 參考 適用於 .NET 的 AWS SDK 標準 2.0](#) 中所述。將程式碼移植到其中一個建議的程式碼基底之後，Unity 應用程式就可以存取該開發套件提供的所有服務。

由於 Unity 支援 .NET Standard 2.0，開發套件第 3.5 版的，AWSSDK.Core 套件不再具有 Unity 專用程式碼，包括某些較高階的功能。為了提供更好的轉換，所有舊版 Unity 程式碼都可以在 [aws/aws-sdk-unity-net](#) GitHub 儲存庫中參考。如果您發現缺少功能會影響使用 Unity AWS 的，您可以在 <https://github.com/aws/dotnet/issues> 提出功能請求。

另請參閱[Unity 支援的特殊考量](#)。

通用 Windows 平台 (UWP)

將 UWP 應用程式的目標鎖定於 [16299 版或更新版本](#) (Fall Creators Update，2017 年 10 月發佈的 1709 版)。

Windows Phone 和 Silverlight

3.5 版 適用於 .NET 的 AWS SDK 的 不支援這些平台，因為 Microsoft 不再積極開發這些平台。如需詳細資訊，請參閱下列內容：

- [Windows 10 Mobile 終止支援](#)
- [Silverlight 終止支援](#)

舊版可攜式類別程式庫 (設定檔型 PCLs)

考慮將程式庫的目標重新鎖定於 .NET Standard。如需詳細資訊，請參閱來自 Microsoft 的[與可攜式類別程式庫的比較](#)。

Amazon Cognito Sync Manager 和 Amazon Mobile Analytics Manager

簡化使用 Amazon Cognito Sync 和 Amazon Mobile Analytics 的高階抽象概念會從 3.5 版中移除 適用於 .NET 的 AWS SDK。AWS AppSync 是 Amazon Cognito Sync 的首選替代項目。Amazon Pinpoint 是 Amazon Mobile Analytics 的首選替代。

如果您的程式碼受到 AWS AppSync 和 Amazon Pinpoint 缺少更高層級的程式庫程式碼的影響，您可以記錄您對下列其中一個或兩個 GitHub 問題的興趣：<https://github.com/aws/dotnet/issues/20>：// 和 <https://github.com/aws/dotnet/issues/19>。您也可以從下列 GitHub 儲存庫取得 Amazon Cognito Sync Manager 和 Amazon Mobile Analytics Manager 的程式庫：[aws/amazon-cognito-sync-manager-net](https://github.com/aws/amazon-cognito-sync-manager-net) 和 [aws/aws-mobile-analytics-manager-net](https://github.com/aws/aws-mobile-analytics-manager-net)。

遷移同步程式碼

3.5 版同時適用於 .NET 的 AWS SDK 支援 .NET Framework 和 .NET Standard (透過 .NET Core 版本，例如 .NET Core 3.1、.NET 5 等)。符合 .NET Standard 的 SDK 變化僅提供非同步方法，因此如果您想要利用 .NET Standard，您必須變更同步程式碼，使其以非同步方式執行。

下列程式碼片段說明如何將同步程式碼變更為非同步程式碼。這些程式碼片段中的程式碼用於顯示 Amazon S3 儲存貯體的數量。

原始程式碼會呼叫 [ListBuckets](#)。

```
private static ListBucketsResponse MyListBuckets()
{
    var s3Client = new AmazonS3Client();
    var response = s3Client.ListBuckets();
    return response;
}

// From the calling function
ListBucketsResponse response = MyListBuckets();
Console.WriteLine($"Number of buckets: {response.Buckets.Count}");
```

若要使用開發套件第 3.5 版，請改為呼叫 [ListBucketsAsync](#)。

```
private static async Task<ListBucketsResponse> MyListBuckets()
{
    var s3Client = new AmazonS3Client();
    var response = await s3Client.ListBucketsAsync();
    return response;
}

// From an asynchronous calling function
ListBucketsResponse response = await MyListBuckets();
Console.WriteLine($"Number of buckets: {response.Buckets.Count}");
```

```
// OR From a **synchronous** calling function
Task<ListBucketsResponse> response = MyListBuckets();
Console.WriteLine($"Number of buckets: {response.Result.Buckets.Count}");
```

遷移至 3.7 版 適用於 .NET 的 AWS SDK

從 3.7 版開始，適用於 .NET 的 AWS SDK 不再支援 .NET Standard 1.3。

如需從 .NET Standard 1.3 遷移的資訊，請參閱 [從 .NET Standard 1.3 遷移](#)。

從 .NET Standard 1.3 遷移

在 2019 年 6 月 27 日，Microsoft [結束了對 .NET Core 1.0 和 .NET Core 1.1 版本的支援](#)。在此公告之後，AWS 已於 2020 年 12 月 31 日適用於 .NET 的 AWS SDK 日終止對 .NET Standard 1.3 的支援。

AWS 持續提供適用於 .NET 的 AWS SDK 針對 .NET Standard 1.3 的服務更新和安全性修正，直到 2020 年 10 月 1 日為止。在該日期之後，.NET Standard 1.3 目標進入維護模式，這表示沒有發佈新的更新；僅 AWS 套用關鍵錯誤修正和安全性修補程式。

在 2020 年 12 月 31 日，上的 .NET Standard 1.3 支援 適用於 .NET 的 AWS SDK 已終止。在該日期之後，不會套用任何錯誤修正或安全修補程式。使用該目標建置的成品仍可在 NuGet 上下載。

您需要執行的事項

- 如果您使用 .NET Framework 執行應用程式，則不會受到影響。
- 如果您使用 .NET Core 2.0 或更高版本執行應用程式，則不會受到影響。
- 如果您使用 .NET Core 1.0 或 .NET Core 1.1 執行應用程式，請依照 [Microsoft 遷移說明](#)，將應用程式遷移到較新版本的 .NET Core。我們建議至少使用 .NET Core 3.1。
- 如果您執行的是目前無法升級的關鍵業務應用程式，您可以繼續使用目前的 適用於 .NET 的 AWS SDK 版本。

如果您有問題或疑慮，[請聯絡 AWS 支援部門](#)。

在 中使用 AWS 服務 適用於 .NET 的 AWS SDK

下列各節包含範例、教學課程、任務和指南，說明如何使用 適用於 .NET 的 AWS SDK 來使用 AWS 服務。這些範例和教學課程依賴 適用於 .NET 的 AWS SDK 提供的 API。若要查看 API 中有哪些類別和方法可用，請參閱 [適用於 .NET 的 AWS SDK API 參考](#)。

如果您是初次使用 適用於 .NET 的 AWS SDK，建議您先查看[快速導覽](#)主題。它為您提供 SDK 的簡介。

您可以在 GitHub 的程式碼範例[AWS 儲存庫](#)和 [aws-labs 儲存庫](#)中找到更多程式碼範例。 <https://github.com/aws-labs/aws-sdk-net-samples>

開始之前，請確定您已[設定環境和專案](#)。也請檢閱 中的資訊[開發套件功能](#)。

主題

- [具有 指引的程式碼範例 適用於 .NET 的 AWS SDK](#)
- [使用 AWS Lambda 進行運算服務](#)
- [的高階程式庫和架構 適用於 .NET 的 AWS SDK](#)
- [支援其他 AWS 服務和組態](#)

具有 指引的程式碼範例 適用於 .NET 的 AWS SDK

下列各節包含程式碼範例，並提供範例的指引。他們可以協助您了解如何使用 適用於 .NET 的 AWS SDK 來使用 AWS 服務。

如果您是初次使用 適用於 .NET 的 AWS SDK，建議您先查看[快速導覽](#)主題。它為您提供 SDK 的簡介。

開始之前，請確定您已[設定環境和專案](#)。也請檢閱 中的資訊[開發套件功能](#)。

主題

- [CloudFormation 使用 存取 適用於 .NET 的 AWS SDK](#)
- [使用 Amazon Cognito 驗證使用者](#)
- [使用 Amazon DynamoDB NoSQL 資料庫](#)
- [使用 Amazon EC2](#)
- [使用 存取 AWS Identity and Access Management \(IAM\) 適用於 .NET 的 AWS SDK](#)

- [使用 Amazon Simple Storage Service 網際網路儲存](#)
- [使用 Amazon Simple Notification Service 從雲端傳送通知](#)
- [使用 Amazon SQS 傳送訊息](#)

CloudFormation 使用 存取 適用於 .NET 的 AWS SDK

適用於 .NET 的 AWS SDK 支援 [AWS CloudFormation](#)，可預測並重複建立和佈建 AWS 基礎設施部署。

API

為 CloudFormation 用戶端 適用於 .NET 的 AWS SDK 提供 APIs。APIs 可讓您使用 範本和堆疊等 CloudFormation 功能。本節包含一些範例，顯示您在使用這些 APIs 時可遵循的模式。若要檢視完整的 APIs 集，請參閱 [適用於 .NET 的 AWS SDK API 參考](#) (並捲動至「Amazon.CloudFormation」)。

AWS CloudFormation APIs 由 [AWSSDK.CloudFormation](#) 套件提供。

先決條件

開始之前，請確定您已[設定環境和專案](#)。也請檢閱 中的資訊[開發套件功能](#)。

主題

主題

- [使用 列出 AWS 資源 AWS CloudFormation](#)

使用 列出 AWS 資源 AWS CloudFormation

此範例說明如何使用 適用於 .NET 的 AWS SDK 列出 CloudFormation 堆疊中的資源。此範例使用低階 API。應用程式不需要任何引數，但只會收集使用者登入資料可存取的所有堆疊資訊，然後顯示這些堆疊的相關資訊。

開發套件參考

NuGet 套件：

- [AWSSDK.CloudFormation](#)

程式設計元素：

- 命名空間 [Amazon.CloudFormation](#)

[AmazonCloudFormationClient](#) 類別

- 命名空間 [Amazon.CloudFormation.Model](#)

類別 [ICloudFormationPaginatorFactory.DescribeStacks](#)

類別 [DescribeStackResourcesRequest](#)

類別 [DescribeStackResourcesResponse](#)

類別 [堆疊](#)

類別 [StackResource](#)

類別 [標籤](#)

```
using Amazon.CloudFormation;
using Amazon.CloudFormation.Model;
using Amazon.Runtime;

namespace CloudFormationActions;

public static class HelloCloudFormation
{
    public static IAmazonCloudFormation _amazonCloudFormation;

    static async Task Main(string[] args)
    {
        // Create the CloudFormation client
        _amazonCloudFormation = new AmazonCloudFormationClient();
        Console.WriteLine($"\\nIn Region:
{_amazonCloudFormation.Config.RegionEndpoint}");

        // List the resources for each stack
        await ListResources();
    }

    /// <summary>
    /// Method to list stack resources and other information.
    /// </summary>
    /// <returns>True if successful.</returns>
```

```

public static async Task<bool> ListResources()
{
    try
    {
        Console.WriteLine("Getting CloudFormation stack information...");

        // Get all stacks using the stack paginator.
        var paginatorForDescribeStacks =
            _amazonCloudFormation.Paginators.DescribeStacks(
                new DescribeStacksRequest());
        await foreach (Stack stack in paginatorForDescribeStacks.Stacks)
        {
            // Basic information for each stack

            Console.WriteLine("\n-----");
            Console.WriteLine($"Stack: {stack.StackName}");
            Console.WriteLine($"Status: {stack.StackStatus.Value}");
            Console.WriteLine($"Created: {stack.CreationTime}");

            // The tags of each stack (etc.)
            if (stack.Tags.Count > 0)
            {
                Console.WriteLine("Tags:");
                foreach (Tag tag in stack.Tags)
                {
                    Console.WriteLine($"    {tag.Key}, {tag.Value}");
                }
            }

            // The resources of each stack
            DescribeStackResourcesResponse responseDescribeResources =
                await _amazonCloudFormation.DescribeStackResourcesAsync(
                    new DescribeStackResourcesRequest
                    {
                        StackName = stack.StackName
                    });
            if (responseDescribeResources.StackResources.Count > 0)
            {
                Console.WriteLine("Resources:");
                foreach (StackResource resource in responseDescribeResources
                    .StackResources)
                {
                    Console.WriteLine(
                        $"    {resource.LogicalResourceId}:
{resource.ResourceStatus}");
                }
            }
        }
    }
}

```

```
        Console.WriteLine("\n-----");
        return true;
    }
    catch (AmazonCloudFormationException ex)
    {
        Console.WriteLine("Unable to get stack information:\n" + ex.Message);
        return false;
    }
    catch (AmazonServiceException ex)
    {
        if (ex.Message.Contains("Unable to get IAM security credentials"))
        {
            Console.WriteLine(ex.Message);
            Console.WriteLine("If you are usnig SS0, be sure to install" +
                               " the AWSSDK.SS0 and AWSSDK.SS00IDC packages.");
        }
        else
        {
            Console.WriteLine(ex.Message);
            Console.WriteLine(ex.StackTrace);
        }

        return false;
    }
    catch (ArgumentNullException ex)
    {
        if (ex.Message.Contains("Options property cannot be empty: ClientName"))
        {
            Console.WriteLine(ex.Message);
            Console.WriteLine("If you are using SS0, have you logged in?");
        }
        else
        {
            Console.WriteLine(ex.Message);
            Console.WriteLine(ex.StackTrace);
        }

        return false;
    }
}
```

使用 Amazon Cognito 驗證使用者

Note

本主題中的資訊專屬於以 .NET Framework 和 3.3 適用於 .NET 的 AWS SDK 版及更早版本為基礎的專案。

使用 Amazon Cognito Identity，您可以為使用者建立唯一身分，並對其進行身分驗證，以安全地存取您的 AWS 資源，例如 Amazon S3 或 Amazon DynamoDB。Amazon Cognito Identity 支援公有身分提供者，例如 Amazon、Facebook、Twitter/Digits、Google 或任何 OpenID Connect 相容提供者，以及未驗證的身分。Amazon Cognito 也支援[開發人員驗證的身分](#)，可讓您使用自己的後端身分驗證程序註冊和驗證使用者，同時仍使用 Amazon Cognito Sync 同步使用者資料和存取 AWS 資源。

如需 [Amazon Cognito](#) 的詳細資訊，請參閱《[Amazon Cognito 開發人員指南](#)》。

下列程式碼範例示範如何輕鬆使用 Amazon Cognito Identity。此[憑證提供者](#)範例示範如何建立和驗證使用者身分。此[CognitoAuthentication 延伸程式庫](#)範例示範如何使用 CognitoAuthentication 延伸程式庫來驗證 Amazon Cognito 使用者集區。

主題

- [Amazon Cognito 登入資料提供者](#)
- [Amazon CognitoAuthentication 延伸程式庫範例](#)

Amazon Cognito 登入資料提供者

Note

本主題中的資訊專屬於以 .NET Framework 和 3.3 適用於 .NET 的 AWS SDK 版及更早版本為基礎的專案。

Amazon.CognitoIdentity.CognitoAWSCredentials位於 [AWSSDK.CognitoIdentity](#) NuGet 套件中的是登入資料物件，使用 Amazon Cognito 和 AWS Security Token Service (AWS STS) 擷取登入資料以進行 AWS 呼叫。

設定 CognitoAWSCredentials 的第一步是建立「身分集區」。身分集區是您的帳戶專屬的使用者身分資訊存放區。此資訊可跨用戶端平台、裝置和作業系統擷取，因此，如果使用者一開始是在手機上

使用您的應用程式，之後再切換到平板電腦，所保存的應用程式資訊仍然可供該使用者使用。您可以從 Amazon Cognito 主控台建立新的身分集區。如果您使用主控台，它還會提供您需要的其他資訊：

- 您的帳號是 12 位數字的號碼，例如 123456789012，是您帳戶專有。
- 未驗證角色 ARN - 未驗證的使用者將擔任的角色。例如，此角色可提供您資料的唯讀許可。
- 已驗證的角色 ARN - 已驗證的使用者將擔任的角色。此角色可提供您資料更多許可。

設定 CognitoAWSCredentials

下列程式碼範例示範如何設定 CognitoAWSCredentials，然後您可以使用它以未經驗證的使用者身分呼叫 Amazon S3。這可讓您只使用所需的最少量資料來驗證使用者身分。使用者權限由角色控制，因此您可以依需要設定存取權。

```
CognitoAWSCredentials credentials = new CognitoAWSCredentials(  
    accountId,          // Account number  
    identityPoolId,     // Identity pool ID  
    unAuthRoleArn,      // Role for unauthenticated users  
    null,               // Role for authenticated users, not set  
    region);  
using (var s3Client = new AmazonS3Client(credentials))  
{  
    s3Client.ListBuckets();  
}
```

使用 AWS 做為未驗證的使用者

下列程式碼範例示範如何以未經驗證的使用者 AWS 身分開始使用，然後透過 Facebook 進行身分驗證，並更新登入資料以使用 Facebook 登入資料。使用此方法，您便可已驗證的角色授與不同功能給已驗證身分的使用者。例如您的手機應用程式允許使用者匿名檢視內容，如果使用一或多個設定的提供者身分登入的話，還可讓他們張貼文章。

```
CognitoAWSCredentials credentials = new CognitoAWSCredentials(  
    accountId, identityPoolId,  
    unAuthRoleArn,    // Role for unauthenticated users  
    authRoleArn,      // Role for authenticated users  
    region);  
using (var s3Client = new AmazonS3Client(credentials))  
{  
    // Initial use will be unauthenticated  
    s3Client.ListBuckets();  
}
```

```
// Authenticate user through Facebook
string facebookToken = GetFacebookAuthToken();

// Add Facebook login to credentials. This clears the current AWS credentials
// and retrieves new AWS credentials using the authenticated role.
credentials.AddLogin("graph.facebook.com", facebookAccessToken);

// This call is performed with the authenticated role and credentials
s3Client.ListBuckets();
}
```

如果您使用 `AmazonCognitoSyncClient` (屬適用於 .NET 的 AWS SDK 的一部分), `CognitoAWSCredentials` 物件甚至能提供更多功能。如果您同時使用 `AmazonCognitoSyncClient` 和 `CognitoAWSCredentials`, 則不需要在使用呼叫時指定 `IdentityPoolId` 和 `IdentityId` 屬性 `AmazonCognitoSyncClient`。這些屬性會自動從 `CognitoAWSCredentials` 填入。下一個程式碼範例將對此做說明, 並且提供一個事件, 只要適用於 `CognitoAWSCredentials` 的 `IdentityId` 有變動時就會通知您。在某些情況下, 例如從未驗證使用者變更為已驗證使用者時, `IdentityId` 即可變更。

```
CognitoAWSCredentials credentials = GetCognitoAWSCredentials();

// Log identity changes
credentials.IdentityChangedEvent += (sender, args) =>
{
    Console.WriteLine("Identity changed: [{0}] => [{1}]", args.OldIdentityId,
        args.NewIdentityId);
};

using (var syncClient = new AmazonCognitoSyncClient(credentials))
{
    var result = syncClient.ListRecords(new ListRecordsRequest
    {
        DatasetName = datasetName
        // No need to specify these properties
        //IdentityId = "...",
        //IdentityPoolId = "..."
    });
}
```

Amazon CognitoAuthentication 延伸程式庫範例

Note

本主題中的資訊專屬於以 .NET Framework 和 3.3 適用於 .NET 的 AWS SDK 版及更早版本為基礎的專案。

CognitoAuthentication 延伸程式庫位於 [Amazon.Extensions.CognitoAuthentication](#) NuGet 套件中，可簡化 .NET Core 和 Xamarin 開發人員的 Amazon Cognito 使用者集區的身分驗證程序。程式庫建置在 Amazon Cognito Identity Provider API 之上，以建立和傳送使用者身分驗證 API 呼叫。

使用 CognitoAuthentication 延伸程式庫

Amazon Cognito 有一些標準身分驗證流程的內建 AuthFlow 和 ChallengeName 值，可透過安全遠端密碼 (SRP) 驗證使用者名稱和密碼。如需有關驗證流量的詳細資訊，請參閱 [Amazon Cognito 使用者集區身分驗證流程](#)。

以下範例需要這些 using 陳述式：

```
// Required for all examples
using System;
using Amazon;
using Amazon.CognitoIdentity;
using Amazon.CognitoIdentityProvider;
using Amazon.Extensions.CognitoAuthentication;
using Amazon.Runtime;
// Required for the GetS3BucketsAsync example
using Amazon.S3;
using Amazon.S3.Model;
```

使用基本身分驗證

使用 [AnonymousAWSCredentials](#) 建立 [AmazonCognitoIdentityProviderClient](#)，這不需要簽署的請求。您不需要提供一個區域。如果未提供區域，基本程式碼會呼叫 `FallbackRegionFactory.GetRegionEndpoint()`。建立 `CognitoUserPool` 和 `CognitoUser` 物件。以 `InitiateSrpAuthRequest` 呼叫 `StartWithSrpAuthAsync` 的方法，其中包含使用者密碼。

```
public static async void GetCredsAsync()
{
```

```

    AmazonCognitoIdentityProviderClient provider =
        new AmazonCognitoIdentityProviderClient(new
Amazon.Runtime.AnonymousAWSCredentials());
    CognitoUserPool userPool = new CognitoUserPool("poolID", "clientID", provider);
    CognitoUser user = new CognitoUser("username", "clientID", userPool, provider);
    InitiateSrpAuthRequest authRequest = new InitiateSrpAuthRequest()
    {
        Password = "userPassword"
    };

    AuthFlowResponse authResponse = await
user.StartWithSrpAuthAsync(authRequest).ConfigureAwait(false);
    accessToken = authResponse.AuthenticationResult.AccessToken;
}

```

利用挑戰進行驗證

繼續挑戰驗證流程，例如使用 `NewPasswordRequired` 和 `Multi-Factor Authentication (MFA)`，也更簡易。唯一的需求是 `CognitoAuthentication` 物件、SRP 使用者的密碼和下次挑戰需要的資訊，需要在使用者輸入後取得提示。以下程式碼會在驗證流程中顯示一個方式來檢查挑戰類型、取得 MFA 的適當回應和 `NewPasswordRequired` 挑戰。

如同之前提出基本驗證請求，並且 `await AuthFlowResponse`。當透過傳回的 `AuthenticationResult` 物件收到循環回應時。如果 `ChallengeName` 類型為 `NEW_PASSWORD_REQUIRED`，呼叫 `RespondToNewPasswordRequiredAsync` 方法。

```

public static async void GetCredsChallengesAsync()
{
    AmazonCognitoIdentityProviderClient provider =
        new AmazonCognitoIdentityProviderClient(new
Amazon.Runtime.AnonymousAWSCredentials());
    CognitoUserPool userPool = new CognitoUserPool("poolID", "clientID", provider);
    CognitoUser user = new CognitoUser("username", "clientID", userPool, provider);
    InitiateSrpAuthRequest authRequest = new InitiateSrpAuthRequest(){
        Password = "userPassword"
    };

    AuthFlowResponse authResponse = await
user.StartWithSrpAuthAsync(authRequest).ConfigureAwait(false);

    while (authResponse.AuthenticationResult == null)
    {

```

```
if (authResponse.ChallengeName == ChallengeNameType.NEW_PASSWORD_REQUIRED)
{
    Console.WriteLine("Enter your desired new password:");
    string newPassword = Console.ReadLine();

    authResponse = await user.RespondToNewPasswordRequiredAsync(new
RespondToNewPasswordRequiredRequest()
    {
        SessionID = authResponse.SessionID,
        NewPassword = newPassword
    });
    accessToken = authResponse.AuthenticationResult.AccessToken;
}
else if (authResponse.ChallengeName == ChallengeNameType.SMS_MFA)
{
    Console.WriteLine("Enter the MFA Code sent to your device:");
    string mfaCode = Console.ReadLine();

    AuthFlowResponse mfaResponse = await user.RespondToSmsMfaAuthAsync(new
RespondToSmsMfaRequest()
    {
        SessionID = authResponse.SessionID,
        MfaCode = mfaCode
    }).ConfigureAwait(false);
    accessToken = authResponse.AuthenticationResult.AccessToken;
}
else
{
    Console.WriteLine("Unrecognized authentication challenge.");
    accessToken = "";
    break;
}
}

if (authResponse.AuthenticationResult != null)
{
    Console.WriteLine("User successfully authenticated.");
}
else
{
    Console.WriteLine("Error in authentication process.");
}
```

```
}
```

身分驗證後使用 AWS 資源

使用 CognitoAuthentication 程式庫驗證使用者後，下一步是允許使用者存取適當的 AWS 資源。若要這樣做，您必須透過 Amazon Cognito 聯合身分主控台建立身分集區。透過指定您建立做為提供者的 Amazon Cognito 使用者集區，使用其 poolID 和 clientID，您可以允許 Amazon Cognito 使用者集區使用者存取 AWS 連接到您帳戶的資源。您也可以指定不同的角色，以啟用這兩種未經驗證及經過驗證的使用者存取不同的資源。您可以在 IAM 主控台變更這些規則，其中您可以新增或移除附加政策之角色的 Action (動作) 欄位的許可。然後，使用適當的身分集區、使用者集區和 Amazon Cognito 使用者資訊，您可以呼叫不同的 AWS 資源。下列範例顯示透過 SRP 驗證的使用者，存取關聯身分集區角色允許的不同 Amazon S3 儲存貯體

```
public async void GetS3BucketsAsync()
{
    var provider = new AmazonCognitoIdentityProviderClient(new
    AnonymousAWSCredentials());
    CognitoUserPool userPool = new CognitoUserPool("poolID", "clientID", provider);
    CognitoUser user = new CognitoUser("username", "clientID", userPool, provider);

    string password = "userPassword";

    AuthFlowResponse context = await user.StartWithSrpAuthAsync(new
    InitiateSrpAuthRequest()
    {
        Password = password
    }).ConfigureAwait(false);

    CognitoAWSCredentials credentials =
        user.GetCognitoAWSCredentials("identityPoolID", RegionEndpoint.<
    YourIdentityPoolRegion >);

    using (var client = new AmazonS3Client(credentials))
    {
        ListBucketsResponse response =
            await client.ListBucketsAsync(new
    ListBucketsRequest()).ConfigureAwait(false);

        foreach (S3Bucket bucket in response.Buckets)
        {
            Console.WriteLine(bucket.BucketName);
        }
    }
}
```

```
}  
}
```

更多身分驗證選項

除了 SRP、NewPasswordRequired 和 MFA，CognitoAuthentication 擴展程式庫提供更輕鬆的驗證流程：

- 自訂 - 以呼叫 `StartWithCustomAuthAsync(InitiateCustomAuthRequest customRequest)` 起始
- RefreshToken - 以呼叫 `StartWithRefreshTokenAuthAsync(InitiateRefreshTokenAuthRequest refreshTokenRequest)` 起始
- RefreshTokenSRP - 以呼叫 `StartWithRefreshTokenAuthAsync(InitiateRefreshTokenAuthRequest refreshTokenRequest)` 起始
- AdminNoSRP - 以呼叫 `StartWithAdminNoSrpAuthAsync(InitiateAdminNoSrpAuthRequest adminAuthRequest)` 起始

根據您要的流程呼叫適當的方法。然後，當每個方法呼叫的 `AuthFlowResponse` 物件中顯示挑戰時，繼續提示使用者挑戰的存在。同時呼叫適當的回應方法，例如 `RespondToSmsMfaAuthAsync` 用於 MFA 挑戰，`RespondToCustomAuthAsync` 用於自訂挑戰。

使用 Amazon DynamoDB NoSQL 資料庫

Note

這些主題中的程式設計模型同時存在於 .NET Framework 和 .NET (Core) 中，但無論同步或非同步，呼叫慣例都不同。

適用於 .NET 的 AWS SDK 支援 Amazon DynamoDB，這是提供的快速 NoSQL 資料庫服務 AWS。開發套件提供三種與 DynamoDB 通訊的程式設計模型：低階模型、文件模型和物件持久性模型。

下列資訊介紹這些模型及其 APIs、提供如何使用和何時使用這些模型的範例，並為您提供 中其他 DynamoDB 程式設計資源的連結 適用於 .NET 的 AWS SDK。

低階模型

低階程式設計模型會包裝對 DynamoDB 服務的直接呼叫。您透過 [Amazon.DynamoDBv2](#) 命名空間存取此模型。

三個模型中，低階模型要求您撰寫最多的程式碼。例如，您必須將 .NET 資料類型轉換為 DynamoDB 中的對等資料類型。不過，這個模型可讓您存取最多的功能。

下列範例示範如何使用低階模型來建立資料表、修改資料表，以及將項目插入 DynamoDB 中的資料表。

建立資料表

在下列範例中，您可以使用 `AmazonDynamoDBClient` 類別的 `CreateTable` 方法建立資料表。此 `CreateTable` 方法使用 `CreateTableRequest` 類別的執行個體，其中包含特性，例如必要項目屬性名稱、主索引鍵定義和傳輸量。`CreateTable` 方法傳回 `CreateTableResponse` 類別的執行個體。

```
// using Amazon.DynamoDBv2;
// using Amazon.DynamoDBv2.Model;

var client = new AmazonDynamoDBClient();

Console.WriteLine("Getting list of tables");
List<string> currentTables = client.ListTables().TableNames;
Console.WriteLine("Number of tables: " + currentTables.Count);
if (!currentTables.Contains("AnimalsInventory"))
{
    var request = new CreateTableRequest
    {
        TableName = "AnimalsInventory",
        AttributeDefinitions = new List<AttributeDefinition>
        {
            new AttributeDefinition
            {
                AttributeName = "Id",
                // "S" = string, "N" = number, and so on.
                AttributeType = "N"
            },
            new AttributeDefinition
            {
                AttributeName = "Type",
                AttributeType = "S"
            }
        }
    }
```



```

    },
    KeySchema = new List<KeySchemaElement>
    {
        new KeySchemaElement
        {
            AttributeName = "Id",
            // "HASH" = hash key, "RANGE" = range key.
            KeyType = "HASH"
        },
        new KeySchemaElement
        {
            AttributeName = "Type",
            KeyType = "RANGE"
        },
    },
    ProvisionedThroughput = new ProvisionedThroughput
    {
        ReadCapacityUnits = 10,
        WriteCapacityUnits = 5
    },
};

var response = client.CreateTable(request);

Console.WriteLine("Table created with request ID: " +
    response.ResponseMetadata.RequestId);
}

```

確認資料表已準備修改

在您可以變更或修改資料表之前，資料表必須做好修改的準備。下列範例示範如何使用低階模型來驗證 DynamoDB 中的資料表是否已就緒。在這個範例中，透過 `AmazonDynamoDBClient` 類別的 `DescribeTable` 方法來做為檢查目標資料表的參考。程式碼每 5 秒檢查一次資料表的 `TableStatus` 屬性值。當狀態是設定為 `ACTIVE`，資料表已準備好做修改。

```

// using Amazon.DynamoDBv2;
// using Amazon.DynamoDBv2.Model;

var client = new AmazonDynamoDBClient();
var status = "";

do
{

```

```
// Wait 5 seconds before checking (again).
System.Threading.Thread.Sleep(TimeSpan.FromSeconds(5));

try
{
    var response = client.DescribeTable(new DescribeTableRequest
    {
        TableName = "AnimalsInventory"
    });

    Console.WriteLine("Table = {0}, Status = {1}",
        response.Table.TableName,
        response.Table.TableStatus);

    status = response.Table.TableStatus;
}
catch (ResourceNotFoundException)
{
    // DescribeTable is eventually consistent. So you might
    // get resource not found.
}

} while (status != TableStatus.ACTIVE);
```

將項目插入到資料表

在下列範例中，您使用低階模型將兩個項目插入 DynamoDB 中的資料表。每個項目使用 `PutItemRequest` 類別的執行個體，透過 `AmazonDynamoDBClient` 類別的 `PutItem` 方法插入。`PutItemRequest` 類別的兩個執行個體的每一個，採用具有一系列的項目屬性值，且其項目將插入的資料表名稱。

```
// using Amazon.DynamoDBv2;
// using Amazon.DynamoDBv2.Model;

var client = new AmazonDynamoDBClient();

var request1 = new PutItemRequest
{
    TableName = "AnimalsInventory",
    Item = new Dictionary<string, AttributeValue>
    {
        { "Id", new AttributeValue { N = "1" } },
        { "Type", new AttributeValue { S = "Dog" } },
    }
}
```

```
        { "Name", new AttributeValue { S = "Fido" }}
    }
};

var request2 = new PutItemRequest
{
    TableName = "AnimalsInventory",
    Item = new Dictionary<string, AttributeValue>
    {
        { "Id", new AttributeValue { N = "2" }},
        { "Type", new AttributeValue { S = "Cat" }},
        { "Name", new AttributeValue { S = "Patches" }}
    }
};

client.PutItem(request1);
client.PutItem(request2);
```

文件模型

文件程式設計模型提供更簡單的方法來使用 DynamoDB 中的資料。此模型特別適用於存取資料表和資料表中的項目。您透過 [Amazon.DynamoDBv2.DocumentModel](#) 命名空間存取此模型。

與低階程式設計模型相比，文件模型更容易針對 DynamoDB 資料編寫程式碼。例如，您不需要在 DynamoDB 中將任意數量的 .NET 資料類型轉換為同等類型。不過，這個模型不提供如同低階程式設計模型數量一樣多功能的存取權。例如，您可以使用此模型來建立、擷取、更新和刪除資料表中的項目。不過，若要建立資料表，您必須使用低階模型。相較於物件持續性模型，這個模型要求您編寫更多的程式碼來存放、載入和查詢 .NET 物件。

如需 DynamoDB 文件程式設計模型的詳細資訊，請參閱《[Amazon DynamoDB 開發人員指南](#)》中的 [.NET：文件模型](#)。

下列各節提供如何建立所需 DynamoDB 資料表之表示法的相關資訊，以及如何使用文件模型將項目插入資料表並從資料表取得項目的範例。

建立資料表的表示法

若要使用文件模型執行資料操作，您必須先建立代表特定資料表的 Table 類別執行個體。有兩種主要方式可以執行此操作。

LoadTable 方法

第一個機制是使用 [Table](#) 類別的其中一個靜態 LoadTable 方法，類似下列範例：

```
var client = new AmazonDynamoDBClient();
Table table = Table.LoadTable(client, "Reply");
```

Note

雖然此機制可以運作，但在某些情況下，它有時可能會因為冷啟動和執行緒集區行為而導致額外的延遲或死結。如需這些行為的詳細資訊，請參閱部落格文章[改善的 DynamoDB 初始化模式 適用於 .NET 的 AWS SDK](#)。

TableBuilder

[AWSSDK.DynamoDBv2 NuGet 套件的 3.7.203 版](#)中推出了替代機制 [TableBuilder](#)類別。此機制可以透過移除某些隱含方法呼叫來解決上述行為；特別是 DescribeTable方法。此機制的使用方式類似下列範例：

```
var client = new AmazonDynamoDBClient();
var table = new TableBuilder(client, "Reply")
    .AddHashKey("Id", DynamoDBEntryType.String)
    .AddRangeKey("ReplyDateTime", DynamoDBEntryType.String)
    .AddGlobalSecondaryIndex("PostedBy-Message-index", "Author",
        DynamoDBEntryType.String, "Message", DynamoDBEntryType.String)
    .Build();
```

如需此替代機制的詳細資訊，請再次參閱部落格文章[改善的 DynamoDB 初始化模式 適用於 .NET 的 AWS SDK](#)。

將項目插入資料表

在下列範例中，回覆會透過 Table類別的 PutItemAsync方法插入回覆資料表。此 PutItemAsync方法採用 Document類別的執行個體；Document類別只是一組初始化屬性。

```
using Amazon.DynamoDBv2;
using Amazon.DynamoDBv2.DocumentModel;

// Create a representation of the "Reply" table
// by using one of the mechanisms described previously.

// Then, add a reply to the table.
var newReply = new Document();
```

```
newReply["Id"] = Guid.NewGuid().ToString();
newReply["ReplyDateTime"] = DateTime.UtcNow;
newReply["PostedBy"] = "Author1";
newReply["Message"] = "Thank you!";

await table.PutItemAsync(newReply);
```

從資料表取得項目

在下列範例中，會透過 Table 類別的 `GetItemAsync` 方法擷取回覆。為了判斷要取得的回覆，`GetItemAsync` 方法會使用目標回覆的 hash-and-range 主索引鍵。

```
using Amazon.DynamoDBv2;
using Amazon.DynamoDBv2.DocumentModel;

// Create a representation of the "Reply" table
// by using one of the mechanisms described previously.

// Then, get a reply from the table
// where "guid" is the hash key and "datetime" is the range key.
var reply = await table.GetItemAsync(guid, datetime);
Console.WriteLine("Id = " + reply["Id"]);
Console.WriteLine("ReplyDateTime = " + reply["ReplyDateTime"]);
Console.WriteLine("PostedBy = " + reply["PostedBy"]);
Console.WriteLine("Message = " + reply["Message"]);
```

上述範例會隱含地將資料表值轉換為 `WriteLine` 方法的字串。您可以使用 `DynamoDBEntry` 類別的各種「As【type】」方法進行明確轉換。例如，您可以透過 `AsGuid()` 方法，將的 `Id` 從 `Primitive` 資料類型明確轉換為 GUID：

```
var guid = reply["Id"].AsGuid();
```

物件持續性模型

物件持久性程式設計模型專為在 DynamoDB 中存放、載入和查詢 .NET 物件而設計。您透過 [Amazon.DynamoDBv2.DataModel](#) 命名空間存取此模型。

在三個模型中，每當您儲存、載入或查詢 DynamoDB 資料時，物件持久性模型最容易對進行編碼。例如，您可以直接使用 DynamoDB 資料類型。不過，此模型只能存取在 DynamoDB 中存放、載入和查詢 .NET 物件的操作。例如，您可以使用此模型來建立、擷取、更新和刪除資料表中的項目。不過，您必須先使用低階模型建立資料表，然後使用此模型將 .NET 類別對應至資料表。

如需 DynamoDB 物件持久性程式設計模型的詳細資訊，請參閱《[Amazon DynamoDB 開發人員指南](#)》中的 [.NET：物件持久性模型](#)。

下列範例示範如何定義代表 DynamoDB 項目的 .NET 類別、使用 .NET 類別的執行個體將項目插入 DynamoDB 資料表，以及使用 .NET 類別的執行個體從資料表取得項目。

定義代表資料表中項目的 .NET 類別

在下列類別定義範例中，DynamoDBTable 屬性會指定資料表名稱，而 DynamoDBHashKey 和 DynamoDBRangeKey 屬性則會建立資料表 hash-and-range 主索引鍵的模型。DynamoDBGlobalSecondaryIndexHashKey 屬性已定義，因此可以建構特定作者的回覆查詢。

```
using Amazon.DynamoDBv2;
using Amazon.DynamoDBv2.DataModel;

[DynamoDBTable("Reply")]
public class Reply
{
    [DynamoDBHashKey]
    public string Id { get; set; }

    [DynamoDBRangeKey(StoreAsEpoch = false)]
    public DateTime ReplyDateTime { get; set; }

    [DynamoDBGlobalSecondaryIndexHashKey("PostedBy-Message-Index",
        AttributeName = "PostedBy")]
    public string Author { get; set; }

    [DynamoDBGlobalSecondaryIndexRangeKey("PostedBy-Message-Index")]
    public string Message { get; set; }
}
```

建立物件持久性模型的內容

若要使用 DynamoDB 的物件持久性程式設計模型，您必須建立內容，以提供與 DynamoDB 的連線，並可讓您存取資料表、執行各種操作和執行查詢。

基本內容

下列範例示範如何建立最基本的內容。

```
using Amazon.DynamoDBv2;
```

```
using Amazon.DynamoDBv2.DataModel;

var client = new AmazonDynamoDBClient();
var context = new DynamoDBContext(client);
```

DisableFetchingTableMetadata 屬性的內容

下列範例示範如何額外設定 DynamoDBContextConfig 類別的 DisableFetchingTableMetadata 屬性，以防止對 DescribeTable 方法的隱含呼叫。

```
using Amazon.DynamoDBv2;
using Amazon.DynamoDBv2.DataModel;

var client = new AmazonDynamoDBClient();
var context = new DynamoDBContext(client, new DynamoDBContextConfig
{
    DisableFetchingTableMetadata = true
});
```

如果 DisableFetchingTableMetadata 屬性設為 false (預設值)，如第一個範例所示，您可以省略描述 Reply 類別中資料表項目索引鍵和索引結構的屬性。這些屬性將改為透過對 DescribeTable 方法的隱含呼叫來推斷。如果 DisableFetchingTableMetadata 設定為 true，如第二個範例所示，物件持久性模型的方法，例如 SaveAsync 和 完全 QueryAsync 依賴 Reply 類別中定義的屬性。在此情況下，不會呼叫 DescribeTable 方法。

Note

在某些情況下，對 DescribeTable 方法的呼叫有時可能會因為冷啟動和執行緒集區行為而導致額外的延遲或死結。因此，有時最好避免呼叫該方法。

如需這些行為的詳細資訊，請參閱部落格文章 [改善的 DynamoDB 初始化模式 適用於 .NET 的 AWS SDK](#)。

使用 .NET 類別的執行個體將項目插入資料表

在此範例中，項目是透過 DynamoDBContext 類別的 SaveAsync 方法插入，這會取得代表項目之 .NET 類別的初始化執行個體。

```
using Amazon.DynamoDBv2;
using Amazon.DynamoDBv2.DataModel;
```

```
// Create an appropriate context for the object persistence programming model,
// examples of which have been described earlier.

// Create an object that represents the new item.
var reply = new Reply()
{
    Id = Guid.NewGuid().ToString(),
    ReplyDateTime = DateTime.UtcNow,
    Author = "Author1",
    Message = "Thank you!"
};

// Insert the item into the table.
await context.SaveAsync<Reply>(reply, new DynamoDBOperationConfig
{
    IndexName = "PostedBy-Message-index"
});
```

使用 .NET 類別的執行個體從資料表取得項目

在此範例中，會建立查詢，以使用 `DynamoDBContext` 類別的 `QueryAsync` 方法尋找「Author1」的所有記錄。然後，透過查詢的 `GetNextSetAsync` 方法擷取項目。

```
using Amazon.DynamoDBv2;
using Amazon.DynamoDBv2.DataModel;

// Create an appropriate context for the object persistence programming model,
// examples of which have been described earlier.

// Construct a query that finds all replies by a specific author.
var query = context.QueryAsync<Reply>("Author1", new DynamoDBOperationConfig
{
    IndexName = "PostedBy-Message-index"
});

// Display the result.
var set = await query.GetNextSetAsync();
foreach (var item in set)
{
    Console.WriteLine("Id = " + item.Id);
    Console.WriteLine("ReplyDateTime = " + item.ReplyDateTime);
    Console.WriteLine("PostedBy = " + item.Author);
    Console.WriteLine("Message = " + item.Message);
}
```



```
}
```

物件持久性模型的其他資訊

上述範例和說明有時會包含名為 `DynamoDBContext` 類別的屬性 `DisableFetchingTableMetadata`。此屬性在 [AWSSDK.DynamoDBv2 NuGet 套件的 3.7.203 版](#)中推出，可讓您避免因冷啟動和執行緒集區行為而可能導致額外延遲或死結的特定情況。如需詳細資訊，請參閱部落格文章[改善的 DynamoDB 初始化模式 適用於 .NET 的 AWS SDK](#)。

以下是有關此屬性的一些額外資訊。

- 如果您使用 .NET Framework，則可以在 `app.config` 或 `web.config` 檔案中全域設定此屬性。
- 您可以使用 [AWSConfigsDynamoDB](#) 類別全域設定此屬性，如下列範例所示。

```
// Set the DisableFetchingTableMetadata property globally
// before constructing any context objects.
AWSConfigsDynamoDB.Context.DisableFetchingTableMetadata = true;

var client = new AmazonDynamoDBClient();
var context = new DynamoDBContext(client);
```

- 在某些情況下，您無法將 `DynamoDB` 屬性新增至 .NET 類別；例如，如果類別是在相依性中定義。在這種情況下，仍然可以利用 `DisableFetchingTableMetadata` 屬性。若要這樣做，請在 `DisableFetchingTableMetadata` 屬性之外使用 [TableBuilder](#) 類別。此 `TableBuilder` 類別也在 [AWSSDK.DynamoDBv2 NuGet 套件的 3.7.203 版](#)中推出。

```
// Set the DisableFetchingTableMetadata property globally
// before constructing any context objects.
AWSConfigsDynamoDB.Context.DisableFetchingTableMetadata = true;

var client = new AmazonDynamoDBClient();
var context = new DynamoDBContext(client);

var table = new TableBuilder(client, "Reply")
    .AddHashKey("Id", DynamoDBEntryType.String)
    .AddRangeKey("ReplyDateTime", DynamoDBEntryType.String)
    .AddGlobalSecondaryIndex("PostedBy-Message-index", "Author",
        DynamoDBEntryType.String,
        "Message", DynamoDBEntryType.String)
    .Build();

// This registers the "Reply" table we constructed via the builder.
```

```
context.RegisterTableDefinition(table);

// Now operations like this will work,
// even if the Reply class was not annotated with this index.
var query = context.QueryAsync<Reply>("Author1", new DynamoDBOperationConfig()
{
    IndexName = "PostedBy-Message-index"
});
```

其他資訊

使用 適用於 .NET 的 AWS SDK 來程式設計 DynamoDB、資訊和範例

- [DynamoDB API](#)
- [DynamoDB 系列開始](#)
- [DynamoDB 系列 - 文件模型](#)
- [DynamoDB 系列 - 轉換結構描述](#)
- [DynamoDB 系列 - 物件持久性模型](#)
- [DynamoDB 系列 - 運算式](#)
- [搭配 Amazon DynamoDB 和使用運算式 適用於 .NET 的 AWS SDK](#)
- [Amazon DynamoDB 中的 JSON 支援](#)

低階模型、資訊和範例

- [使用 適用於 .NET 的 AWS SDK 低階 API 處理資料表](#)
- [使用 適用於 .NET 的 AWS SDK 低階 API 處理項目](#)
- [使用 適用於 .NET 的 AWS SDK 低階 API 查詢資料表](#)
- [使用 適用於 .NET 的 AWS SDK 低階 API 掃描資料表](#)
- [使用 適用於 .NET 的 AWS SDK 低階 API 處理本機次要索引](#)
- [使用 適用於 .NET 的 AWS SDK 低階 API 處理全域次要索引](#)

文件模型、資訊和範例

- [DynamoDB 資料類型](#)
- [DynamoDBEntry](#)

- [.NET：文件模型](#)

物件持久性模型、資訊和範例

- [.NET：物件持久性模型](#)

其他實用資訊

- [AWS 與 .NET Acoveer 整合](#) 如需使用 Amazon DynamoDB 進行本機開發的相關資訊，請參閱。

主題

- [搭配 Amazon DynamoDB 和使用運算式 適用於 .NET 的 AWS SDK](#)
- [Amazon DynamoDB 中的 JSON 支援](#)

搭配 Amazon DynamoDB 和 使用運算式 適用於 .NET 的 AWS SDK

 Note

本主題中的資訊專屬於以 .NET Framework 和 3.3 適用於 .NET 的 AWS SDK 版及更早版本為基礎的專案。

下列程式碼範例示範如何使用 適用於 .NET 的 AWS SDK 搭配表達式來程式設計 DynamoDB。運算式表示您要從 DynamoDB 資料表中的項目讀取的屬性。您也可以在寫入項目時使用表達式來表示必須符合的任何條件 (也稱為條件更新) 及屬性的更新方式。有些更新範例是以新值取代屬性，或新增資料到清單或對應表。如需詳細資訊，請參閱[使用運算式讀取和寫入項目](#)。

主題

- [範例資料](#)
- [使用表達式和項目的主索引鍵取得單一項目](#)
- [使用表達式和資料表的主索引鍵取得多重項目](#)
- [使用運算式和其他項目屬性來取得多重項目](#)
- [列印項目](#)
- [使用運算式建立或取代項目](#)
- [使用運算式更新項目](#)

- [使用運算式刪除項目](#)
- [詳細資訊](#)

範例資料

本主題中的程式碼範例依賴名為 `ProductCatalog` 的 DynamoDB 資料表中的下列兩個範例項目。這些項目描述有關產品項目存放在虛構自行車目錄的資訊。這些項目中提供的範例是根據 [案例研究：ProductCatalog 項目](#)。資料類型描述項如 `B00L`、`L`、`M`、`N`、`NS`、`S` 和 `SS`，對應到 [JSON 資料格式](#) 中的描述項。

```
{
  "Id": {
    "N": "205"
  },
  "Title": {
    "S": "20-Bicycle 205"
  },
  "Description": {
    "S": "205 description"
  },
  "BicycleType": {
    "S": "Hybrid"
  },
  "Brand": {
    "S": "Brand-Company C"
  },
  "Price": {
    "N": "500"
  },
  "Gender": {
    "S": "B"
  },
  "Color": {
    "SS": [
      "Red",
      "Black"
    ]
  },
  "ProductCategory": {
    "S": "Bike"
  },
  "InStock": {
```

```
"BOOL": true
},
"QuantityOnHand": {
  "N": "1"
},
"RelatedItems": {
  "NS": [
    "341",
    "472",
    "649"
  ]
},
"Pictures": {
  "L": [
    {
      "M": {
        "FrontView": {
          "S": "http://example/products/205_front.jpg"
        }
      }
    },
    {
      "M": {
        "RearView": {
          "S": "http://example/products/205_rear.jpg"
        }
      }
    },
    {
      "M": {
        "SideView": {
          "S": "http://example/products/205_left_side.jpg"
        }
      }
    }
  ]
},
"ProductReviews": {
  "M": {
    "FiveStar": {
      "SS": [
        "Excellent! Can't recommend it highly enough! Buy it!",
        "Do yourself a favor and buy this."
      ]
    }
  }
}
```

```
    },
    "OneStar": {
      "SS": [
        "Terrible product! Do not buy this."
      ]
    }
  }
},
{
  "Id": {
    "N": "301"
  },
  "Title": {
    "S": "18-Bicycle 301"
  },
  "Description": {
    "S": "301 description"
  },
  "BicycleType": {
    "S": "Road"
  },
  "Brand": {
    "S": "Brand-Company C"
  },
  "Price": {
    "N": "185"
  },
  "Gender": {
    "S": "F"
  },
  "Color": {
    "SS": [
      "Blue",
      "Silver"
    ]
  },
  "ProductCategory": {
    "S": "Bike"
  },
  "InStock": {
    "BOOL": true
  },
  "QuantityOnHand": {
```

```

    "N": "3"
  },
  "RelatedItems": {
    "NS": [
      "801",
      "822",
      "979"
    ]
  },
  "Pictures": {
    "L": [
      {
        "M": {
          "FrontView": {
            "S": "http://example/products/301_front.jpg"
          }
        }
      },
      {
        "M": {
          "RearView": {
            "S": "http://example/products/301_rear.jpg"
          }
        }
      },
      {
        "M": {
          "SideView": {
            "S": "http://example/products/301_left_side.jpg"
          }
        }
      }
    ]
  },
  "ProductReviews": {
    "M": {
      "FiveStar": {
        "SS": [
          "My daughter really enjoyed this bike!"
        ]
      },
      "ThreeStar": {
        "SS": [
          "This bike was okay, but I would have preferred it in my color.",

```

```
        "Fun to ride."
    ]
}
}
}
}
```

使用表達式和項目的主索引鍵取得單一項目

以下範例功能 Amazon.DynamoDBv2.AmazonDynamoDBClient.GetItem 方法和一組可取得並列印具有 Id 的 205 項目的運算式。只有下列項目的屬性會傳回：Id、Title、Description、Color、RelatedItems、Pictures 和 ProductReviews。

```
// using Amazon.DynamoDBv2;
// using Amazon.DynamoDBv2.Model;

var client = new AmazonDynamoDBClient();
var request = new GetItemRequest
{
    TableName = "ProductCatalog",
    ProjectionExpression = "Id, Title, Description, Color, #ri, Pictures, #pr",
    ExpressionAttributeNames = new Dictionary<string, string>
    {
        { "#pr", "ProductReviews" },
        { "#ri", "RelatedItems" }
    },
    Key = new Dictionary<string, AttributeValue>
    {
        { "Id", new AttributeValue { N = "205" } }
    },
};
var response = client.GetItem(request);

// PrintItem() is a custom function.
PrintItem(response.Item);
```

在上述範例中，ProjectionExpression 屬性指定要傳回的屬性。此 ExpressionAttributeNames 屬性指定預留位置 #pr 代表 ProductReviews 屬性，而預留位置 #ri 代表 RelatedItems 屬性。呼叫 PrintItem 是指在[列印項目](#)中描述的自訂功能。

使用表達式和資料表的主索引鍵取得多重項目

以下範例具備 `Amazon.DynamoDBv2.AmazonDynamoDBClient.Query` 方法和一組可取得的運算式，然後列印具有 `Id` 301 的項目，但只限於 `Price` 值大於 150 時。只有下列項目的屬性會傳回：`Id`、`Title` 和所有在 `ProductReviews` 的 `ThreeStar` 屬性。

```
// using Amazon.DynamoDBv2;
// using Amazon.DynamoDBv2.Model;

var client = new AmazonDynamoDBClient();
var request = new QueryRequest
{
    TableName = "ProductCatalog",
    KeyConditions = new Dictionary<string, Condition>
    {
        { "Id", new Condition()
            {
                ComparisonOperator = ComparisonOperator.EQ,
                AttributeValueList = new List<AttributeValue>
                {
                    new AttributeValue { N = "301" }
                }
            }
        },
    },
    ProjectionExpression = "Id, Title, #pr.ThreeStar",
    ExpressionAttributeNames = new Dictionary<string, string>
    {
        { "#pr", "ProductReviews" },
        { "#p", "Price" }
    },
    ExpressionAttributeValues = new Dictionary<string, AttributeValue>
    {
        { ":val", new AttributeValue { N = "150" } }
    },
    FilterExpression = "#p > :val"
};
var response = client.Query(request);

foreach (var item in response.Items)
{
    // Write out the first page of an item's attribute keys and values.
    // PrintItem() is a custom function.
}
```

```
PrintItem(item);
Console.WriteLine("====");
}
```

在上述範例中，`ProjectionExpression` 屬性指定要傳回的屬性。此 `ExpressionAttributeNames` 屬性指定預留位置 `#pr` 代表 `ProductReviews` 屬性，而預留位置 `#p` 代表 `Price` 屬性。`#pr.ThreeStar` 指定只傳回 `ThreeStar` 屬性。`ExpressionAttributeValues` 屬性指定預留位置 `:val` 代表值 `150`。`FilterExpression` 屬性指定 `#p (Price)` 必須大於 `:val (150)`。呼叫 `PrintItem` 是指在[列印項目](#)中描述的自訂功能。

使用運算式和其他項目屬性來取得多重項目

以下範例具備 `Amazon.DynamoDBv2.AmazonDynamoDBClient.Scan` 方法和一組可取得的運算式，然後列印所有具有 `Bike` 的 `ProductCategory` 項目。只有下列項目的屬性會傳回：`Id`、`Title` 和所有在 `ProductReviews` 的屬性。

```
// using Amazon.DynamoDBv2;
// using Amazon.DynamoDBv2.Model;

var client = new AmazonDynamoDBClient();
var request = new ScanRequest
{
    TableName = "ProductCatalog",
    ProjectionExpression = "Id, Title, #pr",
    ExpressionAttributeValues = new Dictionary<string, AttributeValue>
    {
        { ":catg", new AttributeValue { S = "Bike" } }
    },
    ExpressionAttributeNames = new Dictionary<string, string>
    {
        { "#pr", "ProductReviews" },
        { "#pc", "ProductCategory" }
    },
    FilterExpression = "#pc = :catg",
};
var response = client.Scan(request);

foreach (var item in response.Items)
{
    // Write out the first page/scan of an item's attribute keys and values.
    // PrintItem() is a custom function.
    PrintItem(item);
}
```

```
Console.WriteLine("====");  
}
```

在上述範例中，`ProjectionExpression` 屬性指定要傳回的屬性。此 `ExpressionAttributeNames` 屬性指定預留位置 `#pr` 代表 `ProductReviews` 屬性，而預留位置 `#pc` 代表 `ProductCategory` 屬性。`ExpressionAttributeValues` 屬性指定預留位置 `:catg` 代表值 `Bike`。`FilterExpression` 屬性指定 `#pc (ProductCategory)` 必須等於 `:catg (Bike)`。呼叫 `PrintItem` 是指在[列印項目](#)中描述的自訂功能。

列印項目

以下範例說明如何列印某個項目的屬性和值。此範例用於上述範例，說明如何[使用表達式和項目的主索引鍵取得單一項目](#)、[使用表達式和資料表的主索引鍵取得多重項目](#)，以及[使用表達式和其他項目屬性取得多重項目](#)。

```
// using Amazon.DynamoDBv2.Model;  
  
// Writes out an item's attribute keys and values.  
public static void PrintItem(Dictionary<string, AttributeValue> attrs)  
{  
    foreach (KeyValuePair<string, AttributeValue> kvp in attrs)  
    {  
        Console.Write(kvp.Key + " = ");  
        PrintValue(kvp.Value);  
    }  
}  
  
// Writes out just an attribute's value.  
public static void PrintValue(AttributeValue value)  
{  
    // Binary attribute value.  
    if (value.B != null)  
    {  
        Console.Write("Binary data");  
    }  
    // Binary set attribute value.  
    else if (value.BS.Count > 0)  
    {  
        foreach (var bValue in value.BS)  
        {  
            Console.Write("\n  Binary data");  
        }  
    }  
}
```

```
}
// List attribute value.
else if (value.L.Count > 0)
{
    foreach (AttributeValue attr in value.L)
    {
        PrintValue(attr);
    }
}
// Map attribute value.
else if (value.M.Count > 0)
{
    Console.WriteLine("\n");
    PrintItem(value.M);
}
// Number attribute value.
else if (value.N != null)
{
    Console.WriteLine(value.N);
}
// Number set attribute value.
else if (value.NS.Count > 0)
{
    Console.WriteLine("{0}", string.Join("\n", value.NS.ToArray()));
}
// Null attribute value.
else if (value.NULL)
{
    Console.WriteLine("Null");
}
// String attribute value.
else if (value.S != null)
{
    Console.WriteLine(value.S);
}
// String set attribute value.
else if (value.SS.Count > 0)
{
    Console.WriteLine("{0}", string.Join("\n", value.SS.ToArray()));
}
// Otherwise, boolean value.
else
{
    Console.WriteLine(value.BOOL);
}
```

```
}

Console.WriteLine("\n");
}
```

在上述範例中，每個屬性值有數種資料類型特定屬性，可進行評估以判斷列印屬性所用的正確格式。這些屬性包括 B、BOOL、BS、L、M、N、NS、NULL、S 和 SS，這些分別對應於那些[JSON 資料格式](#)。對於像 B、N、NULL 和 S 的屬性，如果對應的屬性不是 null，則屬性是對應的非 null 資料類型。對於，例如 BS、L、M、NS 和 SS 屬性，如果 Count 大於零，則屬性是對應的非零值資料類型。如果所有屬性的資料類型特定屬性是 null 或 Count 等於零，則屬性對應到 BOOL 資料類型。

使用運算式建立或取代項目

以下範例具備 Amazon.DynamoDBv2.AmazonDynamoDBClient.PutItem 方法和一組可取得的運算式，可更新具有 18-Bicycle 301 的 Title 的項目。如果項目尚未存在，則會新增新的項目。

```
// using Amazon.DynamoDBv2;
// using Amazon.DynamoDBv2.Model;

var client = new AmazonDynamoDBClient();
var request = new PutItemRequest
{
    TableName = "ProductCatalog",
    ExpressionAttributeNames = new Dictionary<string, string>
    {
        { "#title", "Title" }
    },
    ExpressionAttributeValues = new Dictionary<string, AttributeValue>
    {
        { ":product", new AttributeValue { S = "18-Bicycle 301" } }
    },
    ConditionExpression = "#title = :product",
    // CreateItemData() is a custom function.
    Item = CreateItemData()
};
client.PutItem(request);
```

在上述範例中，ExpressionAttributeNames 屬性指定預留位置 #title 代表 Title 屬性。ExpressionAttributeValues 屬性指定預留位置 :product 代表值 18-Bicycle 301。ConditionExpression 屬性指定 #title (Title) 必須等於 :product (18-Bicycle 301)。此呼叫 CreateItemData 是指以下自訂函數：

```
// using Amazon.DynamoDBv2.Model;

// Provides a sample item that can be added to a table.
public static Dictionary<string, AttributeValue> CreateItemData()
{
    var itemData = new Dictionary<string, AttributeValue>
    {
        { "Id", new AttributeValue { N = "301" } },
        { "Title", new AttributeValue { S = "18\" Girl's Bike" } },
        { "BicycleType", new AttributeValue { S = "Road" } },
        { "Brand" , new AttributeValue { S = "Brand-Company C" } },
        { "Color", new AttributeValue { SS = new List<string>{ "Blue", "Silver" } } },
        { "Description", new AttributeValue { S = "301 description" } },
        { "Gender", new AttributeValue { S = "F" } },
        { "InStock", new AttributeValue { BOOL = true } },
        { "Pictures", new AttributeValue { L = new List<AttributeValue>{
            { new AttributeValue { M = new Dictionary<string,AttributeValue>{
                { "FrontView", new AttributeValue { S = "http://example/
products/301_front.jpg" } } } },
            { new AttributeValue { M = new Dictionary<string,AttributeValue>{
                { "RearView", new AttributeValue {S = "http://example/
products/301_rear.jpg" } } } },
            { new AttributeValue { M = new Dictionary<string,AttributeValue>{
                { "SideView", new AttributeValue { S = "http://example/
products/301_left_side.jpg" } } } } }
        } } },
        { "Price", new AttributeValue { N = "185" } },
        { "ProductCategory", new AttributeValue { S = "Bike" } },
        { "ProductReviews", new AttributeValue { M = new Dictionary<string,AttributeValue>{
            { "FiveStar", new AttributeValue { SS = new List<string>{
                "My daughter really enjoyed this bike!" } } },
            { "OneStar", new AttributeValue { SS = new List<string>{
                "Fun to ride.",
                "This bike was okay, but I would have preferred it in my color." } } }
        } } },
        { "QuantityOnHand", new AttributeValue { N = "3" } },
        { "RelatedItems", new AttributeValue { NS = new List<string>{ "979", "822",
"801" } } }
    };

    return itemData;
}
```

在上述範例中，具範例資料的範例項目會傳回給呼叫者。建構一系列屬性和對應的值，使用資料類型例如 BOOL、L、M、N、NS、S、和SS、分別對應於那些 [JSON 資料格式](#)。

使用運算式更新項目

以下範例具備 Amazon.DynamoDBv2.AmazonDynamoDBClient.UpdateItem 方法和一組運算式，為具有 Id 301 的項目變更 Title 到 18" Girl's Bike。

```
// using Amazon.DynamoDBv2;
// using Amazon.DynamoDBv2.Model;

var client = new AmazonDynamoDBClient();
var request = new UpdateItemRequest
{
    TableName = "ProductCatalog",
    Key = new Dictionary<string,AttributeValue>
    {
        { "Id", new AttributeValue { N = "301" } }
    },
    ExpressionAttributeNames = new Dictionary<string, string>
    {
        { "#title", "Title" }
    },
    ExpressionAttributeValues = new Dictionary<string, AttributeValue>
    {
        { ":newproduct", new AttributeValue { S = "18\" Girl's Bike" } }
    },
    UpdateExpression = "SET #title = :newproduct"
};
client.UpdateItem(request);
```

在上述範例中，ExpressionAttributeNames 屬性指定預留位置 #title 代表 Title 屬性。ExpressionAttributeValues 屬性指定預留位置 :newproduct 代表值 18" Girl's Bike。UpdateExpression 屬性指定變更 #title (Title) 為 :newproduct (18" Girl's Bike)。

使用運算式刪除項目

以下範例具備 Amazon.DynamoDBv2.AmazonDynamoDBClient.DeleteItem 方法和一組表達式，可刪除具有 Id 301 的項目，但只有項目的 Title 為 18-Bicycle 301。

```
// using Amazon.DynamoDBv2;
```

```
// using Amazon.DynamoDBv2.Model;

var client = new AmazonDynamoDBClient();
var request = new DeleteItemRequest
{
    TableName = "ProductCatalog",
    Key = new Dictionary<string,AttributeValue>
    {
        { "Id", new AttributeValue { N = "301" } }
    },
    ExpressionAttributeNames = new Dictionary<string, string>
    {
        { "#title", "Title" }
    },
    ExpressionAttributeValues = new Dictionary<string, AttributeValue>
    {
        { ":product", new AttributeValue { S = "18-Bicycle 301" } }
    },
    ConditionExpression = "#title = :product"
};
client.DeleteItem(request);
```

在上述範例中，`ExpressionAttributeNames` 屬性指定預留位置 `#title` 代表 `Title` 屬性。`ExpressionAttributeValues` 屬性指定預留位置 `:product` 代表值 `18-Bicycle 301`。`ConditionExpression` 屬性指定 `#title (Title)` 必須等於 `:product (18-Bicycle 301)`。

詳細資訊

如需詳細資訊和編碼範例，請參閱：

- [DynamoDB 系列 - 運算式](#)
- [存取項目的投影運算式屬性](#)
- [使用預留位置的屬性名稱和值](#)
- [使用條件運算式指定條件](#)
- [以更新運算式修改項目和屬性](#)
- [使用 適用於 .NET 的 AWS SDK 低階 API 處理項目](#)
- [使用 適用於 .NET 的 AWS SDK 低階 API 查詢資料表](#)
- [使用 適用於 .NET 的 AWS SDK 低階 API 掃描資料表](#)

- [使用 適用於 .NET 的 AWS SDK 低階 API 處理本機次要索引](#)
- [使用 適用於 .NET 的 AWS SDK 低階 API 處理全域次要索引](#)

Amazon DynamoDB 中的 JSON 支援

Note

本主題中的資訊專屬於以 .NET Framework 和 3.3 適用於 .NET 的 AWS SDK 版及更早版本為基礎的專案。

使用 Amazon DynamoDB 時，適用於 .NET 的 AWS SDK 支援 JSON 資料。這可讓您更輕鬆地從 DynamoDB 資料表取得 JSON 格式的資料，並將 JSON 文件插入其中。

主題

- [以 JSON 格式從 DynamoDB 資料表取得資料](#)
- [將 JSON 格式資料插入 DynamoDB 資料表](#)
- [DynamoDB 資料類型轉換為 JSON](#)
- [詳細資訊](#)

以 JSON 格式從 DynamoDB 資料表取得資料

下列範例顯示如何從 DynamoDB 資料表取得 JSON 格式的資料：

```
// using Amazon.DynamoDBv2;
// using Amazon.DynamoDBv2.DocumentModel;

var client = new AmazonDynamoDBClient();
var table = Table.LoadTable(client, "AnimalsInventory");
var item = table.GetItem(3, "Horse");

var jsonText = item.ToJson();
Console.WriteLine(jsonText);

// Output:
// {"Name":"Shadow","Type":"Horse","Id":3}

var jsonPrettyText = item.ToJsonPretty();
```

```
Console.WriteLine(jsonPrettyText);

// Output:
// {
//     "Name" : "Shadow",
//     "Type" : "Horse",
//     "Id"    : 3
// }
```

在上述範例中，Document 類別的 ToJson 方法將某個項目從資料表轉換到 JSON 格式字串。該項目透過 Table 類別的 GetItem 方法擷取。在此範例中，為判斷要取得的項目，GetItem 方法使用目標項目的雜湊和範圍主索引鍵。為了決定要從中取得項目的資料表，Table 類別的 LoadTable 方法會使用 DynamoDB 中 AmazonDynamoDBClient 類別的執行個體和目標資料表的名稱。

將 JSON 格式資料插入 DynamoDB 資料表

下列範例示範如何使用 JSON 格式將項目插入 DynamoDB 資料表：

```
// using Amazon.DynamoDBv2;
// using Amazon.DynamoDBv2.DocumentModel;

var client = new AmazonDynamoDBClient();
var table = Table.LoadTable(client, "AnimalsInventory");
var jsonText = "{\"Id\":6,\"Type\":\"Bird\",\"Name\":\"Tweety\"}";
var item = Document.FromJson(jsonText);

table.PutItem(item);
```

在上述範例中，Document 類別的 FromJson 方法將 JSON 格式字串轉換到項目。項目是透過 Table 類別的 PutItem 方法插入到資料表中，其使用包含項目的 Document 類別的執行個體。若要判斷要插入項目的資料表，會呼叫 Table 類別的 LoadTable 方法，在 DynamoDB 中指定 AmazonDynamoDBClient 類別的執行個體和目標資料表的名稱。

DynamoDB 資料類型轉換為 JSON

每當您呼叫 Document 類別的 ToJson 方法，然後在產生的 JSON 資料上呼叫 FromJson 方法，將 JSON 資料轉換回 Document 類別的執行個體時，某些 DynamoDB 資料類型將不會如預期轉換。具體而言：

- DynamoDB 集合 (SS、NS 和 BS 類型) 將轉換為 JSON 陣列。
- DynamoDB 二進位純量和集 (B 和 BS 類型) 將轉換為 base64 編碼的 JSON 字串或字串清單。

在此案例中，您必須呼叫的 Document 類別的 DecodeBase64Attributes 方法，使用正確的二進位代碼取代以 base64 編碼的 JSON 資料。在以下範例中，在名為 Picture 之 Document 類別的執行個體中，使用正確的二進位代碼取代以 base64 編碼的二進位純量項目屬性。此範例也在名為 RelatedPictures 之 Document 類別的相同執行個體中，針對以 base64 編碼的二進位集項目屬性進行目同操作：

```
item.DecodeBase64Attributes("Picture", "RelatedPictures");
```

詳細資訊

如需使用 DynamoDB 搭配對 JSON 進程式設計的詳細資訊和範例 適用於 .NET 的 AWS SDK，請參閱：

- [DynamoDB JSON 支援](#)
- [Amazon DynamoDB 更新 - JSON、擴充免費方案、靈活擴展、較大項目](#)

使用 Amazon EC2

適用於 .NET 的 AWS SDK 支援 [Amazon EC2](#)，這是一種 Web 服務，可提供可調整大小的運算容量。您可以使用此運算容量來建置和託管軟體系統。

API

為 Amazon EC2 用戶端 適用於 .NET 的 AWS SDK 提供 APIs。APIs 可讓您使用安全群組和金鑰對等 EC2 功能。APIs 也可讓您控制 Amazon EC2 執行個體。本節包含一些範例，顯示您在使用這些 APIs 時可遵循的模式。若要檢視完整的 APIs 集，請參閱 [適用於 .NET 的 AWS SDK API 參考](#)（並捲動至「Amazon.EC2」）。

Amazon EC2 APIs 由 [AWSSDK.EC2](#) NuGet 套件提供。

先決條件

開始之前，請確定您已[設定環境和專案](#)。也請檢閱 中的資訊[開發套件功能](#)。

關於範例

本節中的範例說明如何使用 Amazon EC2 用戶端和管理 Amazon EC2 執行個體。

[EC2 Spot 執行個體教學](#)課程說明如何請求 Amazon EC2 Spot 執行個體。Spot 執行個體可讓您以低於隨需價格的價格存取未使用的 EC2 容量。

主題

- [在 Amazon EC2 中使用安全群組](#)
- [使用 Amazon EC2 金鑰對](#)
- [查看您的 Amazon EC2 區域和可用區域](#)
- [使用 Amazon EC2 執行個體](#)
- [Amazon EC2 Spot 執行個體教學課程](#)

在 Amazon EC2 中使用安全群組

在 Amazon EC2 中，安全群組可做為虛擬防火牆，控制一或多個 EC2 執行個體的網路流量。根據預設，EC2 會將您的執行個體與不允許傳入流量的安全群組建立關聯。您可以建立允許您的 EC2 執行個體接受特定連接的安全群組。例如，如果您需要連接到 EC2 Windows 執行個體，則必須設定安全群組以允許 RDP 流量。

若要進一步了解安全群組，請參閱 [《Amazon EC2 使用者指南》中的 Amazon EC2 安全群組](#)。
[Amazon EC2](#)

Warning

EC2-Classic 在 2022 年 8 月 15 日淘汰。建議您從 EC2-Classic 遷移至 VPC。如需詳細資訊，請參閱部落格文章 [EC2-Classic Networking 正在淘汰 – 以下是如何準備](#)。

如需 APIs 和先決條件的相關資訊，請參閱父區段 ([使用 Amazon EC2](#))。

主題

- [列舉安全群組](#)
- [建立安全群組](#)
- [更新安全群組](#)

列舉安全群組

此範例說明如何使用 適用於 .NET 的 AWS SDK 列舉安全群組。如果您提供 [Amazon Virtual Private Cloud](#) ID，應用程式會列舉該特定 VPC 的安全群組。否則，應用程式只會顯示所有可用安全群組的清單。

下列各節提供此範例的程式碼片段。之後會顯示[範例的完整程式碼](#)，並可依原樣建置和執行。

主題

- [列舉安全群組](#)
- [完成程式碼](#)
- [其他考量](#)

列舉安全群組

下列程式碼片段會列舉您的安全群組。如果指定一個群組，則會列舉特定 VPC 的所有群組或群組。

[本主題結尾](#)的範例顯示此程式碼片段正在使用中。

```
//
// Method to enumerate the security groups
private static async Task EnumerateGroups(IAmazonEC2 ec2Client, string vpcID)
{
    // A request object, in case we need it.
    var request = new DescribeSecurityGroupsRequest();

    // Put together the properties, if needed
    if(!string.IsNullOrEmpty(vpcID))
    {
        // We have a VPC ID. Find the security groups for just that VPC.
        Console.WriteLine($"\\nGetting security groups for VPC {vpcID}...\\n");
        request.Filters.Add(new Filter
        {
            Name = "vpc-id",
            Values = new List<string>() { vpcID }
        });
    }

    // Get the list of security groups
    DescribeSecurityGroupsResponse response =
        await ec2Client.DescribeSecurityGroupsAsync(request);
```

```
// Display the list of security groups.
foreach (SecurityGroup item in response.SecurityGroups)
{
    Console.WriteLine("Security group: " + item.GroupId);
    Console.WriteLine("\tGroupId: " + item.GroupId);
    Console.WriteLine("\tGroupName: " + item.GroupName);
    Console.WriteLine("\tVpcId: " + item.VpcId);
    Console.WriteLine();
}
}
```

完成程式碼

本節顯示此範例的相關參考和完整程式碼。

開發套件參考

NuGet 套件：

- [AWSSDK.EC2](#)

程式設計元素：

- 命名空間 [Amazon.EC2](#)

[AmazonEC2Client](#) 類別

- 命名空間 [Amazon.EC2.Model](#)

類別 [DescribeSecurityGroupsRequest](#)

類別 [DescribeSecurityGroupsResponse](#)

類別 [篩選條件](#)

類別 [SecurityGroup](#)

程式碼

```
using System;
using System.Threading.Tasks;
using System.Collections.Generic;
using Amazon.EC2;
```

```
using Amazon.EC2.Model;

namespace EC2EnumerateSecGroups
{
    class Program
    {
        static async Task Main(string[] args)
        {
            // Parse the command line
            string vpcID = string.Empty;
            if(args.Length == 0)
            {
                Console.WriteLine("\nEC2EnumerateSecGroups [vpc_id]");
                Console.WriteLine("  vpc_id - The ID of the VPC for which you want to see
security groups.");
                Console.WriteLine("\nSince you specified no arguments, showing all available
security groups.");
            }
            else
            {
                vpcID = args[0];
            }

            if(vpcID.StartsWith("vpc-") || string.IsNullOrEmpty(vpcID))
            {
                // Create an EC2 client object
                var ec2Client = new AmazonEC2Client();

                // Enumerate the security groups
                await EnumerateGroups(ec2Client, vpcID);
            }
            else
            {
                Console.WriteLine("Could not find a valid VPC ID in the command-line
arguments:");
                Console.WriteLine($"{args[0]}");
            }
        }

        //
        // Method to enumerate the security groups
        private static async Task EnumerateGroups(IAmazonEC2 ec2Client, string vpcID)
        {
```

```
// A request object, in case we need it.
var request = new DescribeSecurityGroupsRequest();

// Put together the properties, if needed
if(!string.IsNullOrEmpty(vpcID))
{
    // We have a VPC ID. Find the security groups for just that VPC.
    Console.WriteLine($"\\nGetting security groups for VPC {vpcID}...\\n");
    request.Filters.Add(new Filter
    {
        Name = "vpc-id",
        Values = new List<string>() { vpcID }
    });
}

// Get the list of security groups
DescribeSecurityGroupsResponse response =
    await ec2Client.DescribeSecurityGroupsAsync(request);

// Display the list of security groups.
foreach (SecurityGroup item in response.SecurityGroups)
{
    Console.WriteLine("Security group: " + item.GroupId);
    Console.WriteLine("\\tGroupId: " + item.GroupId);
    Console.WriteLine("\\tGroupName: " + item.GroupName);
    Console.WriteLine("\\tVpcId: " + item.VpcId);
    Console.WriteLine();
}
}
}
```

其他考量

- 請注意，VPC 案例的篩選條件建構時，名稱/值對Name的部分設定為 "vpc-id"。此名稱來自 [DescribeSecurityGroupsRequest](#) 類別Filters屬性的描述。
- 若要取得安全群組的完整清單，您也可以在沒有參數的情況下使用 [DescribeSecurityGroupsAsync](#)。
- 您可以在 [Amazon EC2 主控台](#) 中檢查安全群組清單來驗證結果。

建立安全群組

此範例說明如何使用適用於 .NET 的 AWS SDK 來建立安全群組。您可以提供現有 VPC 的 ID，以在 VPC 中建立 EC2 的安全群組。如果您未提供此類 ID，如果 AWS 您的帳戶支援此 ID，則新的安全群組將適用於 EC2-Classic。

如果您未提供 VPC ID，且 AWS 您的帳戶不支援 EC2-Classic，則新的安全群組將屬於您帳戶的預設 VPC。

Warning

EC2-Classic 在 2022 年 8 月 15 日淘汰。建議您從 EC2-Classic 遷移至 VPC。如需詳細資訊，請參閱部落格文章 [EC2-Classic Networking 正在淘汰 – 以下是如何準備](#)。

下列各節提供此範例的程式碼片段。之後會顯示[範例的完整程式碼](#)，並可依原樣建置和執行。

主題

- [尋找現有的安全群組](#)
- [建立安全群組](#)
- [完成程式碼](#)

尋找現有的安全群組

下列程式碼片段會搜尋指定 VPC 中具有指定名稱的現有安全群組。

[本主題結尾](#)的範例顯示此程式碼片段正在使用中。

```
//  
// Method to determine if a security group with the specified name  
// already exists in the VPC  
private static async Task<List<SecurityGroup>> FindSecurityGroups(  
    IAmazonEC2 ec2Client, string groupName, string vpcID)  
{  
    var request = new DescribeSecurityGroupsRequest();  
    request.Filters.Add(new Filter{  
        Name = "group-name",  
        Values = new List<string>() { groupName }  
    });
```

```

    if(!string.IsNullOrEmpty(vpcID))
        request.Filters.Add(new Filter{
            Name = "vpc-id",
            Values = new List<string>() { vpcID }
        });

    var response = await ec2Client.DescribeSecurityGroupsAsync(request);
    return response.SecurityGroups;
}

```

建立安全群組

如果指定 VPC 中不存在具有該名稱的群組，以下程式碼片段會建立新的安全群組。如果未指定 VPC，且具有該名稱的一或多個群組存在，則程式碼片段只會傳回群組清單。

[本主題結尾](#)的範例顯示此程式碼片段正在使用中。

```

//
// Method to create a new security group (either EC2-Classic or EC2-VPC)
// If vpcID is empty, the security group will be for EC2-Classic
private static async Task<List<SecurityGroup>> CreateSecurityGroup(
    IAmazonEC2 ec2Client, string groupName, string vpcID)
{
    // See if one or more security groups with that name
    // already exist in the given VPC. If so, return the list of them.
    var securityGroups = await FindSecurityGroups(ec2Client, groupName, vpcID);
    if (securityGroups.Count > 0)
    {
        Console.WriteLine(
            $"\\nOne or more security groups with name {groupName} already exist.\\n");
        return securityGroups;
    }

    // If the security group doesn't already exists, create it.
    var createRequest = new CreateSecurityGroupRequest{
        GroupName = groupName
    };
    if(string.IsNullOrEmpty(vpcID))
    {
        createRequest.Description = "My .NET example security group for EC2-Classic";
    }
    else
    {

```

```
        createRequest.VpcId = vpcID;
        createRequest.Description = "My .NET example security group for EC2-VPC";
    }
    CreateSecurityGroupResponse createResponse =
        await ec2Client.CreateSecurityGroupAsync(createRequest);

    // Return the new security group
    DescribeSecurityGroupsResponse describeResponse =
        await ec2Client.DescribeSecurityGroupsAsync(new DescribeSecurityGroupsRequest{
            GroupIds = new List<string>() { createResponse.GroupId }
        });
    return describeResponse.SecurityGroups;
}
```

完成程式碼

本節顯示此範例的相關參考和完整程式碼。

開發套件參考

NuGet 套件：

- [AWSSDK.EC2](#)

程式設計元素：

- 命名空間 [Amazon.EC2](#)

[AmazonEC2Client](#) 類別

- 命名空間 [Amazon.EC2.Model](#)

類別 [CreateSecurityGroupRequest](#)

類別 [CreateSecurityGroupResponse](#)

類別 [DescribeSecurityGroupsRequest](#)

類別 [DescribeSecurityGroupsResponse](#)

類別 [篩選條件](#)

類別 [SecurityGroup](#)

程式碼

```

using System;
using System.Threading.Tasks;
using System.Collections.Generic;
using Amazon.EC2;
using Amazon.EC2.Model;

namespace EC2CreateSecGroup
{
    // = = = = =
    // Class to create a security group
    class Program
    {
        private const int MaxArgs = 2;

        static async Task Main(string[] args)
        {
            // Parse the command line and show help if necessary
            var parsedArgs = CommandLine.Parse(args);
            if(parsedArgs.Count == 0)
            {
                PrintHelp();
                return;
            }
            if(parsedArgs.Count > MaxArgs)
                CommandLine.ErrorExit("\nThe number of command-line arguments is incorrect." +
                    "\nRun the command with no arguments to see help.");

            // Get the application arguments from the parsed list
            var groupName = CommandLine.GetArgument(parsedArgs, null, "-g", "--group-name");
            var vpcID = CommandLine.GetArgument(parsedArgs, null, "-v", "--vpc-id");
            if(string.IsNullOrEmpty(groupName))
                CommandLine.ErrorExit("\nYou must supply a name for the new group." +
                    "\nRun the command with no arguments to see help.");
            if(!string.IsNullOrEmpty(vpcID) && !vpcID.StartsWith("vpc-"))
                CommandLine.ErrorExit($"Not a valid VPC ID: {vpcID}");

            // groupName has a value and vpcID either has a value or is null (which is fine)
            // Create the new security group and display information about it
            var securityGroups =
                await CreateSecurityGroup(new AmazonEC2Client(), groupName, vpcID);
            Console.WriteLine("Information about the security group(s):");
        }
    }
}

```

```

    foreach(var group in securityGroups)
    {
        Console.WriteLine($"\\nGroupName: {group.GroupName}");
        Console.WriteLine($"GroupId: {group.GroupId}");
        Console.WriteLine($"Description: {group.Description}");
        Console.WriteLine($"VpcId (if any): {group.VpcId}");
    }
}

//
// Method to create a new security group (either EC2-Classic or EC2-VPC)
// If vpcID is empty, the security group will be for EC2-Classic
private static async Task<List<SecurityGroup>> CreateSecurityGroup(
    IAmazonEC2 ec2Client, string groupName, string vpcID)
{
    // See if one or more security groups with that name
    // already exist in the given VPC. If so, return the list of them.
    var securityGroups = await FindSecurityGroups(ec2Client, groupName, vpcID);
    if (securityGroups.Count > 0)
    {
        Console.WriteLine(
            $"\\nOne or more security groups with name {groupName} already exist.\\n");
        return securityGroups;
    }

    // If the security group doesn't already exists, create it.
    var createRequest = new CreateSecurityGroupRequest{
        GroupName = groupName
    };
    if(string.IsNullOrEmpty(vpcID))
    {
        createRequest.Description = "Security group for .NET code example (no VPC
specified)";
    }
    else
    {
        createRequest.VpcId = vpcID;
        createRequest.Description = "Security group for .NET code example (VPC: " +
vpcID + ")";
    }
    CreateSecurityGroupResponse createResponse =
        await ec2Client.CreateSecurityGroupAsync(createRequest);

```

```

    // Return the new security group
    DescribeSecurityGroupsResponse describeResponse =
        await ec2Client.DescribeSecurityGroupsAsync(new DescribeSecurityGroupsRequest{
            GroupIds = new List<string>() { createResponse.GroupId }
        });
    return describeResponse.SecurityGroups;
}

//
// Method to determine if a security group with the specified name
// already exists in the VPC
private static async Task<List<SecurityGroup>> FindSecurityGroups(
    IAmazonEC2 ec2Client, string groupName, string vpcID)
{
    var request = new DescribeSecurityGroupsRequest();
    request.Filters.Add(new Filter{
        Name = "group-name",
        Values = new List<string>() { groupName }
    });
    if(!string.IsNullOrEmpty(vpcID))
        request.Filters.Add(new Filter{
            Name = "vpc-id",
            Values = new List<string>() { vpcID }
        });

    var response = await ec2Client.DescribeSecurityGroupsAsync(request);
    return response.SecurityGroups;
}

//
// Command-line help
private static void PrintHelp()
{
    Console.WriteLine(
        "\nUsage: EC2CreateSecGroup -g <group-name> [-v <vpc-id>]" +
        "\n  -g, --group-name: The name you would like the new security group to have."
    +
        "\n  -v, --vpc-id: The ID of a VPC to which the new security group will
    belong." +
        "\n      If vpc-id isn't present, the security group will be" +
        "\n      for EC2-Classic (if your AWS account supports this)" +
        "\n      or will use the default VCP for EC2-VPC.");
}

```

```

    }
}

// =====
// Class that represents a command line on the console or terminal.
// (This is the same for all examples. When you have seen it once, you can ignore
it.)
static class CommandLine
{
    //
    // Method to parse a command line of the form: "--key value" or "-k value".
    //
    // Parameters:
    // - args: The command-line arguments passed into the application by the system.
    //
    // Returns:
    // A Dictionary with string Keys and Values.
    //
    // If a key is found without a matching value, Dictionary.Value is set to the key
    // (including the dashes).
    // If a value is found without a matching key, Dictionary.Key is set to "--NoKeyN",
    // where "N" represents sequential numbers.
    public static Dictionary<string,string> Parse(string[] args)
    {
        var parsedArgs = new Dictionary<string,string>();
        int i = 0, n = 0;
        while(i < args.Length)
        {
            // If the first argument in this iteration starts with a dash it's an option.
            if(args[i].StartsWith("-"))
            {
                var key = args[i++];
                var value = key;

                // Check to see if there's a value that goes with this option?
                if((i < args.Length) && (!args[i].StartsWith("-"))) value = args[i++];
                parsedArgs.Add(key, value);
            }

            // If the first argument in this iteration doesn't start with a dash, it's a
value
            else

```

```

        {
            parsedArgs.Add("--NoKey" + n.ToString(), args[i++]);
            n++;
        }
    }

    return parsedArgs;
}

//
// Method to get an argument from the parsed command-line arguments
//
// Parameters:
// - parsedArgs: The Dictionary object returned from the Parse() method (shown
above).
// - defaultValue: The default string to return if the specified key isn't in
parsedArgs.
// - keys: An array of keys to look for in parsedArgs.
public static string GetArgument(
    Dictionary<string,string> parsedArgs, string defaultReturn, params string[] keys)
{
    string retval = null;
    foreach(var key in keys)
        if(parsedArgs.TryGetValue(key, out retval)) break;
    return retval ?? defaultReturn;
}

//
// Method to exit the application with an error.
public static void ErrorExit(string msg, int code=1)
{
    Console.WriteLine("\nError");
    Console.WriteLine(msg);
    Environment.Exit(code);
}
}
}
}

```

更新安全群組

此範例說明如何使用 適用於 .NET 的 AWS SDK 將規則新增至安全群組。特別是，此範例會新增規則，以允許特定 TCP 連接埠上的傳入流量，例如用於 EC2 執行個體的遠端連線。應用程式會取得現

有安全群組的 ID、CIDR 格式的 IP 地址（或地址範圍），以及選用的 TCP 連接埠號碼。然後，它會將傳入規則新增至指定的安全群組。

Note

若要用此範例，您需要 CIDR 格式的 IP 地址（或地址範圍）。如需取得本機電腦 IP 地址的方法，請參閱本主題結尾的其他考量事項。

下列各節提供此範例的程式碼片段。之後會顯示[範例的完整程式碼](#)，並可依原樣建置和執行。

主題

- [新增傳入規則](#)
- [完成程式碼](#)
- [其他考量](#)

新增傳入規則

下列程式碼片段會將傳入規則新增至特定 IP 地址（或範圍）和 TCP 連接埠的安全群組。

[本主題結尾](#)的範例顯示此程式碼片段正在使用中。

```
//
// Method that adds a TCP ingress rule to a security group
private static async Task AddIngressRule(
    IAmazonEC2 eC2Client, string groupId, string ipAddress, int port)
{
    // Create an object to hold the request information for the rule.
    // It uses an IpPermission object to hold the IP information for the rule.
    var ingressRequest = new AuthorizeSecurityGroupIngressRequest{
        GroupId = groupId;
        ingressRequest.IpPermissions.Add(new IpPermission{
            IpProtocol = "tcp",
            FromPort = port,
            ToPort = port,
            Ipv4Ranges = new List<IpRange>() { new IpRange { CidrIp = ipAddress } }
        });

    // Create the inbound rule for the security group
    AuthorizeSecurityGroupIngressResponse responseIngress =
        await eC2Client.AuthorizeSecurityGroupIngressAsync(ingressRequest);
```

```

        Console.WriteLine($"\\nNew RDP rule was written in {groupId} for {ipAddress}.");
        Console.WriteLine($"Result: {responseIngress.HttpStatusCode}");
    }

```

完成程式碼

本節顯示此範例的相關參考和完整程式碼。

開發套件參考

NuGet 套件：

- [AWSSDK.EC2](#)

程式設計元素：

- 命名空間 [Amazon.EC2](#)

[AmazonEC2Client](#) 類別

- 命名空間 [Amazon.EC2.Model](#)

類別 [AuthorizeSecurityGroupIngressRequest](#)

類別 [AuthorizeSecurityGroupIngressResponse](#)

類別 [IpPermission](#)

類別 [IpRange](#)

程式碼

```

using System;
using System.Threading.Tasks;
using System.Collections.Generic;
using Amazon.EC2;
using Amazon.EC2.Model;

namespace EC2AddRuleForRDP
{
    // = = = = =
    // Class to add a rule that allows inbound traffic on TCP a port

```

```

class Program
{
    private const int DefaultPort = 3389;

    static async Task Main(string[] args)
    {
        // Parse the command line and show help if necessary
        var parsedArgs = CommandLine.Parse(args);
        if(parsedArgs.Count == 0)
        {
            PrintHelp();
            return;
        }

        // Get the application arguments from the parsed list
        var groupId = CommandLine.GetArgument(parsedArgs, null, "-g", "--group-id");
        var ipAddress = CommandLine.GetArgument(parsedArgs, null, "-i", "--ip-address");
        var portStr = CommandLine.GetArgument(parsedArgs, DefaultPort.ToString(), "-p",
"--port");
        if(string.IsNullOrEmpty(ipAddress))
            CommandLine.ErrorExit("\nYou must supply an IP address in CIDR format.");
        if(string.IsNullOrEmpty(groupId) || !groupId.StartsWith("sg-"))
            CommandLine.ErrorExit("\nThe ID for a security group is missing or
incorrect.");
        if(int.Parse(portStr) == 0)
            CommandLine.ErrorExit($"The given TCP port number, {portStr}, isn't
allowed.");

        // Add a rule to the given security group that allows
        // inbound traffic on a TCP port
        await AddIngressRule(
            new AmazonEC2Client(), groupId, ipAddress, int.Parse(portStr));
    }

    //
    // Method that adds a TCP ingress rule to a security group
    private static async Task AddIngressRule(
        IAmazonEC2 eC2Client, string groupId, string ipAddress, int port)
    {
        // Create an object to hold the request information for the rule.
        // It uses an IpPermission object to hold the IP information for the rule.
        var ingressRequest = new AuthorizeSecurityGroupIngressRequest{
            GroupId = groupId};
    }
}

```

```

    ingressRequest.IpPermissions.Add(new IpPermission{
        IpProtocol = "tcp",
        FromPort = port,
        ToPort = port,
        Ipv4Ranges = new List<IpRange>() { new IpRange { CidrIp = ipAddress } }
    });

    // Create the inbound rule for the security group
    AuthorizeSecurityGroupIngressResponse responseIngress =
        await eC2Client.AuthorizeSecurityGroupIngressAsync(ingressRequest);
    Console.WriteLine($"\\nNew RDP rule was written in {groupId} for {ipAddress}.");
    Console.WriteLine($"Result: {responseIngress.HttpStatusCode}");
}

//
// Command-line help
private static void PrintHelp()
{
    Console.WriteLine(
        "\\nUsage: EC2AddRuleForRDP -g <group-id> -i <ip-address> [-p <port>]" +
        "\\n -g, --group-id: The ID of the security group to which you want to add the
inbound rule." +
        "\\n -i, --ip-address: An IP address or address range in CIDR format." +
        "\\n -p, --port: The TCP port number. Defaults to 3389.");
}
}

// = = = = =
// Class that represents a command line on the console or terminal.
// (This is the same for all examples. When you have seen it once, you can ignore
it.)
static class CommandLine
{
    //
    // Method to parse a command line of the form: "--key value" or "-k value".
    //
    // Parameters:
    // - args: The command-line arguments passed into the application by the system.
    //
    // Returns:
    // A Dictionary with string Keys and Values.

```

```

//
// If a key is found without a matching value, Dictionary.Value is set to the key
// (including the dashes).
// If a value is found without a matching key, Dictionary.Key is set to "--NoKeyN",
// where "N" represents sequential numbers.
public static Dictionary<string,string> Parse(string[] args)
{
    var parsedArgs = new Dictionary<string,string>();
    int i = 0, n = 0;
    while(i < args.Length)
    {
        // If the first argument in this iteration starts with a dash it's an option.
        if(args[i].StartsWith("-"))
        {
            var key = args[i++];
            var value = key;

            // Check to see if there's a value that goes with this option?
            if((i < args.Length) && (!args[i].StartsWith("-"))) value = args[i++];
            parsedArgs.Add(key, value);
        }

        // If the first argument in this iteration doesn't start with a dash, it's a
value
        else
        {
            parsedArgs.Add("--NoKey" + n.ToString(), args[i++]);
            n++;
        }
    }

    return parsedArgs;
}

//
// Method to get an argument from the parsed command-line arguments
//
// Parameters:
// - parsedArgs: The Dictionary object returned from the Parse() method (shown
above).
// - defaultValue: The default string to return if the specified key isn't in
parsedArgs.
// - keys: An array of keys to look for in parsedArgs.
public static string GetArgument(

```

```

    Dictionary<string,string> parsedArgs, string defaultReturn, params string[] keys)
    {
        string retval = null;
        foreach(var key in keys)
            if(parsedArgs.TryGetValue(key, out retval)) break;
        return retval ?? defaultReturn;
    }

    //
    // Method to exit the application with an error.
    public static void ErrorExit(string msg, int code=1)
    {
        Console.WriteLine("\nError");
        Console.WriteLine(msg);
        Environment.Exit(code);
    }
}
}

```

其他考量

- 如果您未提供連接埠號碼，應用程式會預設為連接埠 3389。這是 Windows RDP 的連接埠，可讓您連線至執行 Windows 的 EC2 執行個體。如果您要啟動執行 Linux 的 EC2 執行個體，您可以改用 TCP 連接埠 22 (SSH)。
- 請注意，範例 IpProtocol 設定為 "tcp"。您可以在 [IpPermission](#) 類別 IpProtocol 屬性的描述 IpProtocol 中找到的值。
- 當您使用此範例時，您可能想要本機電腦的 IP 地址。以下是您可以取得地址的一些方式。
 - 如果您的本機電腦（您將從中連線到 EC2 執行個體）具有靜態公有 IP 地址，您可以使用服務來取得該地址。這類服務之一是 <https://http://checkip.amazonaws.com/>。若要進一步了解授權傳入流量，請參閱《[Amazon EC2 使用者指南](#)》中的[將規則新增至安全群組](#)和[不同使用案例的安全群組規則](#)。
 - 取得本機電腦 IP 地址的另一種方法是使用 [Amazon EC2 主控台](#)。

選取其中一個安全群組，選取傳入規則索引標籤，然後選擇編輯傳入規則。在傳入規則中，開啟來源欄中的下拉式功能表，然後選擇我的 IP，以 CIDR 格式查看本機電腦的 IP 地址。請務必取消操作。

- 您可以在 [Amazon EC2 主控台](#) 中檢查安全群組清單，以驗證此範例的結果。

使用 Amazon EC2 金鑰對

Amazon EC2 使用公有金鑰加密法將登入資訊進行加密及解密。公有金鑰密碼編譯使用公有金鑰來加密資料，然後收件人使用私有金鑰來解密資料。公有金鑰和私有金鑰稱為金鑰對。如果您想要登入 EC2 執行個體，您必須在啟動時指定金鑰對，然後在連線時提供該對的私有金鑰。

當您啟動 EC2 執行個體時，您可以為其建立金鑰對，或使用您在啟動其他執行個體時已使用的金鑰對。若要進一步了解 Amazon EC2 金鑰對，請參閱《[Amazon EC2 使用者指南](#)》中的[使用 Amazon EC2 金鑰對](#)。 [Amazon EC2](#)

如需 APIs 和先決條件的相關資訊，請參閱父區段 ([使用 Amazon EC2](#))。

主題

- [建立和顯示金鑰對](#)
- [刪除金鑰對](#)

建立和顯示金鑰對

此範例說明如何使用適用於 .NET 的 AWS SDK 來建立金鑰對。應用程式會取得新金鑰對的名稱和 PEM 檔案的名稱（副檔名為 ".pem"）。它會建立金鑰對、將私有金鑰寫入 PEM 檔案，然後顯示所有可用的金鑰對。如果您不提供命令列引數，應用程式只會顯示所有可用的金鑰對。

下列各節提供此範例的程式碼片段。之後會顯示[範例的完整程式碼](#)，並可依原樣建置和執行。

主題

- [建立金鑰對](#)
- [顯示可用的金鑰對](#)
- [完成程式碼](#)
- [其他考量](#)

建立金鑰對

下列程式碼片段會建立金鑰對，然後將私有金鑰儲存到指定的 PEM 檔案。

[本主題結尾](#)的範例顯示此程式碼片段正在使用中。

```
//
// Method to create a key pair and save the key material in a PEM file
private static async Task CreateKeyPair(
    IAmazonEC2 ec2Client, string keyPairName, string pemFileName)
{
    // Create the key pair
    CreateKeyPairResponse response =
        await ec2Client.CreateKeyPairAsync(new CreateKeyPairRequest{
            KeyName = keyPairName
        });
    Console.WriteLine($"Created new key pair: {response.KeyPair.KeyName}");

    // Save the private key in a PEM file
    using (var s = new FileStream(pemFileName, FileMode.Create))
    using (var writer = new StreamWriter(s))
    {
        writer.WriteLine(response.KeyPair.KeyMaterial);
    }
}
```

顯示可用的金鑰對

下列程式碼片段會顯示可用金鑰對的清單。

[本主題結尾](#)的範例顯示此程式碼片段正在使用中。

```
//
// Method to show the key pairs that are available
private static async Task EnumerateKeyPairs(IAmazonEC2 ec2Client)
{
    DescribeKeyPairsResponse response = await ec2Client.DescribeKeyPairsAsync();
    Console.WriteLine("Available key pairs:");
    foreach (KeyValuePair item in response.KeyPairs)
        Console.WriteLine($" {item.KeyName}");
}
```

完成程式碼

本節顯示此範例的相關參考和完整程式碼。

開發套件參考

NuGet 套件：

- [AWSSDK.EC2](#)

程式設計元素：

- 命名空間 [Amazon.EC2](#)

[AmazonEC2Client](#) 類別

- 命名空間 [Amazon.EC2.Model](#)

類別 [CreateKeyPairRequest](#)

類別 [CreateKeyPairResponse](#)

類別 [DescribeKeyPairsResponse](#)

類別 [KeyPairInfo](#)

程式碼

```
using System;
using System.Threading.Tasks;
using System.IO;
using Amazon.EC2;
using Amazon.EC2.Model;
using System.Collections.Generic;

namespace EC2CreateKeyPair
{
    // = = = = =
    // Class to create and store a key pair
    class Program
    {
        static async Task Main(string[] args)
        {
            // Create the EC2 client
            var ec2Client = new AmazonEC2Client();

            // Parse the command line and show help if necessary
            var parsedArgs = CommandLine.Parse(args);
            if(parsedArgs.Count == 0)
            {
```

```

        // In the case of no command-line arguments,
        // just show help and the existing key pairs
        PrintHelp();
        Console.WriteLine("\nNo arguments specified.");
        Console.Write(
            "Do you want to see a list of the existing key pairs? ((y) or n): ");
        string response = Console.ReadLine();
        if((string.IsNullOrEmpty(response)) || (response.ToLower() == "y"))
            await EnumerateKeyPairs(ec2Client);
        return;
    }

    // Get the application arguments from the parsed list
    string keyPairName =
        CommandLine.GetArgument(parsedArgs, null, "-k", "--keypair-name");
    string pemFileName =
        CommandLine.GetArgument(parsedArgs, null, "-p", "--pem-filename");
    if(string.IsNullOrEmpty(keyPairName))
        CommandLine.ErrorExit("\nNo key pair name specified." +
            "\nRun the command with no arguments to see help.");
    if(string.IsNullOrEmpty(pemFileName) || !pemFileName.EndsWith(".pem"))
        CommandLine.ErrorExit("\nThe PEM filename is missing or incorrect." +
            "\nRun the command with no arguments to see help.");

    // Create the key pair
    await CreateKeyPair(ec2Client, keyPairName, pemFileName);
    await EnumerateKeyPairs(ec2Client);
}

//
// Method to create a key pair and save the key material in a PEM file
private static async Task CreateKeyPair(
    IAmazonEC2 ec2Client, string keyPairName, string pemFileName)
{
    // Create the key pair
    CreateKeyPairResponse response =
        await ec2Client.CreateKeyPairAsync(new CreateKeyPairRequest{
            KeyName = keyPairName
        });
    Console.WriteLine($"Created new key pair: {response.KeyPair.KeyName}");

    // Save the private key in a PEM file
    using (var s = new FileStream(pemFileName, FileMode.Create))

```

```

        using (var writer = new StreamWriter(s))
        {
            writer.WriteLine(response.KeyPair.KeyMaterial);
        }
    }

    //
    // Method to show the key pairs that are available
    private static async Task EnumerateKeyPairs(IAmazonEC2 ec2Client)
    {
        DescribeKeyPairsResponse response = await ec2Client.DescribeKeyPairsAsync();
        Console.WriteLine("Available key pairs:");
        foreach (KeyValuePair item in response.KeyPairs)
            Console.WriteLine($" {item.KeyName}");
    }

    //
    // Command-line help
    private static void PrintHelp()
    {
        Console.WriteLine(
            "\nUsage: EC2CreateKeyPair -k <keypair-name> -p <pem-filename>" +
            "\n -k, --keypair-name: The name you want to assign to the key pair." +
            "\n -p, --pem-filename: The name of the PEM file to create, with a \".pem\" "
extension.");
    }
}

// = = = = =
// Class that represents a command line on the console or terminal.
// (This is the same for all examples. When you have seen it once, you can ignore
it.)
static class CommandLine
{
    //
    // Method to parse a command line of the form: "--key value" or "-k value".
    //
    // Parameters:
    // - args: The command-line arguments passed into the application by the system.
    //

```

```

// Returns:
// A Dictionary with string Keys and Values.
//
// If a key is found without a matching value, Dictionary.Value is set to the key
// (including the dashes).
// If a value is found without a matching key, Dictionary.Key is set to "--NoKeyN",
// where "N" represents sequential numbers.
public static Dictionary<string,string> Parse(string[] args)
{
    var parsedArgs = new Dictionary<string,string>();
    int i = 0, n = 0;
    while(i < args.Length)
    {
        // If the first argument in this iteration starts with a dash it's an option.
        if(args[i].StartsWith("-"))
        {
            var key = args[i++];
            var value = key;

            // Check to see if there's a value that goes with this option?
            if((i < args.Length) && (!args[i].StartsWith("-"))) value = args[i++];
            parsedArgs.Add(key, value);
        }

        // If the first argument in this iteration doesn't start with a dash, it's a
value
        else
        {
            parsedArgs.Add("--NoKey" + n.ToString(), args[i++]);
            n++;
        }
    }

    return parsedArgs;
}

//
// Method to get an argument from the parsed command-line arguments
//
// Parameters:
// - parsedArgs: The Dictionary object returned from the Parse() method (shown
above).
// - defaultValue: The default string to return if the specified key isn't in
parsedArgs.

```

```
// - keys: An array of keys to look for in parsedArgs.
public static string GetArgument(
    Dictionary<string,string> parsedArgs, string defaultReturn, params string[] keys)
{
    string retval = null;
    foreach(var key in keys)
        if(parsedArgs.TryGetValue(key, out retval)) break;
    return retval ?? defaultReturn;
}

//
// Method to exit the application with an error.
public static void ErrorExit(string msg, int code=1)
{
    Console.WriteLine("\nError");
    Console.WriteLine(msg);
    Environment.Exit(code);
}
}

}
```

其他考量

- 執行範例後，您可以在 [Amazon EC2 主控台](#) 中看到新的金鑰對。
- 建立金鑰對時，您必須儲存傳回的私有金鑰，因為您稍後無法擷取私有金鑰。

刪除金鑰對

此範例說明如何使用 適用於 .NET 的 AWS SDK 刪除金鑰對。應用程式會取得金鑰對的名稱。它會刪除金鑰對，然後顯示所有可用的金鑰對。如果您不提供命令列引數，應用程式只會顯示所有可用的金鑰對。

下列各節提供此範例的程式碼片段。之後會顯示[範例的完整程式碼](#)，並可依原樣建置和執行。

主題

- [刪除金鑰對](#)
- [顯示可用的金鑰對](#)
- [完成程式碼](#)

刪除金鑰對

下列程式碼片段會刪除金鑰對。

[本主題結尾](#)的範例顯示此程式碼片段正在使用中。

```
//  
// Method to delete a key pair  
private static async Task DeleteKeyPair(IAmazonEC2 ec2Client, string keyName)  
{  
    await ec2Client.DeleteKeyPairAsync(new DeleteKeyPairRequest{  
        KeyName = keyName});  
    Console.WriteLine($"{keyName} has been deleted (if it existed).");  
}
```

顯示可用的金鑰對

下列程式碼片段會顯示可用金鑰對的清單。

[本主題結尾](#)的範例顯示此程式碼片段正在使用中。

```
//  
// Method to show the key pairs that are available  
private static async Task EnumerateKeyPairs(IAmazonEC2 ec2Client)  
{  
    DescribeKeyPairsResponse response = await ec2Client.DescribeKeyPairsAsync();  
    Console.WriteLine("Available key pairs:");  
    foreach (KeyValuePair item in response.KeyPairs)  
        Console.WriteLine($"{item.KeyName}");  
}
```

完成程式碼

本節顯示此範例的相關參考和完整程式碼。

開發套件參考

NuGet 套件：

- [AWSSDK.EC2](#)

程式設計元素：

- 命名空間 [Amazon.EC2](#)

[AmazonEC2Client](#) 類別

- 命名空間 [Amazon.EC2.Model](#)

類別 [DeleteKeyPairRequest](#)

類別 [DescribeKeyPairsResponse](#)

類別 [KeyPairInfo](#)

程式碼

```
using System;
using System.Threading.Tasks;
using Amazon.EC2;
using Amazon.EC2.Model;

namespace EC2DeleteKeyPair
{
    class Program
    {
        static async Task Main(string[] args)
        {
            // Create the EC2 client
            var ec2Client = new AmazonEC2Client();

            if(args.Length == 1)
            {
                // Delete a key pair (if it exists)
                await DeleteKeyPair(ec2Client, args[0]);

                // Display the key pairs that are left
                await EnumerateKeyPairs(ec2Client);
            }
            else
            {
                Console.WriteLine("\nUsage: EC2DeleteKeyPair keypair-name");
                Console.WriteLine("  keypair-name - The name of the key pair you want to delete.");
                Console.WriteLine("\nNo arguments specified.");
                Console.Write(
```

```

        "Do you want to see a list of the existing key pairs? ((y) or n): ");
        string response = Console.ReadLine();
        if((string.IsNullOrEmpty(response)) || (response.ToLower() == "y"))
            await EnumerateKeyPairs(ec2Client);
    }
}

//
// Method to delete a key pair
private static async Task DeleteKeyPair(IAmazonEC2 ec2Client, string keyName)
{
    await ec2Client.DeleteKeyPairAsync(new DeleteKeyPairRequest{
        KeyName = keyName});
    Console.WriteLine($"\\nKey pair {keyName} has been deleted (if it existed).");
}

//
// Method to show the key pairs that are available
private static async Task EnumerateKeyPairs(IAmazonEC2 ec2Client)
{
    DescribeKeyPairsResponse response = await ec2Client.DescribeKeyPairsAsync();
    Console.WriteLine("Available key pairs:");
    foreach (KeyValuePair item in response.KeyPairs)
        Console.WriteLine($" {item.KeyName}");
}
}
}

```

查看您的 Amazon EC2 區域和可用區域

Amazon EC2 託管於全球多個位置。這些地點是由 區域及可用區域組成。每個區域都是獨立的地理區域，具有多個隔離的位置，稱為可用區域。

若要進一步了解區域和可用區域，請參閱《[Amazon EC2 使用者指南](#)》中的[區域和區域](#)。

此範例說明如何使用 適用於 .NET 的 AWS SDK 來取得與 EC2 用戶端相關的區域和可用區域的詳細資訊。應用程式會顯示 EC2 用戶端可用的區域和可用區域的清單。

開發套件參考

NuGet 套件：

- [AWSSDK.EC2](#)

程式設計元素：

- 命名空間 [Amazon.EC2](#)

[AmazonEC2Client](#) 類別

- 命名空間 [Amazon.EC2.Model](#)

類別 [DescribeAvailabilityZonesResponse](#)

類別 [DescribeRegionsResponse](#)

類別 [AvailabilityZone](#)

類別 [區域](#)

```
using System;
using System.Threading.Tasks;
using Amazon.EC2;
using Amazon.EC2.Model;

namespace EC2RegionsAndZones
{
    class Program
    {
        static async Task Main(string[] args)
        {
            Console.WriteLine(
                "Finding the Regions and Availability Zones available to an EC2 client...");

            // Create the EC2 client
            var ec2Client = new AmazonEC2Client();

            // Display the Regions and Availability Zones
            await DescribeRegions(ec2Client);
            await DescribeAvailabilityZones(ec2Client);
        }
    }

    //
```

```
// Method to display Regions
private static async Task DescribeRegions(IAmazonEC2 ec2Client)
{
    Console.WriteLine("\nRegions that are enabled for the EC2 client:");
    DescribeRegionsResponse response = await ec2Client.DescribeRegionsAsync();
    foreach (Region region in response.Regions)
        Console.WriteLine(region.RegionName);
}

//
// Method to display Availability Zones
private static async Task DescribeAvailabilityZones(IAmazonEC2 ec2Client)
{
    Console.WriteLine("\nAvailability Zones for the EC2 client's region:");
    DescribeAvailabilityZonesResponse response =
        await ec2Client.DescribeAvailabilityZonesAsync();
    foreach (AvailabilityZone az in response.AvailabilityZones)
        Console.WriteLine(az.ZoneName);
}
}
```

使用 Amazon EC2 執行個體

您可以使用 透過建立、啟動和終止等操作 適用於 .NET 的 AWS SDK 來控制 Amazon EC2 執行個體。本節中的主題提供一些如何執行此操作的範例。若要進一步了解 EC2 執行個體，請參閱 [《Amazon EC2 使用者指南》](#) 中的 [Amazon EC2 執行個體](#)。 [Amazon EC2](#)

如需 APIs 和先決條件的相關資訊，請參閱父區段 ([使用 Amazon EC2](#))。

主題

- [啟動 Amazon EC2 執行個體](#)
- [終止 Amazon EC2 執行個體](#)

啟動 Amazon EC2 執行個體

此範例說明如何使用 適用於 .NET 的 AWS SDK，從相同的 Amazon Machine Image (AMI) 啟動一或多個設定相同的 Amazon EC2 執行個體。使用您提供的 [數個輸入](#)，應用程式會啟動 EC2 執行個體，然後監控執行個體，直到其處於「待定」狀態為止。

當 EC2 執行個體執行時，您可以遠端連線到它，如中所述 [\(選用\) 連線至執行個體](#)。

Warning

EC2-Classic 在 2022 年 8 月 15 日淘汰。建議您從 EC2-Classic 遷移至 VPC。如需詳細資訊，請參閱部落格文章 [EC2-Classic Networking 正在淘汰 – 以下是如何準備](#)。

下列各節提供此範例的程式碼片段和其他資訊。[範例的完整程式碼](#)會顯示在程式碼片段之後，並可依原樣建置和執行。

主題

- [收集您需要的內容](#)
- [啟動執行個體](#)
- [監控執行個體](#)
- [完成程式碼](#)
- [其他考量](#)
- [\(選用\) 連線至執行個體](#)
- [清除](#)

收集您需要的內容

若要啟動 EC2 執行個體，您需要幾件事。

- 將啟動執行個體的 [VPC](#)。如果它是 Windows 執行個體，而且您將透過 RDP 連接到它，VPC 很可能需要連接網際網路閘道，以及路由表中網際網路閘道的項目。如需詳細資訊，請參閱《Amazon VPC 使用者指南》中的[網際網路閘道](#)。
- 要啟動執行個體之 VPC 中現有子網路的 ID。尋找或建立此項目的簡單方法是登入 [Amazon VPC 主控台](#)，但您也可以使用 [CreateSubnetAsync](#) 和 [DescribeSubnetsAsync](#) 方法，以程式設計方式取得。

Note

如果您未提供此參數，新的執行個體會在您帳戶的預設 VPC 中啟動。

- 屬於要啟動執行個體之 VPC 的現有安全群組 ID。如需詳細資訊，請參閱[在 Amazon EC2 中使用安全群組](#)。
- 如果您想要連線到新的執行個體，先前提及的安全群組必須具有適當的傳入規則，允許連接埠 22 (Linux 執行個體) 上的 SSH 流量或連接埠 3389 (Windows 執行個體) 上的 RDP 流量。如需如何執行此操作的詳細資訊，請參閱[更新安全群組](#)，包括該主題[其他考量](#)接近結尾的。
- 將用於建立執行個體的 Amazon Machine Image (AMI)。如需 AMIs 的相關資訊，請參閱《[Amazon EC2 使用者指南](#)》中的 [Amazon Machine Image \(AMIs\)](#)。 [Amazon EC2](#) 特別是，請參閱[尋找 AMI](#) 和[共用 AMIs](#)。
- 現有 EC2 金鑰對的名稱，用於連線至新執行個體。如需詳細資訊，請參閱[使用 Amazon EC2 金鑰對](#)。
- 包含先前提及之 EC2 金鑰對私有金鑰的 PEM 檔案名稱。當您[從遠端連線至](#)執行個體時，會使用 PEM 檔案。

啟動執行個體

下列程式碼片段會啟動 EC2 執行個體。

本[主題結尾附近](#)的範例顯示此程式碼片段的使用中。

```
//  
// Method to launch the instances  
// Returns a list with the launched instance IDs  
private static async Task<List<string>> LaunchInstances(  
    IAmazonEC2 ec2Client, RunInstancesRequest requestLaunch)  
{  
    var instanceIds = new List<string>();  
    RunInstancesResponse responseLaunch =  
        await ec2Client.RunInstancesAsync(requestLaunch);  
  
    Console.WriteLine("\nNew instances have been created.");  
    foreach (Instance item in responseLaunch.Reservation.Instances)  
    {  
        instanceIds.Add(item.InstanceId);  
        Console.WriteLine($"  New instance: {item.InstanceId}");  
    }  
}
```

```
}

    return instanceIds;
}
```

監控執行個體

下列程式碼片段會監控執行個體，直到其處於「待定」狀態為止。

本[主題結尾附近](#)的範例顯示此程式碼片段正在使用中。

如需 `Instance.State.Code` 屬性的有效值，請參閱 [InstanceState](#) 類別。

```
//
// Method to wait until the instances are running (or at least not pending)
private static async Task CheckState(IAmazonEC2 ec2Client, List<string>
instanceIds)
{
    Console.WriteLine(
        "\nWaiting for the instances to start." +
        "\nPress any key to stop waiting. (Response might be slightly delayed.)");

    int numberRunning;
    DescribeInstancesResponse responseDescribe;
    var requestDescribe = new DescribeInstancesRequest{
        InstanceIds = instanceIds};

    // Check every couple of seconds
    int wait = 2000;
    while(true)
    {
        // Get and check the status for each of the instances to see if it's past
        pending.
        // Once all instances are past pending, break out.
        // (For this example, we are assuming that there is only one reservation.)
        Console.Write(".");
        numberRunning = 0;
        responseDescribe = await ec2Client.DescribeInstancesAsync(requestDescribe);
        foreach (Instance i in responseDescribe.Reservations[0].Instances)
        {
            // Check the lower byte of State.Code property
            // Code == 0 is the pending state
            if((i.State.Code & 255) > 0) numberRunning++;
        }
    }
}
```

```
        if(numberRunning == responseDescribe.Reservations[0].Instances.Count)
            break;

        // Wait a bit and try again (unless the user wants to stop waiting)
        Thread.Sleep(wait);
        if(Console.KeyAvailable)
            break;
    }

    Console.WriteLine("\nNo more instances are pending.");
    foreach (Instance i in responseDescribe.Reservations[0].Instances)
    {
        Console.WriteLine($"For {i.InstanceId}:");
        Console.WriteLine($"  VPC ID: {i.VpcId}");
        Console.WriteLine($"  Instance state: {i.State.Name}");
        Console.WriteLine($"  Public IP address: {i.PublicIpAddress}");
        Console.WriteLine($"  Public DNS name: {i.PublicDnsName}");
        Console.WriteLine($"  Key pair name: {i.KeyName}");
    }
}
```

完成程式碼

本節顯示此範例的相關參考和完整程式碼。

開發套件參考

NuGet 套件：

- [AWSSDK.EC2](#)

程式設計元素：

- 命名空間 [Amazon.EC2](#)

[AmazonEC2Client](#) 類別

類別 [InstanceType](#)

- 命名空間 [Amazon.EC2.Model](#)

類別 [DescribeInstancesRequest](#)

類別 [DescribeInstancesResponse](#)

類別 [執行個體](#)

類別 [InstanceNetworkInterfaceSpecification](#)

類別 [RunInstancesRequest](#)

類別 [RunInstancesResponse](#)

程式碼

```
using System;
using System.Threading;
using System.Threading.Tasks;
using System.Collections.Generic;
using Amazon.EC2;
using Amazon.EC2.Model;

namespace EC2LaunchInstance
{
    // = = = = =
    // Class to launch an EC2 instance
    class Program
    {
        static async Task Main(string[] args)
        {
            // Parse the command line and show help if necessary
            var parsedArgs = CommandLine.Parse(args);
            if(parsedArgs.Count == 0)
            {
                PrintHelp();
                return;
            }

            // Get the application arguments from the parsed list
            string groupID =
                CommandLine.GetArgument(parsedArgs, null, "-g", "--group-id");
            string ami =
                CommandLine.GetArgument(parsedArgs, null, "-a", "--ami-id");
            string keyPairName =
                CommandLine.GetArgument(parsedArgs, null, "-k", "--keypair-name");
            string subnetID =
```

```

        CommandLine.GetArgument(parsedArgs, null, "-s", "--subnet-id");
    if( (string.IsNullOrEmpty(groupID) || !groupID.StartsWith("sg-"))
        || (string.IsNullOrEmpty(ami) || !ami.StartsWith("ami-"))
        || (string.IsNullOrEmpty(keyPairName))
        || (!string.IsNullOrEmpty(subnetID) && !subnetID.StartsWith("subnet-")))
        CommandLine.ErrorExit(
            "\nOne or more of the required arguments is missing or incorrect." +
            "\nRun the command with no arguments to see help.");

    // Create an EC2 client
    var ec2Client = new AmazonEC2Client();

    // Create an object with the necessary properties
    RunInstancesRequest request = GetRequestData(groupID, ami, keyPairName,
subnetID);

    // Launch the instances and wait for them to start running
    var instanceIds = await LaunchInstances(ec2Client, request);
    await CheckState(ec2Client, instanceIds);
}

//
// Method to put together the properties needed to launch the instance.
private static RunInstancesRequest GetRequestData(
    string groupID, string ami, string keyPairName, string subnetID)
{
    // Common properties
    var groupIDs = new List<string>() { groupID };
    var request = new RunInstancesRequest()
    {
        // The first three of these would be additional command-line arguments or
similar.
        InstanceType = InstanceType.T1Micro,
        MinCount = 1,
        MaxCount = 1,
        ImageId = ami,
        KeyName = keyPairName
    };

    // Properties specifically for EC2 in a VPC.
    if(!string.IsNullOrEmpty(subnetID))
    {
        request.NetworkInterfaces =

```



```

        new List<InstanceNetworkInterfaceSpecification>() {
            new InstanceNetworkInterfaceSpecification() {
                DeviceIndex = 0,
                SubnetId = subnetID,
                Groups = groupIDs,
                AssociatePublicIpAddress = true
            }
        };
    }

    // Properties specifically for EC2-Classic
    else
    {
        request.SecurityGroupIds = groupIDs;
    }
    return request;
}

//
// Method to launch the instances
// Returns a list with the launched instance IDs
private static async Task<List<string>> LaunchInstances(
    IAmazonEC2 ec2Client, RunInstancesRequest requestLaunch)
{
    var instanceIds = new List<string>();
    RunInstancesResponse responseLaunch =
        await ec2Client.RunInstancesAsync(requestLaunch);

    Console.WriteLine("\nNew instances have been created.");
    foreach (Instance item in responseLaunch.Reservation.Instances)
    {
        instanceIds.Add(item.InstanceId);
        Console.WriteLine($"  New instance: {item.InstanceId}");
    }

    return instanceIds;
}

//
// Method to wait until the instances are running (or at least not pending)
private static async Task CheckState(IAmazonEC2 ec2Client, List<string>
instanceIds)

```

```

{
    Console.WriteLine(
        "\nWaiting for the instances to start." +
        "\nPress any key to stop waiting. (Response might be slightly delayed.)");

    int numberRunning;
    DescribeInstancesResponse responseDescribe;
    var requestDescribe = new DescribeInstancesRequest{
        InstanceIds = instanceIds};

    // Check every couple of seconds
    int wait = 2000;
    while(true)
    {
        // Get and check the status for each of the instances to see if it's past
        pending.
        // Once all instances are past pending, break out.
        // (For this example, we are assuming that there is only one reservation.)
        Console.Write(".");
        numberRunning = 0;
        responseDescribe = await ec2Client.DescribeInstancesAsync(requestDescribe);
        foreach(Instance i in responseDescribe.Reservations[0].Instances)
        {
            // Check the lower byte of State.Code property
            // Code == 0 is the pending state
            if((i.State.Code & 255) > 0) numberRunning++;
        }
        if(numberRunning == responseDescribe.Reservations[0].Instances.Count)
            break;

        // Wait a bit and try again (unless the user wants to stop waiting)
        Thread.Sleep(wait);
        if(Console.KeyAvailable)
            break;
    }

    Console.WriteLine("\nNo more instances are pending.");
    foreach(Instance i in responseDescribe.Reservations[0].Instances)
    {
        Console.WriteLine($"For {i.InstanceId}:");
        Console.WriteLine($"  VPC ID: {i.VpcId}");
        Console.WriteLine($"  Instance state: {i.State.Name}");
        Console.WriteLine($"  Public IP address: {i.PublicIpAddress}");
        Console.WriteLine($"  Public DNS name: {i.PublicDnsName}");
    }
}

```

```

        Console.WriteLine($" Key pair name: {i.KeyName}");
    }
}

//
// Command-line help
private static void PrintHelp()
{
    Console.WriteLine(
        "\nUsage: EC2LaunchInstance -g <group-id> -a <ami-id> -k <keypair-name> [-s
<subnet-id>]" +
        "\n -g, --group-id: The ID of the security group." +
        "\n -a, --ami-id: The ID of an Amazon Machine Image." +
        "\n -k, --keypair-name - The name of a key pair." +
        "\n -s, --subnet-id: The ID of a subnet. Required only for EC2 in a VPC.");
}
}

// = = = = =
// Class that represents a command line on the console or terminal.
// (This is the same for all examples. When you have seen it once, you can ignore
it.)
static class CommandLine
{
    //
    // Method to parse a command line of the form: "--key value" or "-k value".
    //
    // Parameters:
    // - args: The command-line arguments passed into the application by the system.
    //
    // Returns:
    // A Dictionary with string Keys and Values.
    //
    // If a key is found without a matching value, Dictionary.Value is set to the key
    // (including the dashes).
    // If a value is found without a matching key, Dictionary.Key is set to "--NoKeyN",
    // where "N" represents sequential numbers.
    public static Dictionary<string,string> Parse(string[] args)
    {
        var parsedArgs = new Dictionary<string,string>();
        int i = 0, n = 0;
    }
}

```

```

while(i < args.Length)
{
    // If the first argument in this iteration starts with a dash it's an option.
    if(args[i].StartsWith("-"))
    {
        var key = args[i++];
        var value = key;

        // Check to see if there's a value that goes with this option?
        if((i < args.Length) && (!args[i].StartsWith("-"))) value = args[i++];
        parsedArgs.Add(key, value);
    }

    // If the first argument in this iteration doesn't start with a dash, it's a
value
    else
    {
        parsedArgs.Add("--NoKey" + n.ToString(), args[i++]);
        n++;
    }
}

return parsedArgs;
}

//
// Method to get an argument from the parsed command-line arguments
//
// Parameters:
// - parsedArgs: The Dictionary object returned from the Parse() method (shown
above).
// - defaultValue: The default string to return if the specified key isn't in
parsedArgs.
// - keys: An array of keys to look for in parsedArgs.
public static string GetArgument(
    Dictionary<string,string> parsedArgs, string defaultReturn, params string[] keys)
{
    string retval = null;
    foreach(var key in keys)
        if(parsedArgs.TryGetValue(key, out retval)) break;
    return retval ?? defaultReturn;
}

//

```

```
// Method to exit the application with an error.
public static void ErrorExit(string msg, int code=1)
{
    Console.WriteLine("\nError");
    Console.WriteLine(msg);
    Environment.Exit(code);
}
}
```

其他考量

- 檢查 EC2 執行個體的狀態時，您可以將篩選條件新增至 [DescribeInstancesRequest](#) 物件的 Filter 屬性。使用此技術，您可以將請求限制為特定執行個體，例如具有特定使用者指定標籤的執行個體。
- 為了簡潔起見，某些屬性被給予典型值。任何或所有這些屬性都可以透過程式設計方式或使用者輸入來決定。
- 您可以用於 [RunInstancesRequest](#) 物件的 MinCount 和 MaxCount 屬性的值取決於目標可用區域，以及執行個體類型允許的執行個體數量上限。如需詳細資訊，請參閱 [Amazon EC2 一般常見問答集中的我可以在 Amazon EC2 中執行多少執行個體](#)。Amazon EC2
- 如果您想要使用與此範例不同的執行個體類型，有數種執行個體類型可供選擇。如需詳細資訊，請參閱《[Amazon EC2 使用者指南](#)》中的 [Amazon EC2 執行個體類型](#)。另請參閱 [執行個體類型詳細資訊](#) 和 [執行個體類型總管](#)。
- 您也可以在此啟動執行個體時，將 [IAM 角色](#) 連接至執行個體。若要這樣做，請建立 Name 屬性設定為 IAM 角色名稱的 [IamInstanceProfileSpecification](#) 物件。然後將該物件新增至 [RunInstancesRequest](#) 物件的 IamInstanceProfile 屬性。

Note

若要啟動已連接 IAM 角色的 EC2 執行個體，IAM 使用者的組態必須包含特定許可。如需所需許可的詳細資訊，請參閱《[Amazon EC2 使用者指南](#)》中的 [授予使用者將 IAM 角色傳遞至執行個體的許可](#)。

(選用) 連線至執行個體

執行個體執行後，您可以使用適當的遠端用戶端從遠端連線到它。對於 Linux 和 Windows 執行個體，您需要執行個體的公有 IP 地址或公有 DNS 名稱。您也需要下列項目。

針對 Linux 執行個體

您可以使用 SSH 用戶端連線到您的 Linux 執行個體。請確定您在啟動執行個體時使用的安全群組允許連接埠 22 上的 SSH 流量，如中所述[更新安全群組](#)。

您也需要用來啟動執行個體之金鑰對的私有部分，也就是 PEM 檔案。

如需詳細資訊，請參閱《Amazon EC2 使用者指南》中的[連線至 Linux 執行個體](#)。

對於 Windows 執行個體

您可以使用 RDP 用戶端連線到執行個體。請確定您在啟動執行個體時使用的安全群組允許連接埠 3389 上的 RDP 流量，如中所述[更新安全群組](#)。

您也需要管理員密碼。您可以使用下列範例程式碼來取得此程式碼，該程式碼需要執行個體 ID 和用來啟動執行個體之金鑰對的私有部分，也就是 PEM 檔案。

如需詳細資訊，請參閱《Amazon EC2 使用者指南》中的[連線至 Windows 執行個體](#)。

Warning

此範例程式碼會傳回執行個體的純文字管理員密碼。

開發套件參考

NuGet 套件：

- [AWSSDK.EC2](#)

程式設計元素：

- 命名空間 [Amazon.EC2](#)

[AmazonEC2Client](#) 類別

- 命名空間 [Amazon.EC2.Model](#)

類別 [GetPasswordDataRequest](#)

類別 [GetPasswordDataResponse](#)

程式碼

```
using System;
using System.Collections.Generic;
using System.IO;
using System.Threading.Tasks;
using Amazon.EC2;
using Amazon.EC2.Model;

namespace EC2GetWindowsPassword
{
    // = = = = =
    // Class to get the Administrator password of a Windows EC2 instance
    class Program
    {
        static async Task Main(string[] args)
        {
            // Parse the command line and show help if necessary
            var parsedArgs = CommandLine.Parse(args);
            if(parsedArgs.Count == 0)
            {
                PrintHelp();
                return;
            }

            // Get the application arguments from the parsed list
            string instanceID =
                CommandLine.GetArgument(parsedArgs, null, "-i", "--instance-id");
            string pemFileName =
                CommandLine.GetArgument(parsedArgs, null, "-p", "--pem-filename");
            if( (string.IsNullOrEmpty(instanceID) || !instanceID.StartsWith("i-"))
                || (string.IsNullOrEmpty(pemFileName) || !pemFileName.EndsWith(".pem")))
                CommandLine.ErrorExit(
                    "\nOne or more of the required arguments is missing or incorrect." +
                    "\nRun the command with no arguments to see help.");
        }
    }
}
```

```

    // Create the EC2 client
    var ec2Client = new AmazonEC2Client();

    // Get and display the password
    string password = await GetPassword(ec2Client, instanceID, pemFileName);
    Console.WriteLine($"Password: {password}");
}

//
// Method to get the administrator password of a Windows EC2 instance
private static async Task<string> GetPassword(
    IAmazonEC2 ec2Client, string instanceID, string pemFilename)
{
    string password = string.Empty;
    GetPasswordDataResponse response =
        await ec2Client.GetPasswordDataAsync(new GetPasswordDataRequest{
            InstanceId = instanceID});
    if(response.PasswordData != null)
    {
        password = response.GetDecryptedPassword(File.ReadAllText(pemFilename));
    }
    else
    {
        Console.WriteLine($"The password is not available for instance
{instanceID}.");
        Console.WriteLine($"If this is a Windows instance, the password might not be
ready.");
    }
    return password;
}

//
// Command-line help
private static void PrintHelp()
{
    Console.WriteLine(
        "\nUsage: EC2GetWindowsPassword -i <instance-id> -p pem-filename" +
        "\n  -i, --instance-id: The name of the EC2 instance." +
        "\n  -p, --pem-filename: The name of the PEM file with the private key.");
}
}

```



```
// = = = = =
= = =
// Class that represents a command line on the console or terminal.
// (This is the same for all examples. When you have seen it once, you can ignore
it.)
static class CommandLine
{
    //
    // Method to parse a command line of the form: "--key value" or "-k value".
    //
    // Parameters:
    // - args: The command-line arguments passed into the application by the system.
    //
    // Returns:
    // A Dictionary with string Keys and Values.
    //
    // If a key is found without a matching value, Dictionary.Value is set to the key
    // (including the dashes).
    // If a value is found without a matching key, Dictionary.Key is set to "--NoKeyN",
    // where "N" represents sequential numbers.
    public static Dictionary<string,string> Parse(string[] args)
    {
        var parsedArgs = new Dictionary<string,string>();
        int i = 0, n = 0;
        while(i < args.Length)
        {
            // If the first argument in this iteration starts with a dash it's an option.
            if(args[i].StartsWith("-"))
            {
                var key = args[i++];
                var value = key;

                // Check to see if there's a value that goes with this option?
                if((i < args.Length) && (!args[i].StartsWith("-"))) value = args[i++];
                parsedArgs.Add(key, value);
            }

            // If the first argument in this iteration doesn't start with a dash, it's a
value
            else
            {
                parsedArgs.Add("--NoKey" + n.ToString(), args[i++]);
                n++;
            }
        }
    }
}
```

```

    }

    return parsedArgs;
}

//
// Method to get an argument from the parsed command-line arguments
//
// Parameters:
// - parsedArgs: The Dictionary object returned from the Parse() method (shown
above).
// - defaultValue: The default string to return if the specified key isn't in
parsedArgs.
// - keys: An array of keys to look for in parsedArgs.
public static string GetArgument(
    Dictionary<string,string> parsedArgs, string defaultReturn, params string[] keys)
{
    string retval = null;
    foreach(var key in keys)
        if(parsedArgs.TryGetValue(key, out retval)) break;
    return retval ?? defaultReturn;
}

//
// Method to exit the application with an error.
public static void ErrorExit(string msg, int code=1)
{
    Console.WriteLine("\nError");
    Console.WriteLine(msg);
    Environment.Exit(code);
}
}
}
}

```

清除

當您不再需要 EC2 執行個體時，請務必將其終止，如中所述[終止 Amazon EC2 執行個體](#)。

終止 Amazon EC2 執行個體

當您不再需要一或多個 Amazon EC2 執行個體時，您可以終止它們。

此範例說明如何使用 適用於 .NET 的 AWS SDK 來終止 EC2 執行個體。它需要執行個體 ID 做為輸入。

開發套件參考

NuGet 套件：

- [AWSSDK.EC2](#)

程式設計元素：

- 命名空間 [Amazon.EC2](#)

[AmazonEC2Client](#) 類別

- 命名空間 [Amazon.EC2.Model](#)

類別 [TerminateInstancesRequest](#)

類別 [TerminateInstancesResponse](#)

```
using System;
using System.Threading.Tasks;
using System.Collections.Generic;
using Amazon.EC2;
using Amazon.EC2.Model;

namespace EC2TerminateInstance
{
    class Program
    {
        static async Task Main(string[] args)
        {
            if((args.Length == 1) && (args[0].StartsWith("i-")))
            {
                // Terminate the instance
                var ec2Client = new AmazonEC2Client();
                await TerminateInstance(ec2Client, args[0]);
            }
            else
            {
                Console.WriteLine("\nCommand-line argument missing or incorrect.");
            }
        }
    }
}
```

```
        Console.WriteLine("\nUsage: EC2TerminateInstance instance-ID");
        Console.WriteLine("  instance-ID - The EC2 instance you want to terminate.");
        return;
    }
}

//
// Method to terminate an EC2 instance
private static async Task TerminateInstance(IAmazonEC2 ec2Client, string
instanceID)
{
    var request = new TerminateInstancesRequest{
        InstanceIds = new List<string>() { instanceID }};
    TerminateInstancesResponse response =
        await ec2Client.TerminateInstancesAsync(new TerminateInstancesRequest{
            InstanceIds = new List<string>() { instanceID }
        });
    foreach (InstanceStateChange item in response.TerminatingInstances)
    {
        Console.WriteLine("Terminated instance: " + item.InstanceId);
        Console.WriteLine("Instance state: " + item.CurrentState.Name);
    }
}
}
```

執行範例之後，最好登入 [Amazon EC2 主控台](#)，以確認 [EC2 執行個體](#) 已終止。

Amazon EC2 Spot 執行個體教學課程

本教學課程說明如何使用 適用於 .NET 的 AWS SDK 來管理 Amazon EC2 Spot 執行個體。

概觀

Spot 執行個體可讓您以低於隨需價格的價格請求未使用的 Amazon EC2 容量。這可以大幅降低可中斷之應用程式的 EC2 成本。

以下是 Spot 執行個體的請求和使用方式的高階摘要。

1. 建立 Spot 執行個體請求，指定您願意支付的最高價格。
2. 完成請求後，像執行任何其他 Amazon EC2 執行個體一樣執行執行個體。
3. 視需要執行執行個體，然後終止執行個體，除非 Spot 價格變更，讓執行個體為您終止。

4. 當您不再需要 Spot 執行個體請求時，請將其清除，以便不再建立 Spot 執行個體。

這是 Spot 執行個體的非常高階概觀。若要進一步了解 Spot 執行個體，請參閱《[Amazon EC2 使用者指南](#)》中的 [Spot 執行個體](#)。

關於本教學

當您遵循本教學課程時，您可以使用適用於 .NET 的 AWS SDK 執行下列動作：

- 建立 Spot 執行個體請求
- 判斷 Spot 執行個體請求何時完成
- 取消 Spot 執行個體請求
- 終止關聯的執行個體

下列各節提供此範例的程式碼片段和其他資訊。[範例的完整程式碼](#)會顯示在程式碼片段之後，並可依原樣建置和執行。

主題

- [先決條件](#)
- [收集您需要的內容](#)
- [建立 Spot 執行個體請求](#)
- [判斷 Spot 執行個體請求的狀態](#)
- [清除 Spot 執行個體請求](#)
- [清除 Spot 執行個體](#)
- [完成程式碼](#)
- [其他考量](#)

先決條件

如需 APIs 和先決條件的相關資訊，請參閱父區段 ([使用 Amazon EC2](#))。

收集您需要的內容

若要建立 Spot 執行個體請求，您需要幾件事。

- 執行個體數量及其執行個體類型。有數種執行個體類型可供選擇。如需詳細資訊，請參閱 [《Amazon EC2 使用者指南》中的 Amazon EC2 執行個體類型](#)。 [Amazon EC2](#) 另請參閱 [執行個體類型詳細資訊](#) 和 [執行個體類型總管](#)。

此教學課程的預設編號為 1。

- 用來建立執行個體的 Amazon Machine Image (AMI)。如需 AMIs 的相關資訊，請參閱 [《Amazon EC2 使用者指南》中的 Amazon Machine Image \(AMIs\)](#)。 [Amazon EC2](#) 特別是，請參閱 [尋找 AMI](#) 和 [共用 AMIs](#)。
- 您願意為每個執行個體小時支付的最高價格。您可以在 [Amazon EC2 定價頁面上](#) 查看所有執行個體類型（適用於隨需執行個體和 Spot 執行個體）的價格。本教學課程的預設價格將於稍後說明。
- 如果您想要從遠端連線至執行個體，則為具有適當組態和資源的安全群組。這在 [中說明](#)，在 [Amazon EC2 中使用安全群組](#) 以及 [收集您需要的內容並連接到中執行個體](#) 的相關資訊 [啟動 Amazon EC2 執行個體](#)。為求簡化，本教學課程使用所有較新 AWS 帳戶預設的安全群組。

請求 Spot 執行個體的方法有很多種。以下是常見的策略：

- 提出一定低於隨需定價的請求。
- 根據產生的運算值提出請求。
- 提出請求以盡快取得運算容量。

下列說明參考 [《Amazon EC2 使用者指南》](#) 中的 [Spot 執行個體定價歷史記錄](#)。

將成本降低到低於隨需

您可以批次處理任務，需要花費數小時或數天的時間完成。但是，在開始和結束時都有彈性。您想要查看是否能以低於隨需執行個體的成本將它完成。

您可以使用 Amazon EC2 主控台或 Amazon EC2 API 來檢查執行個體類型的 Spot 價格歷史記錄。於一個給定的可用區域內分析您所想要的執行個體類型的歷史價格後，您的出價有兩個替代方式：

- 在 Spot 價格範圍的上端指定請求，該請求仍低於隨需價格，預期您的一次性 Spot 執行個體請求最有可能實現並執行足夠的連續運算時間來完成任務。
- 或者，您可以出價此 Spot 價格範圍的下限，並計畫如何透過一個持久性的請求來結合數個已長期啟動的執行個體。該執行個體將總共要執行一段夠長時間，才能以更低的成本完成任務。

支付不超過結果值的費用

您有一個要執行的資料正在處理任務。您充分了解任務結果的值，以得知其在運算成本方面的價值。

分析執行個體類型的 Spot 價格歷史記錄後，您可以選擇運算時間成本不超過任務結果值的價格。您建立可以長久出價的方式，且允許它在 Spot 價格出現波動並等於或低於您的出價時，間歇性地執行。

快速取得運算容量

對於無法透過隨需執行個體取得的額外容量，您有非預期的短期需求。分析執行個體類型的 Spot 價格歷史記錄後，您可以選擇高於最高歷史價格的價格，以大幅提高快速完成請求的可能性，並繼續運算，直到完成為止。

在您收集所需的內容並選擇策略之後，您就可以請求 Spot 執行個體。在本教學課程中，預設最大 Spot 執行個體價格設定為與隨需價格相同 (在本教學課程中為 \$0.003 美元)。以這種方法設定價格能夠最大化實現請求的機會。

建立 Spot 執行個體請求

下列程式碼片段說明如何使用先前收集的元素建立 Spot 執行個體請求。

[本主題結尾](#)的範例顯示此程式碼片段正在使用中。

```
//
// Method to create a Spot Instance request
private static async Task<SpotInstanceRequest> CreateSpotInstanceRequest(
    IAmazonEC2 ec2Client, string amiId, string securityGroupName,
    InstanceType instanceType, string spotPrice, int instanceCount)
{
    var launchSpecification = new LaunchSpecification{
        ImageId = amiId,
        InstanceType = instanceType
    };
    launchSpecification.SecurityGroups.Add(securityGroupName);
    var request = new RequestSpotInstancesRequest{
        SpotPrice = spotPrice,
        InstanceCount = instanceCount,
        LaunchSpecification = launchSpecification
    };

    RequestSpotInstancesResponse result =
        await ec2Client.RequestSpotInstancesAsync(request);
```

```
return result.SpotInstanceRequests[0];  
}
```

從此方法傳回的重要值是 Spot 執行個體請求 ID，其中包含在傳回的 [SpotInstanceRequest](#) 物件 `SpotInstanceRequestId` 成員中。

Note

您將需要為啟動的任何 Spot 執行個體支付費用。為了避免不必要的成本，請務必[取消任何請求並終止任何執行個體](#)。

判斷 Spot 執行個體請求的狀態

下列程式碼片段說明如何取得 Spot 執行個體請求的相關資訊。您可以使用該資訊在程式碼中做出特定決策，例如是否繼續等待 Spot 執行個體請求履行。

[本主題結尾](#)的範例顯示此程式碼片段正在使用中。

```
//  
// Method to get information about a Spot Instance request, including the status,  
// instance ID, etc.  
// It gets the information for a specific request (as opposed to all requests).  
private static async Task<SpotInstanceRequest> GetSpotInstanceRequestInfo(  
    IAmazonEC2 ec2Client, string requestId)  
{  
    var describeRequest = new DescribeSpotInstanceRequestsRequest();  
    describeRequest.SpotInstanceRequestIds.Add(requestId);  
  
    DescribeSpotInstanceRequestsResponse describeResponse =  
        await ec2Client.DescribeSpotInstanceRequestsAsync(describeRequest);  
    return describeResponse.SpotInstanceRequests[0];  
}
```

方法會傳回 Spot 執行個體請求的相關資訊，例如執行個體 ID、其狀態和狀態碼。如需 Spot 執行個體請求狀態碼的詳細資訊，請參閱《[Amazon EC2 使用者指南](#)》中的 [Spot 請求狀態](#)。

清除 Spot 執行個體請求

當您不再需要請求 Spot 執行個體時，請務必取消任何未完成的請求，以防止這些請求重新履行。下列程式碼片段說明如何取消 Spot 執行個體請求。

[本主題結尾](#)的範例顯示此程式碼片段正在使用中。

```
//  
// Method to cancel a Spot Instance request  
private static async Task CancelSpotInstanceRequest(  
    IAmazonEC2 ec2Client, string requestId)  
{  
    var cancelRequest = new CancelSpotInstanceRequestsRequest();  
    cancelRequest.SpotInstanceRequestIds.Add(requestId);  
  
    await ec2Client.CancelSpotInstanceRequestsAsync(cancelRequest);  
}
```

清除 Spot 執行個體

為了避免不必要的成本，請務必終止從 Spot 執行個體請求啟動的任何執行個體；只要取消 Spot 執行個體請求就不會終止您的執行個體，這表示您將繼續支付這些執行個體的費用。下列程式碼片段示範如何在取得作用中 Spot 執行個體的執行個體識別符後終止執行個體。

[本主題結尾](#)的範例顯示此程式碼片段正在使用中。

```
//  
// Method to terminate a Spot Instance  
private static async Task TerminateSpotInstance(  
    IAmazonEC2 ec2Client, string requestId)  
{  
    var describeRequest = new DescribeSpotInstanceRequestsRequest();  
    describeRequest.SpotInstanceRequestIds.Add(requestId);  
  
    // Retrieve the Spot Instance request to check for running instances.  
    DescribeSpotInstanceRequestsResponse describeResponse =  
        await ec2Client.DescribeSpotInstanceRequestsAsync(describeRequest);  
  
    // If there are any running instances, terminate them  
    if( (describeResponse.SpotInstanceRequests[0].Status.Code  
        == "request-canceled-and-instance-running")  
        || (describeResponse.SpotInstanceRequests[0].State ==  
SpotInstanceState.Active))  
    {  
        TerminateInstancesResponse response =  
            await ec2Client.TerminateInstancesAsync(new TerminateInstancesRequest{  
                InstanceIds = new List<string>(){  
                    describeResponse.SpotInstanceRequests[0].InstanceId } });  
    }
```

```
        foreach (InstanceStateChange item in response.TerminatingInstances)
        {
            Console.WriteLine($"\\n  Terminated instance: {item.InstanceId}");
            Console.WriteLine($"  Instance state: {item.CurrentState.Name}\\n");
        }
    }
}
```

完成程式碼

下列程式碼範例會呼叫先前所述的方法來建立和取消 Spot 執行個體請求，並終止 Spot 執行個體。

開發套件參考

NuGet 套件：

- [AWSSDK.EC2](#)

程式設計元素：

- 命名空間 [Amazon.EC2](#)

[AmazonEC2Client](#) 類別

類別 [InstanceType](#)

- 命名空間 [Amazon.EC2.Model](#)

類別 [CancelSpotInstanceRequestsRequest](#)

類別 [DescribeSpotInstanceRequestsRequest](#)

類別 [DescribeSpotInstanceRequestsResponse](#)

類別 [InstanceStateChange](#)

類別 [LaunchSpecification](#)

Class [RequestSpotInstancesRequest](#)

Class [RequestSpotInstancesResponse](#)

類別 [SpotInstanceRequest](#)

類別 [TerminateInstancesRequest](#)

類別 [TerminateInstancesResponse](#)

程式碼

```
using System;
using System.Threading;
using System.Threading.Tasks;
using System.Collections.Generic;
using Amazon.EC2;
using Amazon.EC2.Model;

namespace EC2SpotInstanceRequests
{
    class Program
    {
        static async Task Main(string[] args)
        {
            // Some default values.
            // These could be made into command-line arguments instead.
            var instanceType = InstanceType.T1Micro;
            string securityGroupName = "default";
            string spotPrice = "0.003";
            int instanceCount = 1;

            // Parse the command line arguments
            if((args.Length != 1) || (!args[0].StartsWith("ami-")))
            {
                Console.WriteLine("\nUsage: EC2SpotInstanceRequests ami");
                Console.WriteLine("  ami: the Amazon Machine Image to use for the Spot Instances.");
                return;
            }

            // Create the Amazon EC2 client.
            var ec2Client = new AmazonEC2Client();

            // Create the Spot Instance request and record its ID
            Console.WriteLine("\nCreating spot instance request...");
```

```
var req = await CreateSpotInstanceRequest(
    ec2Client, args[0], securityGroupName, instanceType, spotPrice, instanceCount);
string requestId = req.SpotInstanceRequestId;

// Wait for an EC2 Spot Instance to become active
Console.WriteLine(
    $"Waiting for Spot Instance request with ID {requestId} to become active...");
int wait = 1;
var start = DateTime.Now;
while(true)
{
    Console.Write(".");

    // Get and check the status to see if the request has been fulfilled.
    var requestInfo = await GetSpotInstanceRequestInfo(ec2Client, requestId);
    if(requestInfo.Status.Code == "fulfilled")
    {
        Console.WriteLine($"
Spot Instance request {requestId} " +
            $"has been fulfilled by instance {requestInfo.InstanceId}.
");
        break;
    }

    // Wait a bit and try again, longer each time (1, 2, 4, ...)
    Thread.Sleep(wait);
    wait = wait * 2;
}

// Show the user how long it took to fulfill the Spot Instance request.
TimeSpan span = DateTime.Now.Subtract(start);
Console.WriteLine($"That took {span.TotalMilliseconds} milliseconds");

// Perform actions here as needed.
// For this example, simply wait for the user to hit a key.
// That gives them a chance to look at the EC2 console to see
// the running instance if they want to.
Console.WriteLine("Press any key to start the cleanup...");
Console.ReadKey(true);

// Cancel the request.
// Do this first to make sure that the request can't be re-fulfilled
// once the Spot Instance has been terminated.
Console.WriteLine("Canceling Spot Instance request...");
await CancelSpotInstanceRequest(ec2Client, requestId);
```

```

    // Terminate the Spot Instance that's running.
    Console.WriteLine("Terminating the running Spot Instance...");
    await TerminateSpotInstance(ec2Client, requestId);

    Console.WriteLine("Done. Press any key to exit...");
    Console.ReadKey(true);
}

//
// Method to create a Spot Instance request
private static async Task<SpotInstanceRequest> CreateSpotInstanceRequest(
    IAmazonEC2 ec2Client, string amiId, string securityGroupName,
    InstanceType instanceType, string spotPrice, int instanceCount)
{
    var launchSpecification = new LaunchSpecification{
        ImageId = amiId,
        InstanceType = instanceType
    };
    launchSpecification.SecurityGroups.Add(securityGroupName);
    var request = new RequestSpotInstancesRequest{
        SpotPrice = spotPrice,
        InstanceCount = instanceCount,
        LaunchSpecification = launchSpecification
    };

    RequestSpotInstancesResponse result =
        await ec2Client.RequestSpotInstancesAsync(request);
    return result.SpotInstanceRequests[0];
}

//
// Method to get information about a Spot Instance request, including the status,
// instance ID, etc.
// It gets the information for a specific request (as opposed to all requests).
private static async Task<SpotInstanceRequest> GetSpotInstanceRequestInfo(
    IAmazonEC2 ec2Client, string requestId)
{
    var describeRequest = new DescribeSpotInstanceRequestsRequest();
    describeRequest.SpotInstanceRequestIds.Add(requestId);

    DescribeSpotInstanceRequestsResponse describeResponse =
        await ec2Client.DescribeSpotInstanceRequestsAsync(describeRequest);

```

```

    return describeResponse.SpotInstanceRequests[0];
}

//
// Method to cancel a Spot Instance request
private static async Task CancelSpotInstanceRequest(
    IAmazonEC2 ec2Client, string requestId)
{
    var cancelRequest = new CancelSpotInstanceRequestsRequest();
    cancelRequest.SpotInstanceRequestIds.Add(requestId);

    await ec2Client.CancelSpotInstanceRequestsAsync(cancelRequest);
}

//
// Method to terminate a Spot Instance
private static async Task TerminateSpotInstance(
    IAmazonEC2 ec2Client, string requestId)
{
    var describeRequest = new DescribeSpotInstanceRequestsRequest();
    describeRequest.SpotInstanceRequestIds.Add(requestId);

    // Retrieve the Spot Instance request to check for running instances.
    DescribeSpotInstanceRequestsResponse describeResponse =
        await ec2Client.DescribeSpotInstanceRequestsAsync(describeRequest);

    // If there are any running instances, terminate them
    if( (describeResponse.SpotInstanceRequests[0].Status.Code
        == "request-canceled-and-instance-running")
        || (describeResponse.SpotInstanceRequests[0].State ==
SpotInstanceState.Active))
    {
        TerminateInstancesResponse response =
            await ec2Client.TerminateInstancesAsync(new TerminateInstancesRequest{
                InstanceIds = new List<string>(){
                    describeResponse.SpotInstanceRequests[0].InstanceId } });
        foreach (InstanceStateChange item in response.TerminatingInstances)
        {
            Console.WriteLine($"\\n  Terminated instance: {item.InstanceId}");
            Console.WriteLine($"  Instance state: {item.CurrentState.Name}\\n");
        }
    }
}

```

```
}  
}  
}
```

其他考量

- 執行教學課程後，最好登入 [Amazon EC2 主控台](#)，確認 [Spot 執行個體請求](#) 已取消，且 [Spot 執行個體](#) 已終止。

使用 存取 AWS Identity and Access Management (IAM) 適用於 .NET 的 AWS SDK

適用於 .NET 的 AWS SDK 支援 [AWS Identity and Access Management](#)，這是一種 Web 服務，可讓 AWS 客戶管理 中的使用者和使用者許可 AWS。

AWS Identity and Access Management (IAM) 使用者是您建立的實體 AWS。實體代表與 互動的人員或應用程式 AWS。如需 IAM 使用者的詳細資訊，請參閱《IAM 使用者指南》中的 IAM [使用者](#) 和 IAM [和 STS 限制](#)。

您可以透過建立 IAM 政策將許可授予使用者。政策包含政策文件，其中列出使用者可以執行的動作，以及這些動作可以影響的資源。如需 IAM 政策的詳細資訊，請參閱《IAM 使用者指南》[中的政策和許可](#)。

Warning

為避免安全風險，在開發專用軟體或使用真實資料時，請勿使用 IAM 使用者進行身分驗證。相反地，搭配使用聯合功能和身分提供者，例如 [AWS IAM Identity Center](#)。

API

為 IAM 用戶端 適用於 .NET 的 AWS SDK 提供 APIs。APIs 可讓您使用 IAM 功能，例如使用者、角色和存取金鑰。

本節包含一些範例，顯示您在使用這些 APIs 時可遵循的模式。若要檢視完整的 APIs，請參閱 [適用於 .NET 的 AWS SDK API 參考](#)（並捲動至「Amazon.IdentityManagement」）。

本節也包含 [範例](#)，說明如何將 IAM 角色連接至 Amazon EC2 執行個體，以便更輕鬆地管理登入資料。

IAM APIs 由 [AWSSDK.IdentityManagement](#) NuGet 套件提供。

先決條件

開始之前，請確定您已[設定環境和專案](#)。也請檢閱 中的資訊[開發套件功能](#)。

主題

主題

- [從 JSON 建立 IAM 受管政策](#)
- [顯示 IAM 受管政策的政策文件](#)
- [使用 IAM 角色授予存取權](#)

從 JSON 建立 IAM 受管政策

此範例說明如何使用 從 JSON 中的指定政策文件中 適用於 .NET 的 AWS SDK 建立 [IAM 受管政策](#)。應用程式會建立 IAM 用戶端物件、從 檔案讀取政策文件，然後建立政策。

Note

如需 JSON 中的範例政策文件，請參閱本主題結尾的[其他考量](#)事項。

下列各節提供此範例的程式碼片段。之後會顯示[範例的完整程式碼](#)，並可依原樣建置和執行。

主題

- [建立政策](#)
- [完成程式碼](#)
- [其他考量](#)

建立政策

下列程式碼片段會建立具有指定名稱和政策文件的 IAM 受管政策。

[本主題結尾](#)的範例顯示此程式碼片段正在使用中。

```
//  
// Method to create an IAM policy from a JSON file  
private static async Task<CreatePolicyResponse> CreateManagedPolicy(  
    IAmazonIdentityManagementService iamClient, string policyName, string  
    jsonFilename)
```



```
{
    return await iamClient.CreatePolicyAsync(new CreatePolicyRequest{
        PolicyName = policyName,
        PolicyDocument = File.ReadAllText(jsonFilename)});
}
```

完成程式碼

本節顯示此範例的相關參考和完整程式碼。

開發套件參考

NuGet 套件：

- [AWSSDK.IdentityManagement](#)

程式設計元素：

- 命名空間 [Amazon.IdentityManagement](#)
[AmazonIdentityManagementServiceClient](#) 類別
- 命名空間 [Amazon.IdentityManagement.Model](#)
 類別 [CreatePolicyRequest](#)
 類別 [CreatePolicyResponse](#)

程式碼

```
using System;
using System.Collections.Generic;
using System.IO;
using System.Threading.Tasks;
using Amazon.IdentityManagement;
using Amazon.IdentityManagement.Model;

namespace IamCreatePolicyFromJson
{
    // = = = = =
    // Class to create an IAM policy with a given policy document
    class Program
```

```

{
    private const int MaxArgs = 2;

    static async Task Main(string[] args)
    {
        // Parse the command line and show help if necessary
        var parsedArgs = CommandLine.Parse(args);
        if((parsedArgs.Count == 0) || (parsedArgs.Count > MaxArgs))
        {
            PrintHelp();
            return;
        }

        // Get the application arguments from the parsed list
        string policyName =
            CommandLine.GetArgument(parsedArgs, null, "-p", "--policy-name");
        string policyFilename =
            CommandLine.GetArgument(parsedArgs, null, "-j", "--json-filename");
        if(    string.IsNullOrEmpty(policyName)
            || (string.IsNullOrEmpty(policyFilename) || !
policyFilename.EndsWith(".json")))
            CommandLine.ErrorExit(
                "\nOne or more of the required arguments is missing or incorrect." +
                "\nRun the command with no arguments to see help.");

        // Create an IAM service client
        var iamClient = new AmazonIdentityManagementServiceClient();

        // Create the new policy
        var response = await CreateManagedPolicy(iamClient, policyName, policyFilename);
        Console.WriteLine($"Policy {response.Policy.PolicyName} has been created.");
        Console.WriteLine($"  Arn: {response.Policy.Arn}");
    }

    //
    // Method to create an IAM policy from a JSON file
    private static async Task<CreatePolicyResponse> CreateManagedPolicy(
        IAmazonIdentityManagementService iamClient, string policyName, string
jsonFilename)
    {
        return await iamClient.CreatePolicyAsync(new CreatePolicyRequest{
            PolicyName = policyName,
            PolicyDocument = File.ReadAllText(jsonFilename)});
    }
}

```

```

    }

    //
    // Command-line help
    private static void PrintHelp()
    {
        Console.WriteLine(
            "\nUsage: IamCreatePolicyFromJson -p <policy-name> -j <json-filename>" +
            "\n  -p, --policy-name: The name you want the new policy to have." +
            "\n  -j, --json-filename: The name of the JSON file with the policy
document.");
    }
}

// = = = = =
// Class that represents a command line on the console or terminal.
// (This is the same for all examples. When you have seen it once, you can ignore
it.)
static class CommandLine
{
    //
    // Method to parse a command line of the form: "--key value" or "-k value".
    //
    // Parameters:
    // - args: The command-line arguments passed into the application by the system.
    //
    // Returns:
    // A Dictionary with string Keys and Values.
    //
    // If a key is found without a matching value, Dictionary.Value is set to the key
    // (including the dashes).
    // If a value is found without a matching key, Dictionary.Key is set to "--NoKeyN",
    // where "N" represents sequential numbers.
    public static Dictionary<string,string> Parse(string[] args)
    {
        var parsedArgs = new Dictionary<string,string>();
        int i = 0, n = 0;
        while(i < args.Length)
        {
            // If the first argument in this iteration starts with a dash it's an option.
            if(args[i].StartsWith("-"))

```

```

        {
            var key = args[i++];
            var value = key;

            // Check to see if there's a value that goes with this option?
            if((i < args.Length) && (!args[i].StartsWith("-"))) value = args[i++];
            parsedArgs.Add(key, value);
        }

        // If the first argument in this iteration doesn't start with a dash, it's a
value
        else
        {
            parsedArgs.Add("--NoKey" + n.ToString(), args[i++]);
            n++;
        }
    }

    return parsedArgs;
}

//
// Method to get an argument from the parsed command-line arguments
//
// Parameters:
// - parsedArgs: The Dictionary object returned from the Parse() method (shown
above).
// - defaultValue: The default string to return if the specified key isn't in
parsedArgs.
// - keys: An array of keys to look for in parsedArgs.
public static string GetArgument(
    Dictionary<string,string> parsedArgs, string defaultReturn, params string[] keys)
{
    string retval = null;
    foreach(var key in keys)
        if(parsedArgs.TryGetValue(key, out retval)) break;
    return retval ?? defaultReturn;
}

//
// Method to exit the application with an error.
public static void ErrorExit(string msg, int code=1)
{
    Console.WriteLine("\nError");
}

```

```
        Console.WriteLine(msg);
        Environment.Exit(code);
    }
}
```

其他考量

- 以下是您可以複製到 JSON 檔案並用作此應用程式輸入的範例政策文件：

JSON

```
{
  "Version": "2012-10-17",
  "Id" : "DotnetTutorialPolicy",
  "Statement" : [
    {
      "Sid" : "DotnetTutorialPolicyS3",
      "Effect" : "Allow",
      "Action" : [
        "s3:Get*",
        "s3:List*"
      ],
      "Resource" : "*"
    },
    {
      "Sid" : "DotnetTutorialPolicyPolly",
      "Effect": "Allow",
      "Action": [
        "polly:DescribeVoices",
        "polly:SynthesizeSpeech"
      ],
      "Resource": "*"
    }
  ]
}
```

- 您可以在 [IAM 主控台](#) 中查看政策是否已建立。在篩選政策下拉式清單中，選取客戶受管。當您不再需要政策時，請將其刪除。

- 如需政策建立的詳細資訊，請參閱 [《IAM 使用者指南》中的建立 IAM 政策和 IAM JSON 政策參考](#)

顯示 IAM 受管政策的政策文件

此範例說明如何使用 適用於 .NET 的 AWS SDK 來顯示政策文件。應用程式會建立 IAM 用戶端物件、尋找指定 IAM 受管政策的預設版本，然後在 JSON 中顯示政策文件。

下列各節提供此範例的程式碼片段。之後會顯示[範例的完整程式碼](#)，並可依原樣建置和執行。

主題

- [尋找預設版本](#)
- [顯示政策文件](#)
- [完成程式碼](#)

尋找預設版本

下列程式碼片段會尋找指定 IAM 政策的預設版本。

[本主題結尾](#)的範例顯示此程式碼片段正在使用中。

```
//  
// Method to determine the default version of an IAM policy  
// Returns a string with the version  
private static async Task<string> GetDefaultVersion(  
    IAmazonIdentityManagementService iamClient, string policyArn)  
{  
    // Retrieve all the versions of this policy  
    string defaultVersion = string.Empty;  
    ListPolicyVersionsResponse reponseVersions =  
        await iamClient.ListPolicyVersionsAsync(new ListPolicyVersionsRequest{  
            PolicyArn = policyArn});  
  
    // Find the default version  
    foreach(PolicyVersion version in reponseVersions.Versions)  
    {  
        if(version.IsDefaultVersion)  
        {  
            defaultVersion = version.VersionId;  
            break;  
        }  
    }  
}
```

```
    return defaultVersion;
}
```

顯示政策文件

下列程式碼片段會以指定 IAM 政策的 JSON 顯示政策文件。

[本主題結尾](#)的範例顯示此程式碼片段正在使用中。

```
//
// Method to retrieve and display the policy document of an IAM policy
private static async Task ShowPolicyDocument(
    IAmazonIdentityManagementService iamClient, string policyArn, string
defaultVersion)
{
    // Retrieve the policy document of the default version
    GetPolicyVersionResponse responsePolicy =
        await iamClient.GetPolicyVersionAsync(new GetPolicyVersionRequest{
            PolicyArn = policyArn,
            VersionId = defaultVersion});

    // Display the policy document (in JSON)
    Console.WriteLine($"Version {defaultVersion} of the policy (in JSON format:");
    Console.WriteLine(
        $"{HttpUtility.UrlDecode(responsePolicy.PolicyVersion.Document)}");
}
```

完成程式碼

本節顯示此範例的相關參考和完整程式碼。

開發套件參考

NuGet 套件：

- [AWSSDK.IdentityManagement](#)

程式設計元素：

- 命名空間 [Amazon.IdentityManagement](#)
[AmazonIdentityManagementServiceClient](#) 類別

- 命名空間 [Amazon.IdentityManagement.Model](#)

類別 [GetPolicyVersionRequest](#)

類別 [GetPolicyVersionResponse](#)

類別 [ListPolicyVersionsRequest](#)

類別 [ListPolicyVersionsResponse](#)

類別 [PolicyVersion](#)

程式碼

```
using System;
using System.Web;
using System.Threading.Tasks;
using Amazon.IdentityManagement;
using Amazon.IdentityManagement.Model;

namespace IamDisplayPolicyJson
{
    class Program
    {
        static async Task Main(string[] args)
        {
            // Parse the command line and show help if necessary
            if(args.Length != 1)
            {
                Console.WriteLine("\nUsage: IamDisplayPolicyJson policy-arn");
                Console.WriteLine("    policy-arn: The ARN of the policy to retrieve.");
                return;
            }
            if(!args[0].StartsWith("arn:"))
            {
                Console.WriteLine("\nCould not find policy ARN in the command-line arguments:");
                Console.WriteLine($"{args[0]}");
                return;
            }

            // Create an IAM service client
            var iamClient = new AmazonIdentityManagementServiceClient();
```



```

    // Retrieve and display the policy document of the given policy
    string defaultVersion = await GetDefaultVersion(iamClient, args[0]);
    if(string.IsNullOrEmpty(defaultVersion))
        Console.WriteLine($"Could not find the default version for policy {args[0]}.");
    else
        await ShowPolicyDocument(iamClient, args[0], defaultVersion);
}

//
// Method to determine the default version of an IAM policy
// Returns a string with the version
private static async Task<string> GetDefaultVersion(
    IAmazonIdentityManagementService iamClient, string policyArn)
{
    // Retrieve all the versions of this policy
    string defaultVersion = string.Empty;
    ListPolicyVersionsResponse reponseVersions =
        await iamClient.ListPolicyVersionsAsync(new ListPolicyVersionsRequest{
            PolicyArn = policyArn});

    // Find the default version
    foreach(PolicyVersion version in reponseVersions.Versions)
    {
        if(version.IsDefaultVersion)
        {
            defaultVersion = version.VersionId;
            break;
        }
    }

    return defaultVersion;
}

//
// Method to retrieve and display the policy document of an IAM policy
private static async Task ShowPolicyDocument(
    IAmazonIdentityManagementService iamClient, string policyArn, string
defaultVersion)
{
    // Retrieve the policy document of the default version
    GetPolicyVersionResponse responsePolicy =

```

```
await iamClient.GetPolicyVersionAsync(new GetPolicyVersionRequest{
    PolicyArn = policyArn,
    VersionId = defaultVersion});

// Display the policy document (in JSON)
Console.WriteLine($"Version {defaultVersion} of the policy (in JSON format:");
Console.WriteLine(
    $"{HttpUtility.UrlDecode(responsePolicy.PolicyVersion.Document)}");
}
}
}
```

使用 IAM 角色授予存取權

本教學課程說明如何使用 適用於 .NET 的 AWS SDK 在 Amazon EC2 執行個體上啟用 IAM 角色。

概觀

對的所有請求 AWS 都必須使用 發行的登入資料以密碼編譯方式簽署 AWS。因此，您需要策略來管理在 Amazon EC2 執行個體上執行之應用程式的登入資料。您必須安全地分發、存放和輪換這些登入資料，同時讓應用程式能夠存取這些登入資料。

透過 IAM 角色，您可以有效地管理這些登入資料。您可以建立 IAM 角色，並使用應用程式所需的許可進行設定，然後將該角色連接到 EC2 執行個體。若要進一步了解使用 IAM 角色的好處，請參閱 [《Amazon EC2 使用者指南》中的 Amazon EC2 的 IAM 角色](#)。另請參閱 [《IAM 使用者指南》中的 IAM 角色](#) 相關資訊。

對於使用 建置的應用程式 適用於 .NET 的 AWS SDK，當應用程式建構 AWS 服務的用戶端物件時，物件會從數個潛在來源搜尋登入資料。其搜尋的順序會顯示在 [中憑證和設定檔解析](#)。

如果用戶端物件找不到任何其他來源的登入資料，則會擷取具有與已設定為 IAM 角色且位於 EC2 執行個體中繼資料中相同許可的臨時登入資料。這些登入資料用於 AWS 從用戶端物件呼叫。

關於本教學

遵循本教學課程時，您可以使用 適用於 .NET 的 AWS SDK（和其他工具）啟動已連接 IAM 角色的 Amazon EC2 執行個體，然後使用 IAM 角色的許可查看執行個體上的應用程式。

主題

- [建立範例 Amazon S3 應用程式](#)
- [建立 IAM 角色](#)

- [啟動 EC2 執行個體並連接 IAM 角色](#)
- [連線至 EC2 執行個體](#)
- [在 EC2 執行個體上執行範例應用程式](#)
- [清除](#)

建立範例 Amazon S3 應用程式

此範例應用程式會從 Amazon S3 擷取物件。若要執行應用程式，您需要下列項目：

- 包含文字檔案的 Amazon S3 儲存貯體。
- AWS 開發機器上的登入資料，可讓您存取 儲存貯體。

如需有關建立 Amazon S3 儲存貯體和上傳物件的資訊，請參閱 [Amazon Simple Storage Service 使用者指南](#)。如需 AWS 登入資料的資訊，請參閱 [使用 設定 SDK 身分驗證 AWS](#)。

使用下列程式碼建立 .NET Core 專案。然後在開發機器上測試應用程式。

Note

在您的開發機器上安裝了 .NET Core Runtime，可讓您在不發佈的情況下執行應用程式。在本教學稍後建立 EC2 執行個體時，您可以選擇在執行個體上安裝 .NET Core Runtime。這為您提供了類似的體驗和較小的檔案傳輸。

不過，您也可以選擇不要在執行個體上安裝 .NET Core Runtime。如果您選擇此動作，則必須發佈應用程式，以便在將應用程式轉移到執行個體時包含所有相依性。

開發套件參考

NuGet 套件：

- [AWSSDK.S3](#)

程式設計元素：

- 命名空間 [Amazon.S3](#)

[AmazonS3Client](#) 類別

- 命名空間 [Amazon.S3.Model](#)

類別 [GetObjectResponse](#)

程式碼

```
using System;
using System.Collections.Generic;
using System.IO;
using System.Threading.Tasks;
using Amazon.S3;
using Amazon.S3.Model;

namespace S3GetTextItem
{
    // = = = = =
    // Class to retrieve a text file from an S3 bucket and write it to a local file
    class Program
    {
        static async Task Main(string[] args)
        {
            // Parse the command line and show help if necessary
            var parsedArgs = CommandLine.Parse(args);
            if(parsedArgs.Count == 0)
            {
                PrintHelp();
                return;
            }

            // Get the application arguments from the parsed list
            string bucket =
                CommandLine.GetArgument(parsedArgs, null, "-b", "--bucket-name");
            string item =
                CommandLine.GetArgument(parsedArgs, null, "-t", "--text-object");
            string outFile =
                CommandLine.GetArgument(parsedArgs, null, "-o", "--output-filename");
            if(    string.IsNullOrEmpty(bucket)
                || string.IsNullOrEmpty(item)
                || string.IsNullOrEmpty(outFile))
                CommandLine.ErrorExit(
                    "\nOne or more of the required arguments is missing or incorrect." +
                    "\nRun the command with no arguments to see help.");
        }
    }
}
```

```

    // Create the S3 client object and get the file object from the bucket.
    var response = await GetObject(new AmazonS3Client(), bucket, item);

    // Write the contents of the file object to the given output file.
    var reader = new StreamReader(response.ResponseStream);
    string contents = reader.ReadToEnd();
    using (var s = new FileStream(outFile, FileMode.Create))
    using (var writer = new StreamWriter(s))
        writer.WriteLine(contents);
}

//
// Method to get an object from an S3 bucket.
private static async Task<GetObjectResponse> GetObject(
    IAmazonS3 s3Client, string bucket, string item)
{
    Console.WriteLine($"Retrieving {item} from bucket {bucket}.");
    return await s3Client.GetObjectAsync(bucket, item);
}

//
// Command-line help
private static void PrintHelp()
{
    Console.WriteLine(
        "\nUsage: S3GetTextItem -b <bucket-name> -t <text-object> -o <output-filename>"
+
        "\n  -b, --bucket-name: The name of the S3 bucket." +
        "\n  -t, --text-object: The name of the text object in the bucket." +
        "\n  -o, --output-filename: The name of the file to write the text to.");
}

// =====
//
// Class that represents a command line on the console or terminal.
// (This is the same for all examples. When you have seen it once, you can ignore
it.)
static class CommandLine
{

```

```

//
// Method to parse a command line of the form: "--key value" or "-k value".
//
// Parameters:
// - args: The command-line arguments passed into the application by the system.
//
// Returns:
// A Dictionary with string Keys and Values.
//
// If a key is found without a matching value, Dictionary.Value is set to the key
// (including the dashes).
// If a value is found without a matching key, Dictionary.Key is set to "--NoKeyN",
// where "N" represents sequential numbers.
public static Dictionary<string,string> Parse(string[] args)
{
    var parsedArgs = new Dictionary<string,string>();
    int i = 0, n = 0;
    while(i < args.Length)
    {
        // If the first argument in this iteration starts with a dash it's an option.
        if(args[i].StartsWith("-"))
        {
            var key = args[i++];
            var value = key;

            // Check to see if there's a value that goes with this option?
            if((i < args.Length) && (!args[i].StartsWith("-"))) value = args[i++];
            parsedArgs.Add(key, value);
        }

        // If the first argument in this iteration doesn't start with a dash, it's a
value
        else
        {
            parsedArgs.Add("--NoKey" + n.ToString(), args[i++]);
            n++;
        }
    }

    return parsedArgs;
}

//
// Method to get an argument from the parsed command-line arguments

```

```
//
// Parameters:
// - parsedArgs: The Dictionary object returned from the Parse() method (shown
above).
// - defaultValue: The default string to return if the specified key isn't in
parsedArgs.
// - keys: An array of keys to look for in parsedArgs.
public static string GetArgument(
    Dictionary<string,string> parsedArgs, string defaultReturn, params string[] keys)
{
    string retval = null;
    foreach(var key in keys)
        if(parsedArgs.TryGetValue(key, out retval)) break;
    return retval ?? defaultReturn;
}

//
// Method to exit the application with an error.
public static void ErrorExit(string msg, int code=1)
{
    Console.WriteLine("\nError");
    Console.WriteLine(msg);
    Environment.Exit(code);
}
}
```

如果需要，您可以暫時移除在開發機器上使用的登入資料，以查看應用程式如何回應。（但請務必在完成時還原登入資料。）

建立 IAM 角色

建立具有適當許可的 IAM 角色來存取 Amazon S3。

1. 開啟 [IAM 主控台](#)。
2. 在導覽窗格中，選擇角色，然後選擇建立角色。
3. 選取AWS 服務，尋找並選擇 EC2，然後選擇下一步：許可。
4. 在連接許可政策下，尋找並選取 AmazonS3ReadOnlyAccess。如果您想要的話，請檢閱政策，然後選擇下一步：標籤。
5. 如果需要，請新增標籤，然後選擇下一步：檢閱。

6. 輸入該角色的名稱和說明，然後選擇 Create role (建立新角色)。請記住此名稱，因為在您啟動 EC2 執行個體時需要用到。

啟動 EC2 執行個體並連接 IAM 角色

使用您先前建立的 IAM 角色啟動 EC2 執行個體。您可以透過下列方式執行此操作。

- 使用 EC2 主控台

若要使用 EC2 主控台啟動執行個體，請參閱 [《Amazon EC2 使用者指南》](#) 中的 [使用新的啟動執行個體精靈啟動執行個體](#)。

當您查看啟動頁面時，您至少應該展開進階詳細資訊窗格，以便您可以指定先前在 IAM 執行個體描述檔中建立的 IAM 角色。

- 使用 適用於 .NET 的 AWS SDK

如需相關資訊，請參閱 [啟動 Amazon EC2 執行個體](#)，包括該主題[其他考量](#)接近結尾的。

若要啟動已連接 IAM 角色的 EC2 執行個體，IAM 使用者的組態必須包含特定許可。如需所需許可的詳細資訊，請參閱 [《Amazon EC2 使用者指南》](#) 中的 [授予使用者將 IAM 角色傳遞至執行個體的許可](#)。

連線至 EC2 執行個體

連線至 EC2 執行個體，以便您可以將範例應用程式轉移至該執行個體，然後執行應用程式。您需要包含用來啟動執行個體之金鑰對私有部分的檔案，也就是 PEM 檔案。

如需連接至執行個體的資訊，請參閱 [《Amazon EC2 使用者指南》](#) 中的 [連接至 Linux 執行個體](#) 或 [連接至 Windows 執行個體](#)。當您連線時，請以可讓您將檔案從開發機器傳輸到執行個體的方式執行此操作。

如果您在 Windows 上使用 Visual Studio，您也可以使用 Toolkit for Visual Studio 連線至執行個體。如需詳細資訊，請參閱 AWS Toolkit for Visual Studio [《使用者指南》](#) 中的 [連線至 Amazon EC2 執行個體](#)。

在 EC2 執行個體上執行範例應用程式

1. 將應用程式檔案從本機磁碟機複製到執行個體。

傳輸哪些檔案取決於您建置應用程式的方式，以及執行個體是否已安裝 .NET Core Runtime。如需有關如何將檔案傳輸至執行個體的資訊，請參閱《[Amazon EC2 使用者指南](#)》中的[連線至 Linux 執行個體](#)（請參閱適當的子區段）或[將檔案傳輸至 Windows 執行個體](#)。

2. 啟動應用程式，並確認其執行的結果與開發機器上的結果相同。
3. 確認應用程式使用 IAM 角色提供的登入資料。
 - a. 開啟 [Amazon EC2 主控台](#)。
 - b. 選取執行個體，並透過動作、執行個體設定、連接/取代 IAM 角色來分離 IAM 角色。
 - c. 再次執行應用程式，並查看它傳回授權錯誤。

清除

完成本教學課程後，如果您不再需要您建立的 EC2 執行個體，請務必終止執行個體，以避免不必要的成本。您可以在 [Amazon EC2 主控台](#)或以程式設計方式執行此操作，如中所述[終止 Amazon EC2 執行個體](#)。如果您願意，也可以刪除您為此教學課程建立的其他資源。這些可能包括 IAM 角色、EC2 金鑰對和 PEM 檔案、安全群組等。

使用 Amazon Simple Storage Service 網際網路儲存

適用於 .NET 的 AWS SDK 支援 [Amazon S3](#)，這是網際網路的儲存體。此服務旨在降低開發人員進行網路規模運算的難度。

API

為 Amazon S3 用戶端 適用於 .NET 的 AWS SDK 提供 APIs。APIs 可讓您使用 Amazon S3 資源，例如儲存貯體和項目。若要檢視 Amazon S3 的完整 APIs 集，請參閱以下內容：

- [適用於 .NET 的 AWS SDK API 參考](#)（並捲動至「Amazon.S3」）。
- [Amazon.Extensions.S3.Encryption](#) 文件

Amazon S3 APIs 由下列 NuGet 套件提供：

- [AWSSDK.S3](#)
- [Amazon.Extensions.S3.Encryption](#)

先決條件

開始之前，請確定您已[設定環境和專案](#)。也請檢閱 中的資訊[開發套件功能](#)。

本文件中的範例

本文件中的下列主題說明如何使用 適用於 .NET 的 AWS SDK 來使用 Amazon S3。

- [使用 KMS 金鑰進行 S3 加密](#)

其他文件中的範例

[Amazon S3 開發人員指南](#)的下列連結提供如何使用 適用於 .NET 的 AWS SDK 來使用 Amazon S3 的其他範例。

Note

雖然這些範例和其他程式設計考量是針對 適用於 .NET 的 AWS SDK 使用 .NET Framework 的第 3 版所建立，但它們也適用於 適用於 .NET 的 AWS SDK 使用 .NET Core 的較新版本。有時需要對程式碼進行小型調整。

Amazon S3 程式設計範例

- [管理 ACL](#)
- [建立儲存貯體](#)
- [上傳物件](#)
- [使用高階 API 進行分段上傳 \(Amazon.S3.Transfer.TransferUtility\)](#)
- [使用低階 API 執行分段上傳](#)
- [列出物件](#)
- [列出金鑰](#)
- [取得物件](#)
- [複製物件](#)
- [使用分段上傳 API 複製物件](#)
- [刪除物件](#)
- [刪除多個物件](#)

- [還原物件](#)
- [設定儲存貯體的通知](#)
- [管理物件的生命週期](#)
- [產生預先簽章的物件 URL](#)
- [管理網站](#)
- [啟用跨來源資源分享 \(CORS\)](#)

其他程式設計考量事項

- [使用 適用於 .NET 的 AWS SDK 進行 Amazon S3 程式設計](#)
- [使用 IAM 使用者暫時性登入資料提出請求](#)
- [使用聯合身分使用者暫時登入資料提出請求](#)
- [指定伺服器端加密](#)
- [使用客戶提供的加密金鑰指定伺服器端加密](#)

在 中使用 AWS KMS 金鑰進行 Amazon S3 加密 適用於 .NET 的 AWS SDK

此範例說明如何使用 AWS Key Management Service 金鑰來加密 Amazon S3 物件。應用程式會建立客戶主金鑰 (CMK)，並使用它來建立 [AmazonS3EncryptionClientV2](#) 物件以進行用戶端加密。應用程式使用該用戶端，從現有 Amazon S3 儲存貯體中的指定文字檔案建立加密物件。然後，它會解密物件並顯示其內容。

Warning

稱為 `AmazonS3EncryptionClient` 的類似類別已棄用，且比 `AmazonS3EncryptionClientV2` 類別較不安全。若要遷移使用的現有程式碼 `AmazonS3EncryptionClient`，請參閱 [S3 加密用戶端遷移 \(V1 到 V2\)](#)。

主題

- [建立加密資料](#)
- [建立和加密 Amazon S3 物件](#)
- [完成程式碼](#)
- [其他考量](#)

建立加密資料

下列程式碼片段會建立包含 KMS 金鑰 ID 的 EncryptionMaterials 物件。

[本主題結尾](#)的範例顯示此程式碼片段正在使用中。

```
// Create a customer master key (CMK) and store the result
CreateKeyResponse createKeyResponse =
    await new AmazonKeyManagementServiceClient().CreateKeyAsync(new
CreateKeyRequest());
var kmsEncryptionContext = new Dictionary<string, string>();
var kmsEncryptionMaterials = new EncryptionMaterialsV2(
    createKeyResponse.KeyMetadata.KeyId, KmsType.KmsContext, kmsEncryptionContext);
```

建立和加密 Amazon S3 物件

下列程式碼片段會建立使用先前建立之加密資料的 AmazonS3EncryptionClientV2 物件。然後，它會使用用戶端來建立和加密新的 Amazon S3 物件。

[本主題結尾](#)的範例顯示此程式碼片段正在使用中。

```
//
// Method to create and encrypt an object in an S3 bucket
static async Task<GetObjectResponse> CreateAndRetrieveObjectAsync(
    EncryptionMaterialsV2 materials, string bucketName,
    string fileName, string itemName)
{
    // CryptoStorageMode.ObjectMetadata is required for KMS EncryptionMaterials
    var config = new AmazonS3CryptoConfigurationV2(SecurityProfile.V2AndLegacy)
    {
        StorageMode = CryptoStorageMode.ObjectMetadata
    };
    var s3EncClient = new AmazonS3EncryptionClientV2(config, materials);

    // Create, encrypt, and put the object
    await s3EncClient.PutObjectAsync(new PutObjectRequest
    {
        BucketName = bucketName,
        Key = itemName,
        ContentBody = File.ReadAllText(fileName)
    });

    // Get, decrypt, and return the object
```

```
return await s3EncClient.GetObjectAsync(new GetObjectRequest
{
    BucketName = bucketName,
    Key = itemName
});
}
```

完成程式碼

本節顯示此範例的相關參考和完整程式碼。

開發套件參考

NuGet 套件：

- [Amazon.Extensions.S3.Encryption](#)

程式設計元素：

- 命名空間 [Amazon.Extensions.S3.Encryption](#)

[AmazonS3EncryptionClientV2](#) 類別

[AmazonS3CryptoConfigurationV2](#) 類別

類別 [CryptoStorageMode](#)

類別 [EncryptionMaterialsV2](#)

- 命名空間 [Amazon.Extensions.S3.Encryption.Primitives](#)

類別 [KmsType](#)

- 命名空間 [Amazon.S3.Model](#)

類別 [GetObjectRequest](#)

類別 [GetObjectResponse](#)

類別 [PutObjectRequest](#)

- 命名空間 [Amazon.KeyManagementService](#)

[AmazonKeyManagementServiceClient](#) 類別

- 命名空間 [Amazon.KeyManagementService.Model](#)

類別 [CreateKeyRequest](#)

類別 [CreateKeyResponse](#)

程式碼

```
using System;
using System.Collections.Generic;
using System.IO;
using System.Threading.Tasks;
using Amazon.Extensions.S3.Encryption;
using Amazon.Extensions.S3.Encryption.Primitives;
using Amazon.S3.Model;
using Amazon.KeyManagementService;
using Amazon.KeyManagementService.Model;

namespace KmsS3Encryption
{
    // = = = = =
    // Class to store text in an encrypted S3 object.
    class Program
    {
        private const int MaxArgs = 3;

        public static async Task Main(string[] args)
        {
            // Parse the command line and show help if necessary
            var parsedArgs = CommandLine.Parse(args);
            if((parsedArgs.Count == 0) || (parsedArgs.Count > MaxArgs))
            {
                PrintHelp();
                return;
            }

            // Get the application arguments from the parsed list
            string bucketName =
                CommandLine.GetArgument(parsedArgs, null, "-b", "--bucket-name");
            string fileName =
                CommandLine.GetArgument(parsedArgs, null, "-f", "--file-name");
            string itemName =
```

```

        CommandLine.GetArgument(parsedArgs, null, "-i", "--item-name");
        if(string.IsNullOrEmpty(bucketName) || (string.IsNullOrEmpty(fileName)))
            CommandLine.ErrorExit(
                "\nOne or more of the required arguments is missing or incorrect." +
                "\nRun the command with no arguments to see help.");
        if(!File.Exists(fileName))
            CommandLine.ErrorExit($"The given file {fileName} doesn't exist.");
        if(string.IsNullOrEmpty(itemName))
            itemName = Path.GetFileName(fileName);

        // Create a customer master key (CMK) and store the result
        CreateKeyResponse createKeyResponse =
            await new AmazonKeyManagementServiceClient().CreateKeyAsync(new
CreateKeyRequest());
        var kmsEncryptionContext = new Dictionary<string, string>();
        var kmsEncryptionMaterials = new EncryptionMaterialsV2(
            createKeyResponse.KeyMetadata.KeyId, KmsType.KmsContext, kmsEncryptionContext);

        // Create the object in the bucket, then display the content of the object
        var putObjectResponse =
            await CreateAndRetrieveObjectAsync(kmsEncryptionMaterials, bucketName,
fileName, itemName);
        Stream stream = putObjectResponse.ResponseStream;
        StreamReader reader = new StreamReader(stream);
        Console.WriteLine(reader.ReadToEnd());
    }

    //
    // Method to create and encrypt an object in an S3 bucket
    static async Task<GetObjectResponse> CreateAndRetrieveObjectAsync(
        EncryptionMaterialsV2 materials, string bucketName,
        string fileName, string itemName)
    {
        // CryptoStorageMode.ObjectMetadata is required for KMS EncryptionMaterials
        var config = new AmazonS3CryptoConfigurationV2(SecurityProfile.V2AndLegacy)
        {
            StorageMode = CryptoStorageMode.ObjectMetadata
        };
        var s3EncClient = new AmazonS3EncryptionClientV2(config, materials);

        // Create, encrypt, and put the object
        await s3EncClient.PutObjectAsync(new PutObjectRequest
    {

```

```

        BucketName = bucketName,
        Key = itemName,
        ContentBody = File.ReadAllText(fileName)
    });

    // Get, decrypt, and return the object
    return await s3EncClient.GetObjectAsync(new GetObjectRequest
    {
        BucketName = bucketName,
        Key = itemName
    });
}

//
// Command-line help
private static void PrintHelp()
{
    Console.WriteLine(
        "\nUsage: KmsS3Encryption -b <bucket-name> -f <file-name> [-i <item-name>]" +
        "\n  -b, --bucket-name: The name of an existing S3 bucket." +
        "\n  -f, --file-name: The name of a text file with content to encrypt and store
in S3." +
        "\n  -i, --item-name: The name you want to use for the item." +
        "\n          If item-name isn't given, file-name will be used.");
}

}

// = = = = =
// Class that represents a command line on the console or terminal.
// (This is the same for all examples. When you have seen it once, you can ignore
it.)
static class CommandLine
{
    //
    // Method to parse a command line of the form: "--key value" or "-k value".
    //
    // Parameters:
    // - args: The command-line arguments passed into the application by the system.
    //
    // Returns:
    // A Dictionary with string Keys and Values.

```



```

//
// If a key is found without a matching value, Dictionary.Value is set to the key
// (including the dashes).
// If a value is found without a matching key, Dictionary.Key is set to "--NoKeyN",
// where "N" represents sequential numbers.
public static Dictionary<string,string> Parse(string[] args)
{
    var parsedArgs = new Dictionary<string,string>();
    int i = 0, n = 0;
    while(i < args.Length)
    {
        // If the first argument in this iteration starts with a dash it's an option.
        if(args[i].StartsWith("-"))
        {
            var key = args[i++];
            var value = key;

            // Check to see if there's a value that goes with this option?
            if((i < args.Length) && (!args[i].StartsWith("-"))) value = args[i++];
            parsedArgs.Add(key, value);
        }

        // If the first argument in this iteration doesn't start with a dash, it's a
value
        else
        {
            parsedArgs.Add("--NoKey" + n.ToString(), args[i++]);
            n++;
        }
    }

    return parsedArgs;
}

//
// Method to get an argument from the parsed command-line arguments
//
// Parameters:
// - parsedArgs: The Dictionary object returned from the Parse() method (shown
above).
// - defaultValue: The default string to return if the specified key isn't in
parsedArgs.
// - keys: An array of keys to look for in parsedArgs.
public static string GetArgument(

```

```
Dictionary<string,string> parsedArgs, string defaultReturn, params string[] keys)
{
    string retval = null;
    foreach(var key in keys)
        if(parsedArgs.TryGetValue(key, out retval)) break;
    return retval ?? defaultReturn;
}

//
// Method to exit the application with an error.
public static void ErrorExit(string msg, int code=1)
{
    Console.WriteLine("\nError");
    Console.WriteLine(msg);
    Environment.Exit(code);
}
}
```

其他考量

- 您可以檢查此範例的結果。若要這樣做，請前往 [Amazon S3 主控台](#) 並開啟您提供給應用程式的儲存貯體。然後尋找新物件、下載它，然後在文字編輯器中開啟它。
- [AmazonS3EncryptionClientV2](#) 類別實作與標準AmazonS3Client類別相同的界面。這可讓您更輕鬆地將程式碼移植到 AmazonS3EncryptionClientV2類別，以便在用戶端中自動且透明地進行加密和解密。
- 使用 AWS KMS 金鑰做為主金鑰的一個優點是您不需要儲存和管理自己的主金鑰；這由 完成 AWS。第二個優點是 的 AmazonS3EncryptionClientV2類別可與 的 AmazonS3EncryptionClientV2類別 適用於 .NET 的 AWS SDK 互通 適用於 Java 的 AWS SDK。這表示您可以使用 加密 適用於 Java 的 AWS SDK ，並使用 解密 適用於 .NET 的 AWS SDK ，反之亦然。

Note

的 AmazonS3EncryptionClientV2類別僅在中繼資料模式下執行時 適用於 .NET 的 AWS SDK 支援 KMS 主金鑰。AmazonS3EncryptionClientV2 類別 的指示檔案模式與

AmazonS3EncryptionClientV2類別 適用於 .NET 的 AWS SDK 不相容 適用於 Java 的 AWS SDK。

- 如需使用 AmazonS3EncryptionClientV2類別進行用戶端加密，以及信封加密如何運作的詳細資訊，請參閱[使用 適用於 .NET 的 AWS SDK 和 Amazon S3 進行用戶端資料加密](#)。

使用 Amazon Simple Notification Service 從雲端傳送通知

Note

本主題中的資訊專屬於以 .NET Framework 和 3.3 適用於 .NET 的 AWS SDK 版及更早版本為基礎的專案。

適用於 .NET 的 AWS SDK 支援 Amazon Simple Notification Service (Amazon SNS)，這是一種 Web 服務，可讓應用程式、最終使用者和裝置立即從雲端傳送通知。如需詳細資訊，請參閱 [Amazon SNS](#)。

列出您的 Amazon SNS 主題

下列範例說明如何列出 Amazon SNS 主題、每個主題的訂閱，以及每個主題的屬性。此範例使用預設的 [AmazonSimpleNotificationServiceClient](#)。

```
// using Amazon.SimpleNotificationService;
// using Amazon.SimpleNotificationService.Model;

var client = new AmazonSimpleNotificationServiceClient();
var request = new ListTopicsRequest();
var response = new ListTopicsResponse();

do
{
    response = client.ListTopics(request);

    foreach (var topic in response.Topics)
    {
        Console.WriteLine("Topic: {0}", topic.TopicArn);

        var subs = client.ListSubscriptionsByTopic(
```

```
        new ListSubscriptionsByTopicRequest
        {
            TopicArn = topic.TopicArn
        });

var ss = subs.Subscriptions;

if (ss.Any())
{
    Console.WriteLine("  Subscriptions:");

    foreach (var sub in ss)
    {
        Console.WriteLine("    {0}", sub.SubscriptionArn);
    }
}

var attrs = client.GetTopicAttributes(
    new GetTopicAttributesRequest
    {
        TopicArn = topic.TopicArn
    }).Attributes;

if (attrs.Any())
{
    Console.WriteLine("  Attributes:");

    foreach (var attr in attrs)
    {
        Console.WriteLine("    {0} = {1}", attr.Key, attr.Value);
    }
}

Console.WriteLine();
}

request.NextToken = response.NextToken;
} while (!string.IsNullOrEmpty(response.NextToken));
```

傳送訊息至 Amazon SNS 主題

下列範例示範如何傳送訊息至 Amazon SNS 主題。此範例採用一個引數，即 Amazon SNS 主題的 ARN。

```
using System;
using System.Linq;
using System.Threading.Tasks;

using Amazon;
using Amazon.SimpleNotificationService;
using Amazon.SimpleNotificationService.Model;

namespace SnsSendMessage
{
    class Program
    {
        static void Main(string[] args)
        {
            /* Topic ARNs must be in the correct format:
             *   arn:aws:sns:REGION:ACCOUNT_ID:NAME
             *
             *   where:
             *   REGION      is the region in which the topic is created, such as us-
west-2
             *   ACCOUNT_ID is your (typically) 12-character account ID
             *   NAME        is the name of the topic
             */
            string topicArn = args[0];
            string message = "Hello at " + DateTime.Now.ToShortTimeString();

            var client = new AmazonSimpleNotificationServiceClient(region:
Amazon.RegionEndpoint.USSouth2);

            var request = new PublishRequest
            {
                Message = message,
                TopicArn = topicArn
            };

            try
            {
                var response = client.Publish(request);
            }
        }
    }
}
```

```

        Console.WriteLine("Message sent to topic:");
        Console.WriteLine(message);
    }
    catch (Exception ex)
    {
        Console.WriteLine("Caught exception publishing request:");
        Console.WriteLine(ex.Message);
    }
}
}
}
}
}

```

請參閱 GitHub 上的[完整範例](#)，包括如何從命令列建立和執行範例的資訊。

傳送簡訊至一個電話號碼

以下範例說明如何傳送簡訊到電話號碼。此範例採用一個引數，即電話號碼，其必須採用註解中所述兩種格式之一。

```

using System;
using System.Linq;
using System.Threading.Tasks;
using Amazon;
using Amazon.SimpleNotificationService;
using Amazon.SimpleNotificationService.Model;

namespace SnsPublish
{
    class Program
    {
        static void Main(string[] args)
        {
            // US phone numbers must be in the correct format:
            // +1 (nnn) nnn-nnnn OR +1nnnnnnnnnnn
            string number = args[0];
            string message = "Hello at " + DateTime.Now.ToShortTimeString();

            var client = new AmazonSimpleNotificationServiceClient(region:
Amazon.RegionEndpoint.USWest2);
            var request = new PublishRequest
            {
                Message = message,

```

```
        PhoneNumber = number
    };

    try
    {
        var response = client.Publish(request);

        Console.WriteLine("Message sent to " + number + ":");
        Console.WriteLine(message);
    }
    catch (Exception ex)
    {
        Console.WriteLine("Caught exception publishing request:");
        Console.WriteLine(ex.Message);
    }
}
}
```

請參閱 GitHub 上的[完整範例](#)，包括如何從命令列建立和執行範例的資訊。

使用 Amazon SQS 傳送訊息

適用於 .NET 的 AWS SDK 支援 [Amazon Simple Queue Service \(Amazon SQS\)](#)，這是一種訊息佇列服務，可處理系統中元件之間的訊息或工作流程。

Amazon SQS 佇列提供一種機制，可讓您在微型服務、分散式系統和無伺服器應用程式等軟體元件之間傳送、存放和接收訊息。這可讓您解耦這類元件，讓您無需設計和操作自己的簡訊系統。如需有關佇列和訊息如何在 Amazon SQS 中運作的資訊，請參閱 [《Amazon Simple Queue Service 開發人員指南》](#) 中的 [Amazon SQS 教學](#) 課程和 [基本 Amazon SQS 架構](#)。 <https://docs.aws.amazon.com/AWSSimpleQueueService/latest/SQSDeveloperGuide/>

Important

由於佇列的分散式性質，Amazon SQS 無法保證您會收到精確的訊息。如果您需要保留訊息順序，請使用 [Amazon SQS FIFO 佇列](#)。

API

為 Amazon SQS 用戶端 適用於 .NET 的 AWS SDK 提供 APIs。APIs 可讓您使用 Amazon SQS 功能，例如佇列和訊息。本節包含一些範例，顯示您在使用這些 APIs 時可遵循的模式。若要檢視完整的 APIs 集，請參閱 [適用於 .NET 的 AWS SDK API 參考](#)（並捲動至「Amazon.SQS」）。

Amazon SQS APIs 由 [AWSSDK.SQS](#) NuGet 套件提供。

先決條件

開始之前，請確定您已[設定環境和專案](#)。也請檢閱 中的資訊[開發套件功能](#)。

主題

主題

- [建立 Amazon SQS 佇列](#)
- [更新 Amazon SQS 佇列](#)
- [刪除 Amazon SQS 佇列](#)
- [傳送 Amazon SQS 訊息](#)
- [接收 Amazon SQS 訊息](#)

建立 Amazon SQS 佇列

此範例說明如何使用 適用於 .NET 的 AWS SDK 來建立 Amazon SQS 佇列。如果您未提供無效[字母佇列](#)的 ARN，應用程式會建立無效字母佇列。然後，它會建立標準訊息佇列，其中包含無效字母佇列（您提供的佇列或建立的佇列）。

如果您未提供任何命令列引數，應用程式只會顯示所有現有佇列的相關資訊。

下列各節提供此範例的程式碼片段。之後會顯示[範例的完整程式碼](#)，並可依原樣建置和執行。

主題

- [顯示現有的佇列](#)
- [建立佇列](#)
- [取得佇列的 ARN](#)
- [完成程式碼](#)
- [其他考量](#)

顯示現有的佇列

下列程式碼片段顯示 SQS 用戶端區域中現有佇列的清單，以及每個佇列的屬性。

[本主題結尾](#)的範例顯示此程式碼片段正在使用中。

```
//
// Method to show a list of the existing queues
private static async Task ShowQueues(IAmazonSQS sqsClient)
{
    ListQueuesResponse responseList = await sqsClient.ListQueuesAsync("");
    Console.WriteLine();
    foreach(string qUrl in responseList.QueueUrls)
    {
        // Get and show all attributes. Could also get a subset.
        await ShowAllAttributes(sqsClient, qUrl);
    }
}

//
// Method to show all attributes of a queue
private static async Task ShowAllAttributes(IAmazonSQS sqsClient, string qUrl)
{
    var attributes = new List<string>{ QueueAttributeName.All };
    GetQueueAttributesResponse responseGetAtt =
        await sqsClient.GetQueueAttributesAsync(qUrl, attributes);
    Console.WriteLine($"Queue: {qUrl}");
    foreach(var att in responseGetAtt.Attributes)
        Console.WriteLine($"\\t{att.Key}: {att.Value}");
}
```

建立佇列

下列程式碼片段會建立佇列。程式碼片段包含使用無效字母佇列，但您的佇列不一定需要無效字母佇列。

[本主題結尾](#)的範例顯示此程式碼片段正在使用中。

```
//
// Method to create a queue. Returns the queue URL.
private static async Task<string> CreateQueue(
    IAmazonSQS sqsClient, string qName, string deadLetterQueueUrl=null,
```

```

    string maxReceiveCount=null, string receiveWaitTime=null)
{
    var attrs = new Dictionary<string, string>();

    // If a dead-letter queue is given, create a message queue
    if(!string.IsNullOrEmpty(deadLetterQueueUrl))
    {
        attrs.Add(QueueAttributeName.ReceiveMessageWaitTimeSeconds, receiveWaitTime);
        attrs.Add(QueueAttributeName.RedrivePolicy,
            $"{{\"deadLetterTargetArn\": \"{await GetQueueArn(sqsClient,
deadLetterQueueUrl)}\", \" +
            $\"\"maxReceiveCount\": \"{maxReceiveCount}\"}}");
        // Add other attributes for the message queue such as VisibilityTimeout
    }

    // If no dead-letter queue is given, create one of those instead
    //else
    //{
    // // Add attributes for the dead-letter queue as needed
    // attrs.Add();
    //}

    // Create the queue
    CreateQueueResponse responseCreate = await sqsClient.CreateQueueAsync(
        new CreateQueueRequest{QueueName = qName, Attributes = attrs});
    return responseCreate.QueueUrl;
}

```

取得佇列的 ARN

下列程式碼片段會取得指定佇列 URL 所識別之佇列的 ARN。

[本主題結尾](#)的範例顯示此程式碼片段正在使用中。

```

//
// Method to get the ARN of a queue
private static async Task<string> GetQueueArn(IAmazonSQS sqsClient, string qUrl)
{
    GetQueueAttributesResponse responseGetAtt = await
sqsClient.GetQueueAttributesAsync(
    qUrl, new List<string>{QueueAttributeName.QueueArn});
    return responseGetAtt.QueueARN;
}

```

完成程式碼

本節顯示此範例的相關參考和完整程式碼。

開發套件參考

NuGet 套件：

- [AWSSDK.SQS](#)

程式設計元素：

- 命名空間 [Amazon.SQS](#)

[AmazonSQSClient](#) 類別

類別 [QueueAttributeName](#)

- 命名空間 [Amazon.SQS.Model](#)

類別 [CreateQueueRequest](#)

類別 [CreateQueueResponse](#)

類別 [GetQueueAttributesResponse](#)

類別 [ListQueuesResponse](#)

程式碼

```
using System;
using System.Threading.Tasks;
using System.Collections.Generic;
using Amazon.SQS;
using Amazon.SQS.Model;

namespace SQSCreateQueue
{
    // = = = = =
    // Class to create a queue
    class Program
    {
```

```

private const string MaxReceiveCount = "10";
private const string ReceiveMessageWaitTime = "2";
private const int MaxArgs = 3;

static async Task Main(string[] args)
{
    // Parse the command line and show help if necessary
    var parsedArgs = CommandLine.Parse(args);
    if(parsedArgs.Count > MaxArgs)
        CommandLine.ErrorExit(
            "\nToo many command-line arguments.\nRun the command with no arguments to see
help.");

    // Create the Amazon SQS client
    var sqsClient = new AmazonSQSClient();

    // In the case of no command-line arguments, just show help and the existing
    queues
    if(parsedArgs.Count == 0)
    {
        PrintHelp();
        Console.WriteLine("\nNo arguments specified.");
        Console.Write("Do you want to see a list of the existing queues? ((y) or n):
");
        string response = Console.ReadLine();
        if((string.IsNullOrEmpty(response)) || (response.ToLower() == "y"))
            await ShowQueues(sqsClient);
        return;
    }

    // Get the application arguments from the parsed list
    string queueName =
        CommandLine.GetArgument(parsedArgs, null, "-q", "--queue-name");
    string deadLetterQueueUrl =
        CommandLine.GetArgument(parsedArgs, null, "-d", "--dead-letter-queue");
    string maxReceiveCount =
        CommandLine.GetArgument(parsedArgs, MaxReceiveCount, "-m", "--max-receive-
count");
    string receiveWaitTime =
        CommandLine.GetArgument(parsedArgs, ReceiveMessageWaitTime, "-w", "--wait-
time");

    if(string.IsNullOrEmpty(queueName))
        CommandLine.ErrorExit(

```

```

        "\nYou must supply a queue name.\nRun the command with no arguments to see
help.");

    // If a dead-letter queue wasn't given, create one
    if(string.IsNullOrEmpty(deadLetterQueueUrl))
    {
        Console.WriteLine("\nNo dead-letter queue was specified. Creating one...");
        deadLetterQueueUrl = await CreateQueue(sqsClient, queueName + "__dlq");
        Console.WriteLine($"Your new dead-letter queue:");
        await ShowAllAttributes(sqsClient, deadLetterQueueUrl);
    }

    // Create the message queue
    string messageQueueUrl = await CreateQueue(
        sqsClient, queueName, deadLetterQueueUrl, maxReceiveCount, receiveWaitTime);
    Console.WriteLine($"Your new message queue:");
    await ShowAllAttributes(sqsClient, messageQueueUrl);
}

//
// Method to show a list of the existing queues
private static async Task ShowQueues(IAmazonSQS sqsClient)
{
    ListQueuesResponse responseList = await sqsClient.ListQueuesAsync("");
    Console.WriteLine();
    foreach(string qUrl in responseList.QueueUrls)
    {
        // Get and show all attributes. Could also get a subset.
        await ShowAllAttributes(sqsClient, qUrl);
    }
}

//
// Method to create a queue. Returns the queue URL.
private static async Task<string> CreateQueue(
    IAmazonSQS sqsClient, string qName, string deadLetterQueueUrl=null,
    string maxReceiveCount=null, string receiveWaitTime=null)
{
    var attrs = new Dictionary<string, string>();

    // If a dead-letter queue is given, create a message queue
    if(!string.IsNullOrEmpty(deadLetterQueueUrl))

```

```

    {
        attrs.Add(QueueAttributeName.ReceiveMessageWaitTimeSeconds, receiveWaitTime);
        attrs.Add(QueueAttributeName.RedrivePolicy,
            $"{{"deadLetterTargetArn": "{await GetQueueArn(sqsClient,
deadLetterQueueUrl)}\""}, " +
            $"{\"maxReceiveCount\": \"{maxReceiveCount}\"}");
        // Add other attributes for the message queue such as VisibilityTimeout
    }

    // If no dead-letter queue is given, create one of those instead
    //else
    //{
    //    // Add attributes for the dead-letter queue as needed
    //    attrs.Add();
    //}

    // Create the queue
    CreateQueueResponse responseCreate = await sqsClient.CreateQueueAsync(
        new CreateQueueRequest{QueueName = qName, Attributes = attrs});
    return responseCreate.QueueUrl;
}

//
// Method to get the ARN of a queue
private static async Task<string> GetQueueArn(IAmazonSQS sqsClient, string qUrl)
{
    GetQueueAttributesResponse responseGetAtt = await
sqsClient.GetQueueAttributesAsync(
    qUrl, new List<string>{QueueAttributeName.QueueArn});
    return responseGetAtt.QueueARN;
}

//
// Method to show all attributes of a queue
private static async Task ShowAllAttributes(IAmazonSQS sqsClient, string qUrl)
{
    var attributes = new List<string>{ QueueAttributeName.All };
    GetQueueAttributesResponse responseGetAtt =
        await sqsClient.GetQueueAttributesAsync(qUrl, attributes);
    Console.WriteLine($"Queue: {qUrl}");
    foreach(var att in responseGetAtt.Attributes)
        Console.WriteLine($"{att.Key}: {att.Value}");
}

```

```

    }

    //
    // Command-line help
    private static void PrintHelp()
    {
        Console.WriteLine(
            "\nUsage: SQSCreateQueue -q <queue-name> [-d <dead-letter-queue>]" +
            " [-m <max-receive-count>] [-w <wait-time>]" +
            "\n  -q, --queue-name: The name of the queue you want to create." +
            "\n  -d, --dead-letter-queue: The URL of an existing queue to be used as the
dead-letter queue."+
            "\n      If this argument isn't supplied, a new dead-letter queue will be
created." +
            "\n  -m, --max-receive-count: The value for maxReceiveCount in the RedrivePolicy
of the queue." +
            $"  \n      Default is {MaxReceiveCount}." +
            "\n  -w, --wait-time: The value for ReceiveMessageWaitTimeSeconds of the queue
for long polling." +
            $"  \n      Default is {ReceiveMessageWaitTime}." );
    }
}

// = = = = =
// Class that represents a command line on the console or terminal.
// (This is the same for all examples. When you have seen it once, you can ignore
it.)
static class CommandLine
{
    //
    // Method to parse a command line of the form: "--key value" or "-k value".
    //
    // Parameters:
    // - args: The command-line arguments passed into the application by the system.
    //
    // Returns:
    // A Dictionary with string Keys and Values.
    //
    // If a key is found without a matching value, Dictionary.Value is set to the key
    // (including the dashes).
    // If a value is found without a matching key, Dictionary.Key is set to "--NoKeyN",

```

```

// where "N" represents sequential numbers.
public static Dictionary<string,string> Parse(string[] args)
{
    var parsedArgs = new Dictionary<string,string>();
    int i = 0, n = 0;
    while(i < args.Length)
    {
        // If the first argument in this iteration starts with a dash it's an option.
        if(args[i].StartsWith("-"))
        {
            var key = args[i++];
            var value = key;

            // Check to see if there's a value that goes with this option?
            if((i < args.Length) && (!args[i].StartsWith("-"))) value = args[i++];
            parsedArgs.Add(key, value);
        }

        // If the first argument in this iteration doesn't start with a dash, it's a
value
        else
        {
            parsedArgs.Add("--NoKey" + n.ToString(), args[i++]);
            n++;
        }
    }

    return parsedArgs;
}

//
// Method to get an argument from the parsed command-line arguments
//
// Parameters:
// - parsedArgs: The Dictionary object returned from the Parse() method (shown
above).
// - defaultValue: The default string to return if the specified key isn't in
parsedArgs.
// - keys: An array of keys to look for in parsedArgs.
public static string GetArgument(
    Dictionary<string,string> parsedArgs, string defaultReturn, params string[] keys)
{
    string retval = null;
    foreach(var key in keys)

```



```
        if(parsedArgs.TryGetValue(key, out retval)) break;
    return retval ?? defaultReturn;
}

//
// Method to exit the application with an error.
public static void ErrorExit(string msg, int code=1)
{
    Console.WriteLine("\nError");
    Console.WriteLine(msg);
    Environment.Exit(code);
}
}
```

其他考量

- 您的佇列名稱必須由英數字元、連字號和底線組成。
- 佇列名稱和佇列 URLs 區分大小寫
- 如果您需要佇列 URL，但只有佇列名稱，請使用其中一種 `AmazonSQSClient.GetQueueUrlAsync` 方法。
- 如需有關您可以設定之各種佇列屬性的資訊，請參閱《[適用於 .NET 的 AWS SDK API 參考](#)》中的 [CreateQueueRequest](#) 或《[Amazon Simple Queue Service API 參考](#)》中的 [SetQueueAttributes](#)。
- 此範例會為您建立的佇列上的所有訊息指定長輪詢。這是使用 `ReceiveMessageWaitTimeSeconds` 屬性來完成。

您也可以在呼叫 [AmazonSQSClient](#) 類別 `ReceiveMessageAsync` 的方法期間指定長輪詢。如需詳細資訊，請參閱[接收 Amazon SQS 訊息](#)。

如需短輪詢與長輪詢的相關資訊，請參閱《Amazon Simple Queue Service 開發人員指南》中的[短輪詢和長輪詢](#)。

- 無效字母佇列是其他（來源）佇列可以為未成功處理的訊息設定目標的佇列。如需詳細資訊，請參閱 [《Amazon Simple Queue Service 開發人員指南》](#) 中的 [Amazon SQS 無效字母佇列](#)。
- 您也可以在此 [Amazon SQS 主控台](#) 中查看佇列清單和此範例的結果。

更新 Amazon SQS 佇列

此範例說明如何使用適用於 .NET 的 AWS SDK 來更新 Amazon SQS 佇列。經過一些檢查後，應用程式會使用指定的值更新指定的屬性，然後顯示佇列的所有屬性。

如果命令列引數中只包含佇列 URL，則應用程式只會顯示佇列的所有屬性。

下列各節提供此範例的程式碼片段。之後會顯示[範例的完整程式碼](#)，並可依原樣建置和執行。

主題

- [顯示佇列屬性](#)
- [驗證屬性名稱](#)
- [更新佇列屬性](#)
- [完成程式碼](#)
- [其他考量](#)

顯示佇列屬性

下列程式碼片段顯示指定佇列 URL 所識別之佇列的屬性。

[本主題結尾](#)的範例顯示此程式碼片段正在使用中。

```
//  
// Method to show all attributes of a queue  
private static async Task ShowAllAttributes(IAmazonSQS sqsClient, string qUrl)  
{  
    GetQueueAttributesResponse responseGetAtt =  
        await sqsClient.GetQueueAttributesAsync(qUrl,  
            new List<string>{ QueueAttributeName.All });  
    Console.WriteLine($"Queue: {qUrl}");  
    foreach(var att in responseGetAtt.Attributes)  
        Console.WriteLine($"\\t{att.Key}: {att.Value}");  
}
```

驗證屬性名稱

下列程式碼片段會驗證要更新的屬性名稱。

[本主題結尾](#)的範例顯示此程式碼片段正在使用中。

```
//  
// Method to check the name of the attribute  
private static bool ValidAttribute(string attribute)  
{  
    var attOk = false;  
    var qAttNameType = typeof(QueueAttributeName);  
    List<string> qAttNamefields = new List<string>();  
    foreach(var field in qAttNameType.GetFields())  
        qAttNamefields.Add(field.Name);  
    foreach(var name in qAttNamefields)  
        if(attribute == name) { attOk = true; break; }  
    return attOk;  
}
```

更新佇列屬性

下列程式碼片段會更新指定佇列 URL 所識別之佇列的屬性。

[本主題結尾](#)的範例顯示此程式碼片段正在使用中。

```
//  
// Method to update a queue attribute  
private static async Task UpdateAttribute(  
    IAmazonSQS sqsClient, string qUrl, string attribute, string value)  
{  
    await sqsClient.SetQueueAttributesAsync(qUrl,  
        new Dictionary<string, string>{{attribute, value}});  
}
```

完成程式碼

本節顯示此範例的相關參考和完整程式碼。

開發套件參考

NuGet 套件：

- [AWSSDK.SQS](#)

程式設計元素：

- 命名空間 [Amazon.SQS](#)

[AmazonSQSClient](#) 類別

類別 [QueueAttributeName](#)

- 命名空間 [Amazon.SQS.Model](#)

類別 [GetQueueAttributesResponse](#)

程式碼

```
using System;
using System.Collections.Generic;
using System.Threading.Tasks;
using Amazon.SQS;
using Amazon.SQS.Model;

namespace SQSUpdateQueue
{
    // = = = = =
    // Class to update a queue
    class Program
    {
        private const int MaxArgs = 3;
        private const int InvalidArgCount = 2;

        static async Task Main(string[] args)
        {
            // Parse the command line and show help if necessary
            var parsedArgs = CommandLine.Parse(args);
            if(parsedArgs.Count == 0)
            {
                PrintHelp();
                return;
            }
            if((parsedArgs.Count > MaxArgs) || (parsedArgs.Count == InvalidArgCount))
                CommandLine.ErrorExit("\nThe number of command-line arguments is incorrect." +
                    "\nRun the command with no arguments to see help.");
        }
    }
}
```

```

// Get the application arguments from the parsed list
var qUrl = CommandLine.GetArgument(parsedArgs, null, "-q");
var attribute = CommandLine.GetArgument(parsedArgs, null, "-a");
var value = CommandLine.GetArgument(parsedArgs, null, "-v", "--value");

if(string.IsNullOrEmpty(qUrl))
    CommandLine.ErrorExit("\nYou must supply at least a queue URL." +
        "\nRun the command with no arguments to see help.");

// Create the Amazon SQS client
var sqsClient = new AmazonSQSClient();

// In the case of one command-line argument, just show the attributes for the
queue
if(parsedArgs.Count == 1)
    await ShowAllAttributes(sqsClient, qUrl);

// Otherwise, attempt to update the given queue attribute with the given value
else
{
    // Check to see if the attribute is valid
    if(ValidAttribute(attribute))
    {
        // Perform the update and then show all the attributes of the queue
        await UpdateAttribute(sqsClient, qUrl, attribute, value);
        await ShowAllAttributes(sqsClient, qUrl);
    }
    else
    {
        Console.WriteLine($"The given attribute name, {attribute}, isn't valid.");
    }
}
}

//
// Method to show all attributes of a queue
private static async Task ShowAllAttributes(IAmazonSQS sqsClient, string qUrl)
{
    GetQueueAttributesResponse responseGetAtt =
        await sqsClient.GetQueueAttributesAsync(qUrl,
            new List<string>{ QueueAttributeName.All });
    Console.WriteLine($"Queue: {qUrl}");
    foreach(var att in responseGetAtt.Attributes)

```

```

        Console.WriteLine($"{att.Key}: {att.Value}");
    }

    //
    // Method to check the name of the attribute
    private static bool ValidAttribute(string attribute)
    {
        var attOk = false;
        var qAttNameType = typeof(QueueAttributeName);
        List<string> qAttNamefields = new List<string>();
        foreach(var field in qAttNameType.GetFields())
            qAttNamefields.Add(field.Name);
        foreach(var name in qAttNamefields)
            if(attribute == name) { attOk = true; break; }
        return attOk;
    }

    //
    // Method to update a queue attribute
    private static async Task UpdateAttribute(
        IAmazonSQS sqsClient, string qUrl, string attribute, string value)
    {
        await sqsClient.SetQueueAttributesAsync(qUrl,
            new Dictionary<string, string>{{attribute, value}});
    }

    //
    // Command-line help
    private static void PrintHelp()
    {
        Console.WriteLine("\nUsage: SQSUpdateQueue -q queue_url [-a attribute -v
value]");
        Console.WriteLine("  -q: The URL of the queue you want to update.");
        Console.WriteLine("  -a: The name of the attribute to update.");
        Console.WriteLine("  -v, --value: The value to assign to the attribute.");
    }
}

// = = = = =
= = =

```

```

// Class that represents a command line on the console or terminal.
// (This is the same for all examples. When you have seen it once, you can ignore
it.)
static class CommandLine
{
    //
    // Method to parse a command line of the form: "--key value" or "-k value".
    //
    // Parameters:
    // - args: The command-line arguments passed into the application by the system.
    //
    // Returns:
    // A Dictionary with string Keys and Values.
    //
    // If a key is found without a matching value, Dictionary.Value is set to the key
    // (including the dashes).
    // If a value is found without a matching key, Dictionary.Key is set to "--NoKeyN",
    // where "N" represents sequential numbers.
    public static Dictionary<string,string> Parse(string[] args)
    {
        var parsedArgs = new Dictionary<string,string>();
        int i = 0, n = 0;
        while(i < args.Length)
        {
            // If the first argument in this iteration starts with a dash it's an option.
            if(args[i].StartsWith("-"))
            {
                var key = args[i++];
                var value = key;

                // Check to see if there's a value that goes with this option?
                if((i < args.Length) && (!args[i].StartsWith("-"))) value = args[i++];
                parsedArgs.Add(key, value);
            }

            // If the first argument in this iteration doesn't start with a dash, it's a
value
            else
            {
                parsedArgs.Add("--NoKey" + n.ToString(), args[i++]);
                n++;
            }
        }
    }
}

```

```

        return parsedArgs;
    }

    //
    // Method to get an argument from the parsed command-line arguments
    //
    // Parameters:
    // - parsedArgs: The Dictionary object returned from the Parse() method (shown
    // above).
    // - defaultValue: The default string to return if the specified key isn't in
    // parsedArgs.
    // - keys: An array of keys to look for in parsedArgs.
    public static string GetArgument(
        Dictionary<string,string> parsedArgs, string defaultReturn, params string[] keys)
    {
        string retval = null;
        foreach(var key in keys)
            if(parsedArgs.TryGetValue(key, out retval)) break;
        return retval ?? defaultReturn;
    }

    //
    // Method to exit the application with an error.
    public static void ErrorExit(string msg, int code=1)
    {
        Console.WriteLine("\nError");
        Console.WriteLine(msg);
        Environment.Exit(code);
    }
}
}

```

其他考量

- 若要更新 RedrivePolicy 屬性，您必須根據您的作業系統，引用整個值並逸出鍵/值對的引號。

例如，在 Windows 上，值的建構方式類似如下：

```
"{\"deadLetterTargetArn\":\"DEAD_LETTER-QUEUE-ARN\",\"maxReceiveCount\":\"10\"}"
```


刪除 Amazon SQS 佇列

此範例說明如何使用 適用於 .NET 的 AWS SDK 刪除 Amazon SQS 佇列。應用程式會刪除佇列、等待一段指定的時間讓佇列消失，然後顯示剩餘的佇列清單。

如果您未提供任何命令列引數，應用程式只會顯示現有佇列的清單。

下列各節提供此範例的程式碼片段。之後會顯示[範例的完整程式碼](#)，並可依原樣建置和執行。

主題

- [刪除佇列](#)
- [等待佇列消失](#)
- [顯示現有佇列的清單](#)
- [完成程式碼](#)
- [其他考量](#)

刪除佇列

下列程式碼片段會刪除指定佇列 URL 所識別的佇列。

[本主題結尾](#)的範例顯示此程式碼片段正在使用中。

```
//  
// Method to delete an SQS queue  
private static async Task DeleteQueue(IAmazonSQS sqsClient, string qUrl)  
{  
    Console.WriteLine($"Deleting queue {qUrl}...");  
    await sqsClient.DeleteQueueAsync(qUrl);  
    Console.WriteLine($"Queue {qUrl} has been deleted.");  
}
```

等待佇列消失

下列程式碼片段會等待刪除程序完成，這可能需要 60 秒。

[本主題結尾](#)的範例顯示此程式碼片段正在使用中。

```
//
```

```
// Method to wait up to a given number of seconds
private static async Task Wait(
    IAmazonSQS sqsClient, int numSeconds, string qUrl)
{
    Console.WriteLine($"Waiting for up to {numSeconds} seconds.");
    Console.WriteLine("Press any key to stop waiting. (Response might be slightly
delayed.)");
    for(int i=0; i<numSeconds; i++)
    {
        Console.Write(".");
        Thread.Sleep(1000);
        if(Console.KeyAvailable) break;

        // Check to see if the queue is gone yet
        var found = false;
        ListQueuesResponse responseList = await sqsClient.ListQueuesAsync("");
        foreach(var url in responseList.QueueUrls)
        {
            if(url == qUrl)
            {
                found = true;
                break;
            }
        }
        if(!found) break;
    }
}
```

顯示現有佇列的清單

下列程式碼片段顯示 SQS 用戶端區域中現有佇列的清單。

[本主題結尾](#)的範例顯示此程式碼片段正在使用中。

```
//
// Method to show a list of the existing queues
private static async Task ListQueues(IAmazonSQS sqsClient)
{
    ListQueuesResponse responseList = await sqsClient.ListQueuesAsync("");
    Console.WriteLine("\nList of queues:");
    foreach(var qUrl in responseList.QueueUrls)
        Console.WriteLine($"- {qUrl}");
}
```

完成程式碼

本節顯示此範例的相關參考和完整程式碼。

開發套件參考

NuGet 套件：

- [AWSSDK.SQS](#)

程式設計元素：

- 命名空間 [Amazon.SQS](#)
[AmazonSQSClient](#) 類別
- 命名空間 [Amazon.SQS.Model](#)
[ListQueuesResponse](#) 類別

程式碼

```
using System;
using System.Threading;
using System.Threading.Tasks;
using Amazon.SQS;
using Amazon.SQS.Model;

namespace SQSDeleteQueue
{
    // = = = = =
    // Class to update a queue
    class Program
    {
        private const int TimeToWait = 60;

        static async Task Main(string[] args)
        {
            // Create the Amazon SQS client
            var sqsClient = new AmazonSQSClient();

            // If no command-line arguments, just show a list of the queues
        }
    }
}
```

```

    if(args.Length == 0)
    {
        Console.WriteLine("\nUsage: SQSCreateQueue queue_url");
        Console.WriteLine("    queue_url - The URL of the queue you want to delete.");
        Console.WriteLine("\nNo arguments specified.");
        Console.Write("Do you want to see a list of the existing queues? ((y) or n):");
    };

    var response = Console.ReadLine();
    if((string.IsNullOrEmpty(response)) || (response.ToLower() == "y"))
        await ListQueues(sqsClient);
    return;
}

// If given a queue URL, delete that queue
if(args[0].StartsWith("https://sqs."))
{
    // Delete the queue
    await DeleteQueue(sqsClient, args[0]);
    // Wait for a little while because it takes a while for the queue to disappear
    await Wait(sqsClient, TimeToWait, args[0]);
    // Show a list of the remaining queues
    await ListQueues(sqsClient);
}
else
{
    Console.WriteLine("The command-line argument isn't a queue URL:");
    Console.WriteLine($"{args[0]}");
}
}

//
// Method to delete an SQS queue
private static async Task DeleteQueue(IAmazonSQS sqsClient, string qUrl)
{
    Console.WriteLine($"Deleting queue {qUrl}...");
    await sqsClient.DeleteQueueAsync(qUrl);
    Console.WriteLine($"Queue {qUrl} has been deleted.");
}

//
// Method to wait up to a given number of seconds
private static async Task Wait(

```

```

    IAmazonSQS sqsClient, int numSeconds, string qUrl)
{
    Console.WriteLine($"Waiting for up to {numSeconds} seconds.");
    Console.WriteLine("Press any key to stop waiting. (Response might be slightly
delayed.)");
    for(int i=0; i<numSeconds; i++)
    {
        Console.Write(".");
        Thread.Sleep(1000);
        if(Console.KeyAvailable) break;

        // Check to see if the queue is gone yet
        var found = false;
        ListQueuesResponse responseList = await sqsClient.ListQueuesAsync("");
        foreach(var url in responseList.QueueUrls)
        {
            if(url == qUrl)
            {
                found = true;
                break;
            }
        }
        if(!found) break;
    }
}

//
// Method to show a list of the existing queues
private static async Task ListQueues(IAmazonSQS sqsClient)
{
    ListQueuesResponse responseList = await sqsClient.ListQueuesAsync("");
    Console.WriteLine("\nList of queues:");
    foreach(var qUrl in responseList.QueueUrls)
        Console.WriteLine($"- {qUrl}");
}
}
}

```

其他考量

- DeleteQueueAsync API 呼叫不會檢查您要刪除的佇列是否用作無效字母佇列。更複雜的程序可以檢查此項目。

- 您也可以[在 Amazon SQS 主控台](#)中查看佇列清單和此範例的結果。

傳送 Amazon SQS 訊息

此範例說明如何使用適用於 .NET 的 AWS SDK 將訊息傳送至 Amazon SQS 佇列，您可以透過[程式設計方式](#)或使用[Amazon SQS 主控台](#)建立該佇列。應用程式會將單一訊息傳送至佇列，然後傳送一批訊息。然後，應用程式會等待使用者輸入，這可以是要傳送至佇列的其他訊息或結束應用程式的請求。

此範例和[接收訊息的下一個範例](#)可以一起使用，以查看 Amazon SQS 中的訊息流程。

下列各節提供此範例的程式碼片段。之後會顯示[範例的完整程式碼](#)，並可依原樣建置和執行。

主題

- [傳送訊息](#)
- [傳送一批訊息](#)
- [從佇列刪除所有訊息](#)
- [完成程式碼](#)
- [其他考量](#)

傳送訊息

下列程式碼片段會傳送訊息至指定佇列 URL 所識別的佇列。

[本主題結尾](#)的範例顯示此程式碼片段正在使用中。

```
//  
// Method to put a message on a queue  
// Could be expanded to include message attributes, etc., in a SendMessageRequest  
private static async Task SendMessage(  
    IAmazonSQS sqsClient, string qUrl, string messageBody)  
{  
    SendMessageResponse responseSendMsg =  
        await sqsClient.SendMessageAsync(qUrl, messageBody);  
    Console.WriteLine($"Message added to queue\n {qUrl}");  
    Console.WriteLine($"HttpStatusCode: {responseSendMsg.HttpStatusCode}");  
}
```

傳送一批訊息

下列程式碼片段會將一批訊息傳送至指定佇列 URL 所識別的佇列。

[本主題結尾](#)的範例顯示此程式碼片段正在使用中。

```
//  
// Method to put a batch of messages on a queue  
// Could be expanded to include message attributes, etc.,  
// in the SendMessageBatchRequestEntry objects  
private static async Task SendMessageBatch(  
    IAmazonSQS sqsClient, string qUrl, List<SendMessageBatchRequestEntry> messages)  
{  
    Console.WriteLine($"\\nSending a batch of messages to queue\\n {qUrl}");  
    SendMessageBatchResponse responseSendBatch =  
        await sqsClient.SendMessageBatchAsync(qUrl, messages);  
    // Could test responseSendBatch.Failed here  
    foreach(SendMessageBatchResultEntry entry in responseSendBatch.Successful)  
        Console.WriteLine($"Message {entry.Id} successfully queued.");  
}
```

從佇列刪除所有訊息

下列程式碼片段會從指定佇列 URL 識別的佇列中刪除所有訊息。這也稱為清除佇列。

[本主題結尾](#)的範例顯示此程式碼片段正在使用中。

```
//  
// Method to delete all messages from the queue  
private static async Task DeleteAllMessages(IAmazonSQS sqsClient, string qUrl)  
{  
    Console.WriteLine($"\\nPurging messages from queue\\n {qUrl}...");  
    PurgeQueueResponse responsePurge = await sqsClient.PurgeQueueAsync(qUrl);  
    Console.WriteLine($"HttpStatusCode: {responsePurge.HttpStatusCode}");  
}
```

完成程式碼

本節顯示此範例的相關參考和完整程式碼。

開發套件參考

NuGet 套件：

- [AWSSDK.SQS](#)

程式設計元素：

- 命名空間 [Amazon.SQS](#)

[AmazonSQSClient](#) 類別

- 命名空間 [Amazon.SQS.Model](#)

類別 [PurgeQueueResponse](#)

類別 [SendMessageBatchResponse](#)

類別 [SendMessageResponse](#)

類別 [SendMessageBatchRequestEntry](#)

類別 [SendMessageBatchResultEntry](#)

程式碼

```
using System;
using System.Collections.Generic;
using System.Threading.Tasks;
using Amazon.SQS;
using Amazon.SQS.Model;

namespace SQSSendMessages
{
    // = = = = =
    // Class to send messages to a queue
    class Program
    {
        // Some example messages to send to the queue
        private const string JsonMessage = "{\"product\":{\"name\":\"Product A\",\"price\": \"32\"},{\"name\": \"Product B\",\"price\": \"27\"}}";
        private const string XmlMessage = "<products><product name=\"Product A\" price= \"32\" /><product name=\"Product B\" price=\"27\" /></products>";
        private const string CustomMessage = "||product|Product A|32||product|Product B|27||";
        private const string TextMessage = "Just a plain text message.";

        static async Task Main(string[] args)
        {
            // Do some checks on the command-line
        }
    }
}
```



```

    if(args.Length == 0)
    {
        Console.WriteLine("\nUsage: SQSSendMessages queue_url");
        Console.WriteLine("    queue_url - The URL of an existing SQS queue.");
        return;
    }
    if(!args[0].StartsWith("https://sqs."))
    {
        Console.WriteLine("\nThe command-line argument isn't a queue URL:");
        Console.WriteLine($"{args[0]}");
        return;
    }

    // Create the Amazon SQS client
    var sqsClient = new AmazonSQSClient();

    // (could verify that the queue exists)
    // Send some example messages to the given queue
    // A single message
    await SendMessage(sqsClient, args[0], JsonMessage);

    // A batch of messages
    var batchMessages = new List<SendMessageBatchRequestEntry>{
        new SendMessageBatchRequestEntry("xmlMsg", XmlMessage),
        new SendMessageBatchRequestEntry("customeMsg", CustomMessage),
        new SendMessageBatchRequestEntry("textMsg", TextMessage)};
    await SendMessageBatch(sqsClient, args[0], batchMessages);

    // Let the user send their own messages or quit
    await InteractWithUser(sqsClient, args[0]);

    // Delete all messages that are still in the queue
    await DeleteAllMessages(sqsClient, args[0]);
}

//
// Method to put a message on a queue
// Could be expanded to include message attributes, etc., in a SendMessageRequest
private static async Task SendMessage(
    IAmazonSQS sqsClient, string qUrl, string messageBody)
{
    SendMessageResponse responseSendMsg =
        await sqsClient.SendMessageAsync(qUrl, messageBody);
}

```

```
    Console.WriteLine($"Message added to queue\n {qUrl}");
    Console.WriteLine($"HttpStatusCode: {responseSendMsg.HttpStatusCode}");
}

//
// Method to put a batch of messages on a queue
// Could be expanded to include message attributes, etc.,
// in the SendMessageBatchRequestEntry objects
private static async Task SendMessageBatch(
    IAmazonSQS sqsClient, string qUrl, List<SendMessageBatchRequestEntry> messages)
{
    Console.WriteLine($"
Sending a batch of messages to queue\n {qUrl}");
    SendMessageBatchResponse responseSendBatch =
        await sqsClient.SendMessageBatchAsync(qUrl, messages);
    // Could test responseSendBatch.Failed here
    foreach(SendMessageBatchResultEntry entry in responseSendBatch.Successful)
        Console.WriteLine($"Message {entry.Id} successfully queued.");
}

//
// Method to get input from the user
// They can provide messages to put in the queue or exit the application
private static async Task InteractWithUser(IAmazonSQS sqsClient, string qUrl)
{
    string response;
    while (true)
    {
        // Get the user's input
        Console.WriteLine("
Type a message for the queue or \"exit\" to quit:");
        response = Console.ReadLine();
        if(response.ToLower() == "exit") break;

        // Put the user's message in the queue
        await SendMessage(sqsClient, qUrl, response);
    }
}

//
// Method to delete all messages from the queue
private static async Task DeleteAllMessages(IAmazonSQS sqsClient, string qUrl)
{

```

```
Console.WriteLine($"\\nPurging messages from queue\\n {qUrl}...");
PurgeQueueResponse responsePurge = await sqsClient.PurgeQueueAsync(qUrl);
Console.WriteLine($"HttpStatusCode: {responsePurge.HttpStatusCode}");
    }
}
}
```

其他考量

- 如需有關訊息各種限制的資訊，包括允許的字元，請參閱《[Amazon Simple Queue Service 開發人員指南](#)》中的[訊息相關配額](#)。
- 訊息會保留在佇列中，直到刪除或清除佇列為止。當應用程式收到訊息時，即使佇列中仍有訊息，它也不會出現在佇列中。如需可見性逾時的詳細資訊，請參閱[Amazon SQS 可見性逾時](#)。
- 除了訊息內文之外，您也可以將屬性新增至訊息。如需詳細資訊，請參閱[訊息中繼資料](#)。

接收 Amazon SQS 訊息

此範例說明如何使用 從 Amazon SQS 佇列 適用於 .NET 的 AWS SDK 接收訊息，您可以透過[程式設計方式](#)或使用 [Amazon SQS 主控台](#) 建立。應用程式會從佇列讀取單一訊息、處理訊息（在此情況下，會在主控台上顯示訊息內文），然後從佇列刪除訊息。應用程式會重複這些步驟，直到使用者在鍵盤上輸入金鑰為止。

此範例和[先前有關傳送訊息的範例](#)可以一起使用，以查看 Amazon SQS 中的訊息流程。

下列各節提供此範例的程式碼片段。之後會顯示[範例的完整程式碼](#)，並可依原樣建置和執行。

主題

- [接收訊息](#)
- [刪除訊息](#)
- [完成程式碼](#)
- [其他考量](#)

接收訊息

下列程式碼片段會從指定佇列 URL 識別的佇列接收訊息。

[本主題結尾](#)的範例顯示此程式碼片段正在使用中。

```
//  
// Method to read a message from the given queue  
// In this example, it gets one message at a time  
private static async Task<ReceiveMessageResponse> GetMessage(  
    IAmazonSQS sqsClient, string qUrl, int waitTime=0)  
{  
    return await sqsClient.ReceiveMessageAsync(new ReceiveMessageRequest{  
        QueueUrl=qUrl,  
        MaxNumberOfMessages=MaxMessages,  
        WaitTimeSeconds=waitTime  
        // (Could also request attributes, set visibility timeout, etc.)  
    });  
}
```

刪除訊息

下列程式碼片段會從指定佇列 URL 識別的佇列中刪除訊息。

[本主題結尾](#)的範例顯示此程式碼片段正在使用中。

```
//  
// Method to delete a message from a queue  
private static async Task DeleteMessage(  
    IAmazonSQS sqsClient, Message message, string qUrl)  
{  
    Console.WriteLine($"Deleting message {message.MessageId} from queue...");  
    await sqsClient.DeleteMessageAsync(qUrl, message.ReceiptHandle);  
}
```

完成程式碼

本節顯示此範例的相關參考和完整程式碼。

開發套件參考

NuGet 套件：

- [AWSSDK.SQS](#)

程式設計元素：

- 命名空間 [Amazon.SQS](#)

[AmazonSQSClient](#) 類別

- 命名空間 [Amazon.SQS.Model](#)

類別 [ReceiveMessageRequest](#)

類別 [ReceiveMessageResponse](#)

程式碼

```
using System;
using System.Threading.Tasks;
using Amazon.SQS;
using Amazon.SQS.Model;

namespace SQSReceiveMessages
{
    class Program
    {
        private const int MaxMessages = 1;
        private const int WaitTime = 2;
        static async Task Main(string[] args)
        {
            // Do some checks on the command-line
            if(args.Length == 0)
            {
                Console.WriteLine("\nUsage: SQSReceiveMessages queue_url");
                Console.WriteLine("    queue_url - The URL of an existing SQS queue.");
                return;
            }
            if(!args[0].StartsWith("https://sqs."))
            {
                Console.WriteLine("\nThe command-line argument isn't a queue URL:");
                Console.WriteLine($"{args[0]}");
                return;
            }

            // Create the Amazon SQS client
            var sqsClient = new AmazonSQSClient();

            // (could verify that the queue exists)
```

```

    // Read messages from the queue and perform appropriate actions
    Console.WriteLine($"Reading messages from queue\n {args[0]}");
    Console.WriteLine("Press any key to stop. (Response might be slightly
delayed.)");
    do
    {
        var msg = await GetMessage(sqsClient, args[0], WaitTime);
        if(msg.Messages.Count != 0)
        {
            if(ProcessMessage(msg.Messages[0]))
                await DeleteMessage(sqsClient, msg.Messages[0], args[0]);
        }
    } while(!Console.KeyAvailable);
}

//
// Method to read a message from the given queue
// In this example, it gets one message at a time
private static async Task<ReceiveMessageResponse> GetMessage(
    IAmazonSQS sqsClient, string qUrl, int waitTime=0)
{
    return await sqsClient.ReceiveMessageAsync(new ReceiveMessageRequest{
        QueueUrl=qUrl,
        MaxNumberOfMessages=MaxMessages,
        WaitTimeSeconds=waitTime
        // (Could also request attributes, set visibility timeout, etc.)
    });
}

//
// Method to process a message
// In this example, it simply prints the message
private static bool ProcessMessage(Message message)
{
    Console.WriteLine($"\\nMessage body of {message.MessageId}:");
    Console.WriteLine($"{message.Body}");
    return true;
}

//
// Method to delete a message from a queue

```

```
private static async Task DeleteMessage(  
    IAmazonSQS sqsClient, Message message, string qUrl)  
{  
    Console.WriteLine($"\\nDeleting message {message.MessageId} from queue...");  
    await sqsClient.DeleteMessageAsync(qUrl, message.ReceiptHandle);  
}  
}  
}
```

其他考量

- 若要指定長輪詢，此範例會針對 `ReceiveMessageAsync` 方法的每個呼叫使用 `WaitTimeSeconds` 屬性。

您也可以在此[建立](#)或[更新](#)佇列時使用 `ReceiveMessageWaitTimeSeconds` 屬性，為佇列上的所有訊息指定長輪詢。

如需短輪詢與長輪詢的相關資訊，請參閱《Amazon Simple Queue Service 開發人員指南》中的[短輪詢和長輪詢](#)。

- 在訊息處理期間，您可以使用接收控點來變更訊息可見性逾時。如需如何執行此操作的詳細資訊，請參閱 [AmazonSQSClient](#) 類別 `ChangeMessageVisibilityAsync` 的方法。
- 無論可見性逾時設定為何，無條件呼叫 `DeleteMessageAsync` 方法都會從佇列中移除訊息。

使用 AWS Lambda 進行運算服務

適用於 .NET 的 AWS SDK 支援 AWS Lambda，可讓您在不用建置或管理伺服器的情況下執行程式碼。如需詳細資訊，請參閱 [AWS Lambda 產品頁面](#) 和 [AWS Lambda 開發人員指南](#)，特別是[使用 C#](#) 一節。

API

適用於 .NET 的 AWS SDK 提供 APIs AWS Lambda。APIs 可讓您使用[函數](#)、[觸發條件](#)和[事件](#)等 Lambda 功能。若要檢視完整的 APIs 集，請參閱 [適用於 .NET 的 AWS SDK API 參考](#) 中的 [Lambda](#)。

Lambda APIs 由 [NuGet 套件](#) 提供。

先決條件

開始之前，請確定您已[設定環境和專案](#)。也請檢閱 中的資訊[開發套件功能](#)。

其他資訊

如需 AWS Lambda 透過 [AWS 與 .NET Acover 整合](#) .NET Aspire 使用 進行開發的資訊，請參閱 。

主題

主題

- [使用註釋撰寫 AWS Lambda 函數](#)

使用註釋撰寫 AWS Lambda 函數

撰寫 Lambda 函數時，有時需要撰寫大量處理常式程式碼和更新 AWS CloudFormation 範本，以及其他任務。Lambda Annotations 是一種架構，可協助減輕 .NET 6 Lambda 函數的這些負擔，因此讓編寫 Lambda 的體驗在 C# 中更自然。

使用 Lambda 註釋架構的好處範例是，請考慮以下程式碼片段，這些程式碼片段會新增兩個數字。

不含 Lambda 註釋

```
public class Functions
{
    public APIGatewayProxyResponse LambdaMathPlus(APIGatewayProxyRequest request,
        ILambdaContext context)
    {
        if (!request.PathParameters.TryGetValue("x", out var xs))
        {
            return new APIGatewayProxyResponse
            {
                StatusCode = (int)HttpStatusCode.BadRequest
            };
        }
        if (!request.PathParameters.TryGetValue("y", out var ys))
        {
            return new APIGatewayProxyResponse
            {
                StatusCode = (int)HttpStatusCode.BadRequest
            };
        }
    }
}
```



```

        };
    }

    var x = int.Parse(xs);
    var y = int.Parse(ys);

    return new APIGatewayProxyResponse
    {
        StatusCode = (int)HttpStatusCode.OK,
        Body = (x + y).ToString(),
        Headers = new Dictionary<string, string> { { "Content-Type", "text/
plain" } }
    };
}
}

```

使用 Lambda 註釋

```

public class Functions
{
    [LambdaFunction]
    [RestApi("/plus/{x}/{y}")]
    public int Plus(int x, int y)
    {
        return x + y;
    }
}

```

如範例所示，Lambda Annotations 可以消除對特定沸騰板程式碼的需求。

如需如何使用架構的詳細資訊以及其他資訊，請參閱下列資源：

- 有關 Lambda 註釋 APIs 和屬性的文件的 [GitHub README](#)。
- Lambda 註釋的 [部落格文章](#)。
- [Amazon.Lambda.Annotations](#) NuGet 套件。
- GitHub 上的 [相片資產管理專案](#)。具體而言，請參閱專案 [README](#) 中的 [PamApiAnnotations](#) 資料夾和 Lambda Annotations 參考。

的高階程式庫和架構 適用於 .NET 的 AWS SDK

下列各節包含不屬於核心 SDK 功能之高階程式庫和架構的相關資訊。這些程式庫和架構使用核心 SDK 功能來建立可簡化特定任務的功能。

如果您是初次使用 適用於 .NET 的 AWS SDK，建議您先查看[快速導覽](#)主題。它為您提供 SDK 的簡介。

開始之前，請確定您已[設定環境和專案](#)。也請檢閱 中的資訊[開發套件功能](#)。

主題

- [AWS 適用於 .NET 的訊息處理架構](#)
- [在中 AWS 與 .NET ACache 整合 適用於 .NET 的 AWS SDK](#)

AWS 適用於 .NET 的訊息處理架構

適用於 .NET AWS 的訊息處理架構是一種 AWS 原生架構，可簡化開發使用 Amazon Simple Queue Service (SQS)、Amazon Simple Notification Service (SNS) 和 Amazon EventBridge 等 AWS 服務的 .NET 訊息處理應用程式。此架構可減少開發人員需要撰寫的樣板程式碼數量，讓您在發佈和使用訊息時專注於商業邏輯。如需架構如何簡化開發的詳細資訊，請參閱部落格文章[介紹適用於 .NET AWS 的訊息處理架構（預覽）](#)。其中第一部分提供示範，顯示使用低階 API 呼叫和使用架構之間的差異。

訊息處理架構支援下列活動和功能：

- 傳送訊息至 SQS 並將事件發佈至 SNS 和 EventBridge。
- 使用長時間執行的輪詢器接收和處理來自 SQS 的訊息，這通常用於背景服務。這包括在處理訊息時管理可見性逾時，以防止其他用戶端處理它。
- 在 AWS Lambda 函數中處理訊息。
- FIFO first-in-first-out) SQS 佇列和 SNS 主題。
- 用於記錄的 OpenTelemetry。

如需這些活動和功能的詳細資訊，請參閱[部落格文章](#)的功能一節和下列主題。

開始之前，請確定您已[設定環境和專案](#)。也請檢閱 中的資訊[開發套件功能](#)。

其他資源

- [NuGet.org](#) 上的 [AWS.Messaging](#) 套件。

- [API 參考](#)。
- GitHub 儲存庫中的 README 檔案位於 <https://github.com/aws/aws-dotnet-messaging/>
- Microsoft 提供的 [.NET 相依性插入](#)。
- Microsoft 的 [.NET Generic Host](#)。

主題

- [開始使用適用於 .NET AWS 的訊息處理架構](#)
- [使用適用於 .NET 的訊息處理架構發佈 AWS 訊息](#)
- [使用適用於 .NET 的訊息處理架構來使用 AWS 訊息](#)
- [將 FIFO 與適用於 .NET AWS 的訊息處理架構搭配使用](#)
- [適用於 .NET AWS 的訊息處理架構的記錄和 Open Telemetry](#)
- [自訂適用於 .NET AWS 的訊息處理架構](#)
- [適用於 .NET AWS 的訊息處理架構安全性](#)

開始使用適用於 .NET AWS 的訊息處理架構

開始之前，請確定您已[設定環境和專案](#)。也請檢閱 中的資訊[開發套件功能](#)。

本主題提供的資訊可協助您開始使用訊息處理架構。除了先決條件和組態資訊之外，還提供教學課程，說明如何實作常見案例。

先決條件和組態

- 您為應用程式提供的登入資料必須具有其使用的簡訊服務和操作的適當許可。如需詳細資訊，請參閱其各自開發人員指南中的 [SQS](#)、[SNS](#) 和 [EventBridge](#) 的安全主題。另請參閱 GitHub 上討論特定[許可](#)的 [README](#) 檔案部分。
- 若要使用適用於 .NET AWS 的訊息處理架構，您必須將 [AWS.Messaging](#) NuGet 套件新增至您的專案。例如：

```
dotnet add package AWS.Messaging
```

- 框架與 .NET 的[相依性注入 \(DI\) 服務容器](#)整合。您可以在應用程式啟動期間，呼叫 `AddAWSMessageBus` 將其新增至 DI 容器來設定架構。

```
var builder = WebApplication.CreateBuilder(args);
```

```
// Register the AWS Message Processing Framework for .NET
builder.Services.AddAWSMessageBus(builder =>
{
    // Register that you'll publish messages of type ChatMessage to an existing queue
    builder.AddSQSPublisher<ChatMessage>("https://sqs.us-west-2.amazonaws.com/012345678910/MyAppProd");
});
```

教學課程

本教學課程示範如何使用適用於 .NET AWS 的訊息處理架構。它會建立兩個應用程式：在 API 端點收到請求時將訊息傳送至 Amazon SQS 佇列的 ASP.NET Core Minimal API，以及輪詢這些訊息並加以處理的長時間執行主控台應用程式。

- 本教學中的指示偏好 .NET CLI，但您可以使用 .NET CLI 或 Microsoft Visual Studio 等跨平台工具來執行本教學課程。如需工具的資訊，請參閱 [安裝和設定您的工具鏈](#)。
- 本教學假設您使用[default]設定檔做為登入資料。它還假設短期憑證可用，並具有傳送和接收 Amazon SQS 訊息的適當許可。如需詳細資訊，請參閱 [使用 設定 SDK 身分驗證 AWS](#)和 [SQS](#) 的安全主題。

Note

透過執行本教學課程，您可能會產生 SQS 訊息的費用。

步驟

- [建立 SQS 佇列](#)
- [建立並執行發佈應用程式](#)
- [建立並執行處理應用程式](#)
- [清除](#)

建立 SQS 佇列

本教學課程需要 SQS 佇列來傳送訊息至 並從中接收訊息。您可以針對 AWS CLI 或 使用下列其中一個命令來建立佇列 AWS Tools for PowerShell。請記下傳回的佇列 URL，以便您可以在接下來的架構組態中指定該 URL。

AWS CLI

```
aws sqs create-queue --queue-name DemoQueue
```

AWS Tools for PowerShell

```
New-SQSQueue -QueueName DemoQueue
```

建立並執行發佈應用程式

使用下列程序來建立和執行發佈應用程式。

1. 開啟命令提示字元或終端機。尋找或建立可在其下建立 .NET 專案的作業系統資料夾。
2. 在該資料夾中，執行下列命令以建立 .NET 專案。

```
dotnet new webapi --name Publisher
```

3. 導覽至新專案的資料夾。在適用於 .NET AWS 的訊息處理架構上新增相依性。

```
cd Publisher  
dotnet add package AWS.Messaging
```

Note

如果您使用 AWS IAM Identity Center 進行身分驗證，請務必同時新增 `AWSSDK.SSO` 和 `AWSSDK.SSOOIDC`。

4. 使用 `Program.cs` 下列程式碼取代 中的程式碼。

```
using AWS.Messaging;  
using Microsoft.AspNetCore.Mvc;  
using Publisher;  
  
var builder = WebApplication.CreateBuilder(args);  
  
// Add services to the container.  
// Learn more about configuring Swagger/OpenAPI at https://aka.ms/aspnetcore/  
// swashbuckle.  
builder.Services.AddEndpointsApiExplorer();  
builder.Services.AddSwaggerGen();
```

```
// Configure the AWS Message Processing Framework for .NET.
builder.Services.AddAWSMessageBus(builder =>
{
    // Check for input SQS URL.
    // The SQS URL should be passed as a command line argument or set in the Debug
    launch profile.
    if ((args.Length == 1) && (args[0].Contains("https://sqs.")))
    {
        // Register that you'll publish messages of type GreetingMessage:
        // 1. To a specified queue.
        // 2. Using the message identifier "greetingMessage", which will be used
        //    by handlers to route the message to the appropriate handler.
        builder.AddSQSPublisher<GreetingMessage>(args[0], "greetingMessage");
    }
    // You can map additional message types to queues or topics here as well.
});
var app = builder.Build();

// Configure the HTTP request pipeline.
if (app.Environment.IsDevelopment())
{
    app.UseSwagger();
    app.UseSwaggerUI();
}

app.UseHttpsRedirection();

// Create an API Endpoint that receives GreetingMessage objects
// from the caller and then sends them as an SQS message.
app.MapPost("/greeting", async ([FromServices] IMessagePublisher publisher,
    Publisher.GreetingMessage message) =>
{
    return await PostGreeting(message, publisher);
})
.WithName("SendGreeting")
.WithOpenApi();

app.Run();

public partial class Program
{
```

```

    /// <summary>
    /// Endpoint for posting a greeting message.
    /// </summary>
    /// <param name="greetingMessage">The greeting message.</param>
    /// <param name="messagePublisher">The message publisher.</param>
    /// <returns>Async task result.</returns>
    public static async Task<IResult> PostGreeting(GreetingMessage greetingMessage,
        IMessagePublisher messagePublisher)
    {
        if (greetingMessage.SenderName == null || greetingMessage.Greeting == null)
        {
            return Results.BadRequest();
        }

        // Publish the message to the queue configured above.
        await messagePublisher.PublishAsync(greetingMessage);

        return Results.Ok();
    }
}

namespace Publisher
{
    /// <summary>
    /// This class represents the message contents.
    /// </summary>
    public class GreetingMessage
    {
        public string? SenderName { get; set; }
        public string? Greeting { get; set; }
    }
}

```

5. 執行下列命令。這應該會使用 Swagger UI 開啟瀏覽器視窗，讓您探索和測試 API。

```
dotnet watch run <queue URL created earlier>
```

6. 開啟/greeting端點，然後選擇試用。
7. 指定訊息的 senderName 和 greeting 值，然後選擇執行。這會叫用您的 API，以傳送 SQS 訊息。

建立並執行處理應用程式

使用下列程序來建立和執行處理應用程式。

1. 開啟命令提示字元或終端機。尋找或建立可在其下建立 .NET 專案的作業系統資料夾。
2. 在該資料夾中，執行下列命令以建立 .NET 專案。

```
dotnet new console --name Handler
```

3. 導覽至新專案的資料夾。在適用於 .NET AWS 的訊息處理架構上新增相依性。同時新增 Microsoft.Extensions.Hosting 套件，可讓您透過 [.NET Generic Host](#) 設定架構。

```
cd Handler
dotnet add package AWS.Messaging
dotnet add package Microsoft.Extensions.Hosting
```

Note

如果您使用 AWS IAM Identity Center 進行身分驗證，請務必同時新增 AWSSDK.SSO 和 AWSSDK.SSO0IDC。

4. 使用 Program.cs 下列程式碼取代 中的程式碼。

```
using AWS.Messaging;
using Handler;
using Microsoft.Extensions.DependencyInjection;
using Microsoft.Extensions.Hosting;

var builder = Host.CreateDefaultBuilder(args);

builder.ConfigureServices(services =>
{
    // Register the AWS Message Processing Framework for .NET.
    services.AddAWSMessageBus(builder =>
    {
        // Check for input SQS URL.
        // The SQS URL should be passed as a command line argument or set in the
        Debug launch profile.
        if ((args.Length == 1) && (args[0].Contains("https://sqs.")))
        {
```



```
// Register you'll poll the following queue.
builder.AddSQSPoller(args[0]);

// And that messages of type "greetingMessage" should be:
// 1. Deserialized as GreetingMessage objects.
// 2. Which are then passed to GreetingMessageHandler.
builder.AddMessageHandler<GreetingMessageHandler,
GreetingMessage>("greetingMessage");

    }
    // You can add additional message handlers here, using different message
types.
    });
});

var host = builder.Build();
await host.RunAsync();

namespace Handler
{
    /// <summary>
    /// This class represents the message contents.
    /// </summary>
    public class GreetingMessage
    {
        public string? SenderName { get; set; }
        public string? Greeting { get; set; }
    }

    /// <summary>
    /// This handler is invoked each time you receive the message.
    /// </summary>
    public class GreetingMessageHandler : IMessageHandler<GreetingMessage>
    {
        public Task<MessageProcessStatus> HandleAsync(
            MessageEnvelope<GreetingMessage> messageEnvelope,
            CancellationToken token = default)
        {
            Console.WriteLine(
                $"Received message {messageEnvelope.Message.Greeting} from
{messageEnvelope.Message.SenderName}");
            return Task.FromResult(MessageProcessStatus.Success());
        }
    }
}
```

```
}
```

5. 執行下列命令。這會啟動長時間執行的輪詢器。

```
dotnet run <queue URL created earlier>
```

啟動後，應用程式很快就會收到本教學課程第一部分所傳送的訊息，並記錄下列訊息：

```
Received message {greeting} from {senderName}
```

6. 按 Ctrl+C 停止輪詢器。

清除

使用下列其中一個命令，讓 AWS CLI 或 AWS Tools for PowerShell 刪除佇列。

AWS CLI

```
aws sqs delete-queue --queue-url "<queue URL created earlier>"
```

AWS Tools for PowerShell

```
Remove-SQSQueue -QueueUrl "<queue URL created earlier>"
```

使用適用於 .NET 的訊息處理架構發佈 AWS 訊息

.NET AWS 的訊息處理架構支援發佈一或多個訊息類型、處理一或多個訊息類型，或在相同的應用程式中同時執行兩者。

下列程式碼顯示將不同訊息類型發佈至不同 AWS 服務之應用程式的組態。

```
var builder = WebApplication.CreateBuilder(args);

// Register the AWS Message Processing Framework for .NET
builder.Services.AddAWSMessageBus(builder =>
{
    // Register that you'll send messages of type ChatMessage to an existing queue
    builder.AddSQSPublisher<ChatMessage>("https://sqs.us-west-2.amazonaws.com/012345678910/MyAppProd");
});
```

```
// Register that you'll publish messages of type OrderInfo to an existing SNS topic
builder.AddSNSPublisher<OrderInfo>("arn:aws:sns:us-west-2:012345678910:MyAppProd");

// Register that you'll publish messages of type FoodItem to an existing
EventBridge bus
builder.AddEventBridgePublisher<FoodItem>("arn:aws:events:us-
west-2:012345678910:event-bus/default");
});
```

在啟動期間註冊架構後，請將一般 插入 `IMessagePublisher` 您的程式碼。呼叫其 `PublishAsync` 方法以發佈上述設定的任何訊息類型。一般發佈者會根據訊息的類型，決定要將訊息路由到的目的地。

在下列範例中，ASP.NET MVC 控制器會收到來自使用者 `ChatMessage` 的訊息和 `OrderInfo` 事件，然後將其分別發佈到 Amazon SQS 和 Amazon SNS。這兩種訊息類型都可以使用上面設定的一般發佈者來發佈。

```
[ApiController]
[Route("[controller]")]
public class PublisherController : ControllerBase
{
    private readonly IMessagePublisher _messagePublisher;

    public PublisherController(IMessagePublisher messagePublisher)
    {
        _messagePublisher = messagePublisher;
    }

    [HttpPost("chatmessage", Name = "Chat Message")]
    public async Task<IActionResult> PublishChatMessage([FromBody] ChatMessage message)
    {
        // Perform business and validation logic on the ChatMessage here.
        if (message == null)
        {
            return BadRequest("A chat message was not submitted. Unable to forward to the message queue.");
        }
        if (string.IsNullOrEmpty(message.MessageDescription))
        {
            return BadRequest("The MessageDescription cannot be null or empty.");
        }

        // Send the ChatMessage to SQS, using the generic publisher.
        await _messagePublisher.PublishAsync(message);
    }
}
```

```

        return Ok();
    }

    [HttpPost("order", Name = "Order")]
    public async Task<IActionResult> PublishOrder([FromBody] OrderInfo message)
    {
        if (message == null)
        {
            return BadRequest("An order was not submitted.");
        }

        // Publish the OrderInfo to SNS, using the generic publisher.
        await _messagePublisher.PublishAsync(message);

        return Ok();
    }
}

```

為了將訊息路由到適當的處理邏輯，架構會使用稱為訊息類型識別符的中繼資料。根據預設，這是訊息 .NET 類型的全名，包括其組件名稱。如果您同時傳送和處理訊息，如果您跨專案共用訊息物件的定義，則此機制會正常運作。不過，如果訊息是在不同的命名空間中重新定義，或者如果您要與其他架構或程式設計語言交換訊息，則您可能需要覆寫訊息類型識別符。

```

var builder = Host.CreateDefaultBuilder(args);

builder.ConfigureServices(services =>
{
    // Register the AWS Message Processing Framework for .NET
    services.AddAWSMessageBus(builder =>
    {
        // Register that you'll publish messages of type GreetingMessage to an existing
        queue
        builder.AddSQSPublisher<GreetingMessage>("https://sqs.us-
west-2.amazonaws.com/012345678910/MyAppProd", "greetingMessage");
    });
});

```

服務特定的發佈者

上述範例使用一般 `IMessagePublisher`，可根據設定的訊息類型發佈到任何支援的 AWS 服務。此架構也為 Amazon SQS、Amazon SNS 和 Amazon EventBridge 提供服務特定的發佈者。這些特定

發佈者公開僅適用於該服務的選項，並且可以使用類型 `ISQSPublisher`、`ISNSPublisher` 和 注入 `IEventBridgePublisher`。

例如，傳送訊息至 SQS FIFO 佇列時，您必須設定適當的[訊息群組 ID](#)。下列程式碼再次顯示 `ChatMessage` 範例，但現在使用 `ISQSPublisher` 來設定 SQS 特定的選項。

```
public class PublisherController : ControllerBase
{
    private readonly ISQSPublisher _sqsPublisher;

    public PublisherController(ISQSPublisher sqsPublisher)
    {
        _sqsPublisher = sqsPublisher;
    }

    [HttpPost("chatmessage", Name = "Chat Message")]
    public async Task<IActionResult> PublishChatMessage([FromBody] ChatMessage message)
    {
        // Perform business and validation logic on the ChatMessage here
        if (message == null)
        {
            return BadRequest("A chat message was not submitted. Unable to forward to the message queue.");
        }
        if (string.IsNullOrEmpty(message.MessageDescription))
        {
            return BadRequest("The MessageDescription cannot be null or empty.");
        }

        // Send the ChatMessage to SQS using the injected ISQSPublisher, with SQS-specific options
        await _sqsPublisher.SendAsync(message, new SQSOptions
        {
            DelaySeconds = <delay-in-seconds>,
            MessageAttributes = <message-attributes>,
            MessageDeduplicationId = <message-deduplication-id>,
            MessageGroupId = <message-group-id>
        });

        return Ok();
    }
}
```

您可以 `IEventBridgePublisher` 分別使用 `和` 對 `SNS ISNSPublisher` 和 `EventBridge` 進行相同的操作。

```
await _snsPublisher.PublishAsync(message, new SNSOptions
{
    Subject = <subject>,
    MessageAttributes = <message-attributes>,
    MessageDeduplicationId = <message-deduplication-id>,
    MessageGroupId = <message-group-id>
});
```

```
await _eventBridgePublisher.PublishAsync(message, new EventBridgeOptions
{
    DetailType = <detail-type>,
    Resources = <resources>,
    Source = <source>,
    Time = <time>,
    TraceHeader = <trace-header>
});
```

根據預設，指定類型的訊息會傳送至預先設定的目的地。不過，您可以使用訊息特定的發佈者覆寫單一訊息的目的地。您也可以覆寫用於發佈訊息的基礎 適用於 .NET 的 AWS SDK 用戶端，這在您需要變更角色或憑證的多租用戶應用程式中非常有用，視目的地而定。

```
await _sqsPublisher.SendAsync(message, new SQSOptions
{
    OverrideClient = <override IAmazonSQS client>,
    QueueUrl = <override queue URL>
});
```

使用適用於 .NET 的訊息處理架構來使用 AWS 訊息

.NET AWS 的訊息處理架構可讓您使用架構或其中一個訊息服務來取用已[發佈](#)的訊息。這些訊息可以透過各種方式使用，其中一些如下所述。

訊息處理常式

若要取用訊息，請使用您要處理的每個訊息類型的 `IMessageHandler` 介面來實作訊息處理常式。訊息類型和訊息處理常式之間的映射是在專案啟動中設定。

```
await Host.CreateDefaultBuilder(args)
```

```
.ConfigureServices(services =>
{
    // Register the AWS Message Processing Framework for .NET
    services.AddAWSMessageBus(builder =>
    {
        // Register an SQS Queue that the framework will poll for messages.
        // NOTE: The URL given below is an example. Use the appropriate URL for
        your SQS Queue.
        builder.AddSQSPoller("https://sqs.us-west-2.amazonaws.com/012345678910/
MyAppProd");

        // Register all IMessageHandler implementations with the message type they
        should process.
        // Here messages that match our ChatMessage .NET type will be handled by
        our ChatMessageHandler
        builder.AddMessageHandler<ChatMessageHandler, ChatMessage>();
    });
})
.Build()
.RunAsync();
```

下列程式碼顯示訊息的範例ChatMessage訊息處理常式。

```
public class ChatMessageHandler : IMessageHandler<ChatMessage>
{
    public Task<MessageProcessStatus> HandleAsync(MessageEnvelope<ChatMessage>
messageEnvelope, CancellationToken token = default)
    {
        // Add business and validation logic here.
        if (messageEnvelope == null)
        {
            return Task.FromResult(MessageProcessStatus.Failed());
        }

        if (messageEnvelope.Message == null)
        {
            return Task.FromResult(MessageProcessStatus.Failed());
        }

        ChatMessage message = messageEnvelope.Message;

        Console.WriteLine($"Message Description: {message.MessageDescription}");
    }
}
```

```
        // Return success so the framework will delete the message from the queue.
        return Task.FromResult(MessageProcessStatus.Success());
    }
}
```

外部 `MessageEnvelope` 包含架構使用的中繼資料。其 `message` 屬性是訊息類型（在此案例中為 `ChatMessage`）。

您可以返回 `MessageProcessStatus.Success()`，指出訊息已成功處理，架構將從 Amazon SQS 佇列刪除訊息。傳回 `MessageProcessStatus.Failed()`，如果已設定，訊息將保留在佇列中，以供再次處理或移至[無效字母佇列](#)。

在長時間執行的程序中處理訊息

您可以使用 `AddSQSPoller` SQS 佇列 URL 呼叫，以啟動長時間執行[BackgroundService](#)，以持續輪詢佇列並處理訊息。

```
await Host.CreateDefaultBuilder(args)
    .ConfigureServices(services =>
    {
        // Register the AWS Message Processing Framework for .NET
        services.AddAWSMessageBus(builder =>
        {
            // Register an SQS Queue that the framework will poll for messages.
            // NOTE: The URL given below is an example. Use the appropriate URL for
            your SQS Queue.
            builder.AddSQSPoller("https://sqs.us-west-2.amazonaws.com/012345678910/
MyAppProd", options =>
            {
                // The maximum number of messages from this queue that the framework
                will process concurrently on this client.
                options.MaxNumberOfConcurrentMessages = 10;

                // The duration each call to SQS will wait for new messages.
                options.WaitTimeSeconds = 20;
            });

            // Register all IMessageHandler implementations with the message type they
            should process.
            builder.AddMessageHandler<ChatMessageHandler, ChatMessage>();
        });
    })
```



```
.Build()  
.RunAsync();
```

設定 SQS 訊息輪詢器

呼叫 `SQSMessagePollerOptions` 時，可以設定 SQS 訊息輪詢器 `AddSQSPoller`。

- `MaxNumberOfConcurrentMessages` - 佇列中要同時處理的訊息數量上限。預設值為 10。
- `WaitTimeSeconds` - `ReceiveMessage` SQS 呼叫在傳回前等待訊息抵達佇列的持續時間（以秒為單位）。如果訊息可用，呼叫會比 `WaitTimeSeconds` 更快傳回。預設值為 20。

訊息可見性逾時處理

SQS 訊息具有 [可見性逾時](#) 期間。當一個取用者開始處理指定的訊息時，它會保留在佇列中，但其他取用者會將其隱藏以避免處理超過一次。如果未在再次顯示訊息之前處理和刪除訊息，另一個消費者可能會嘗試處理相同的訊息。

框架會追蹤並嘗試延長目前正在處理之訊息的可見性逾時。您可以在呼叫 `SQSMessagePollerOptions` 時，在 `AddSQSPoller` 上設定此行為。

- `VisibilityTimeout` - 從後續擷取請求中隱藏接收訊息的持續時間，以秒為單位。預設值為 30。
- `VisibilityTimeoutExtensionThreshold` - 當訊息的可見性逾時在即將到期的這幾秒鐘內時，架構會將可見性逾時（再延長一 `VisibilityTimeout` 秒鐘）延長。預設值為 5。
- `VisibilityTimeoutExtensionHeartbeatInterval` - 架構會在幾秒內檢查 `VisibilityTimeoutExtensionThreshold` 過期訊息，然後延長可見性逾時的頻率。預設值為 1。

在下列範例中，架構將每 1 秒檢查一次仍在處理的訊息。對於再次顯示訊息的 5 秒內，框架會自動將每則訊息的可見性逾時延長 30 秒。

```
// NOTE: The URL given below is an example. Use the appropriate URL for your SQS Queue.  
builder.AddSQSPoller("https://sqs.us-west-2.amazonaws.com/012345678910/MyAppProd",  
    options =>  
{  
    options.VisibilityTimeout = 30;  
    options.VisibilityTimeoutExtensionThreshold = 5;  
    options.VisibilityTimeoutExtensionHeartbeatInterval = 1;  
});
```

在 AWS Lambda 函數中處理訊息

您可以使用適用於 .NET AWS 的訊息處理架構搭配 [SQS 與 Lambda 的整合](#)。這是由 AWS.Messaging.Lambda 套件提供。請參閱其 [README](#) 以開始使用。

將 FIFO 與適用於 .NET AWS 的訊息處理架構搭配使用

對於訊息排序和訊息重複資料刪除至關重要的使用案例，.NET AWS 的訊息處理架構支援 first-in-first-out (FIFO) [Amazon SQS 佇列](#) 和 [Amazon SNS 主題](#)。

發布

將訊息發佈至 FIFO 佇列或主題時，您必須設定訊息群組 ID，以指定訊息所屬的群組。群組內的訊息會依序處理。您可以在 SQS 特定和 SNS 特定訊息發佈者上設定此項目。

```
await _sqsPublisher.PublishAsync(message, new SQSOptions
{
    MessageDeduplicationId = <message-deduplication-id>,
    MessageGroupId = <message-group-id>
});
```

訂閱

處理來自 FIFO 佇列的訊息時，框架會依照每次 ReceiveMessages 呼叫收到訊息的順序，來處理指定訊息群組內的訊息。當設定佇列結尾為 `FIFO` 時，框架會自動進入此操作模式 `.fifo`。

```
await Host.CreateDefaultBuilder(args)
    .ConfigureServices(services =>
    {
        // Register the AWS Message Processing Framework for .NET.
        services.AddAWSMessageBus(builder =>
        {
            // Because this is a FIFO queue, the framework automatically handles these
            messages in order.
            builder.AddSQSPoller("https://sqs.us-west-2.amazonaws.com/012345678910/MPF.fifo");
            builder.AddMessageHandler<OrderMessageHandler, OrderMessage>();
        });
    })
    .Build()
    .RunAsync();
```

適用於 .NET AWS 的訊息處理架構的記錄和 Open Telemetry

.NET AWS 的訊息處理架構是針對 OpenTelemetry 進行檢測，以記錄架構發佈或處理的每個訊息的[追蹤](#)。這是由 [AWS.Messaging.Telemetry.OpenTelemetry](#) 套件提供。請參閱其 [README](#) 以開始使用。

Note

如需記錄的相關安全資訊，請參閱 [適用於 .NET AWS 的訊息處理架構安全性](#)。

自訂適用於 .NET AWS 的訊息處理架構

.NET AWS 的訊息處理架構會在三個不同的「層」中建置、傳送和處理訊息：

1. 在最外層，架構會建置服務特有的 AWS 原生請求或回應。例如，使用 Amazon SQS 可建置 [SendMessage](#) 請求，並使用 服務定義的 [Message](#) 物件。
2. 在 SQS 請求和回應中，架構會將 `MessageBody` 元素（或 Message Amazon SNS 或 Detail Amazon EventBridge）設定為 [JSON 格式的 CloudEvent](#)。這包含在處理訊息時，可在 `MessageEnvelope` 物件上存取之架構設定的中繼資料。
3. 在最內層，`CloudEvent JSON` 物件內的 `data` 屬性包含作為訊息傳送或接收的 .NET 物件的 JSON 序列化。

```
{
  "id": "b02f156b-0f02-48cf-ae54-4fbbe05cffba",
  "source": "/aws/messaging",
  "specversion": "1.0",
  "type": "Publisher.Models.ChatMessage",
  "time": "2023-11-21T16:36:02.8957126+00:00",
  "data": "<the ChatMessage object serialized as JSON>"
}
```

您可以自訂訊息信封的設定和讀取方式：

- "id" 可唯一識別訊息。根據預設，它會設定為新的 GUID，但可以透過實作您自己的 `IMessageIdGenerator` 並將其插入 DI 容器來覆寫。

- "type" 控制訊息路由到處理常式的方式。根據預設，這會使用與訊息對應的 .NET 類型完整名稱。透過 `AddSNSPublisher`、或將訊息類型映射至目的地時 `AddSQSPublisher`，您可以透過 `messageTypeIdentifier` 參數覆寫此項目 `AddEventBridgePublisher`。
- "source" 指出哪個系統或伺服器傳送訊息。
 - 如果從 發佈，這會是函數名稱 AWS Lambda，如果在 Amazon ECS 上是叢集名稱和任務 ARN，如果在 Amazon EC2 上是執行個體 ID，則將是備用值 `/aws/messaging`。
 - 您可以透過 `AddMessageSource`或在 `AddMessageSourceSuffix`上覆寫此項目 `MessageBusBuilder`。
- "time" 設定為目前的 UTC DateTime。這可以透過實作您自己的 `IDateTimeHandler`並將其注入 DI 容器來覆寫。
- "data" 包含作為訊息傳送或接收的 .NET 物件的 JSON 表示法：
 - `ConfigureSerializationOptions` 上的 `MessageBusBuilder`可讓您設定 [System.Text.Json.JsonSerializerOptions](#)序列化和還原序列化訊息時將使用的。
 - 若要在架構建置後插入其他屬性或轉換訊息信封，您可以在 `AddSerializationCallback`上透過 實作 `ISerializationCallback`並註冊該屬性 `MessageBusBuilder`。

適用於 .NET AWS 的訊息處理架構安全性

.NET AWS 的訊息處理架構倚賴 適用於 .NET 的 AWS SDK 與 通訊 AWS。如需 中安全性的詳細資訊 適用於 .NET 的 AWS SDK，請參閱 [此 AWS 產品或服務的安全性](#)。

基於安全考量，架構不會記錄使用者傳送的資料訊息。如果您想要啟用此功能進行偵錯，您需要在訊息匯流排 `EnableDataMessageLogging()` 中呼叫，如下所示：

```
builder.Services.AddAWSMessageBus(bus =>
{
    builder.EnableDataMessageLogging();
});
```

如果您發現潛在的安全問題，請參閱[安全性政策](#)以取得報告資訊。

在 中 AWS 與 .NET ACache 整合 適用於 .NET 的 AWS SDK

.NET Aspire 是建置雲端應用程式的新方法。特別是，它為要在其中執行、連線和偵錯分散式應用程式元件的本機環境提供協調。為了改善雲端就緒應用程式的內部開發迴圈，已建立與 .NET AShield 的整合，以將您的 .NET 應用程式連線至 AWS 資源。這些整合可透過 [Aspire.Hosting.AWS](#) NuGet 套件取得。

下列 .NET Acsv 整合可供使用：

- 透過 佈建 AWS 資源的能力 [CloudFormation](#)。此整合用於 .NET AShield AppHost 專案中。

如需詳細資訊，請參閱 部落格文章 [AWS 與 .NET Aspire 整合](#)。

- 安裝、設定並將 適用於 .NET 的 AWS SDK 連線至 [Amazon DynamoDB 本機](#)。此整合用於 .NET AShield AppHost 專案中。

如需詳細資訊，請參閱 部落格文章 [AWS 與 .NET Aspire 整合](#)。

- 為 [AWS Lambda](#) 函數啟用本機開發環境。此整合用於 .NET AShield AppHost 專案中。

如需詳細資訊，請參閱部落格文章建置和偵錯 .NET Lambda 應用程式與 .NET Acsv (第 1 部分)，以及建置和偵錯 .NET Lambda 應用程式與 .NET Acsv (第 2 部分)。

Note

這是預覽版本之服務的發行前版本文件。內容可能變動。

由於此功能處於預覽狀態，您將需要選擇加入預覽功能。如需此預覽功能以及如何選擇加入的詳細資訊，請參閱 [GitHub 上的開發追蹤器問題](#)。

其他資訊

如需如何使用 [Aspire.Hosting.AWS](#) 中可用整合的其他資訊和詳細資訊，請參閱下列資源。

- 部落格文章 [AWS 與 .NET Aspire 整合](#)。
- 部落格發佈 [使用 .NET Aspire \(第 1 部分 \) 建置和偵錯 .NET Lambda 應用程式](#)，以及 [使用 .NET ACache \(第 2 部分 \) 建置和偵錯 .NET Lambda 應用程式](#)。
- GitHub 上的 [integrations-on-dotnet-aspire-for-aws](#) 儲存庫。
- [Aspire.Hosting.AWS](#) NuGet 套件的詳細 [README](#)。

支援其他 AWS 服務和組態

除了上述各節所述 AWS 的服務之外，適用於 .NET 的 AWS SDK 還支援服務。如需所有支援服務 APIs 的相關資訊，請參閱 [適用於 .NET 的 AWS SDK API 參考](#)。

除了個別 AWS 服務的命名空間之外，適用於 .NET 的 AWS SDK 還提供下列 APIs：

區域圖	描述	資源
AWS 支援	以程式設計方式存取 AWS 支援案例和 Trusted Advisor 功能。	請參閱 Amazon.AWSSupport 和 Amazon.AWSSupport.Model 。
一般	協助程式和列舉。	請參閱 Amazon 和 Amazon.Util 。

適用於 .NET 的 SDK 程式碼範例

本主題中的程式碼範例說明如何 適用於 .NET 的 AWS SDK 搭配 使用 AWS。

基本概念是程式碼範例，這些範例說明如何在服務內執行基本操作。

Actions 是大型程式的程式碼摘錄，必須在內容中執行。雖然動作會告訴您如何呼叫個別服務函數，但您可以在其相關情境中查看內容中的動作。

案例是向您展示如何呼叫服務中的多個函數或與其他 AWS 服務組合來完成特定任務的程式碼範例。

有些服務包含其他範例類別，示範如何利用特定於服務的程式庫或函數。

服務

- [使用的 ACM 範例 適用於 .NET 的 SDK](#)
- [使用的 API Gateway 範例 適用於 .NET 的 SDK](#)
- [使用的 Aurora 範例 適用於 .NET 的 SDK](#)
- [使用的 Auto Scaling 範例 適用於 .NET 的 SDK](#)
- [使用的 Amazon Bedrock 執行期範例 適用於 .NET 的 SDK](#)
- [使用的 CloudWatch Logs 範例 適用於 .NET 的 SDK](#)
- [使用的 Amazon Cognito 身分提供者範例 適用於 .NET 的 SDK](#)
- [使用的 Amazon Comprehend 範例 適用於 .NET 的 SDK](#)
- [使用的 Amazon DocumentDB 範例 適用於 .NET 的 SDK](#)
- [使用的 DynamoDB 範例 適用於 .NET 的 SDK](#)
- [使用的 Amazon EC2 範例 適用於 .NET 的 SDK](#)
- [使用的 Amazon ECS 範例 適用於 .NET 的 SDK](#)
- [Elastic Load Balancing - 使用的第 2 版範例 適用於 .NET 的 SDK](#)
- [使用的 EventBridge 範例 適用於 .NET 的 SDK](#)
- [使用的 EventBridge 排程器範例 適用於 .NET 的 SDK](#)
- [使用的 Amazon Glacier 範例 適用於 .NET 的 SDK](#)
- [AWS Glue 使用的範例 適用於 .NET 的 SDK](#)
- [使用的 IAM 範例 適用於 .NET 的 SDK](#)
- [使用的 Amazon Keyspaces 範例 適用於 .NET 的 SDK](#)
- [使用的 Kinesis 範例 適用於 .NET 的 SDK](#)

- [AWS KMS 使用的範例 適用於 .NET 的 SDK](#)
- [使用的 Lambda 範例 適用於 .NET 的 SDK](#)
- [使用的 MediaConvert 範例 適用於 .NET 的 SDK](#)
- [使用的 Amazon MSK 範例 適用於 .NET 的 SDK](#)
- [使用的組織範例 適用於 .NET 的 SDK](#)
- [使用的 Partner Central 範例 適用於 .NET 的 SDK](#)
- [使用的 Amazon Pinpoint 範例 適用於 .NET 的 SDK](#)
- [使用的 Amazon Polly 範例 適用於 .NET 的 SDK](#)
- [使用的 Amazon RDS 範例 適用於 .NET 的 SDK](#)
- [使用的 Amazon RDS Data Service 範例 適用於 .NET 的 SDK](#)
- [使用的 Amazon Rekognition 範例 適用於 .NET 的 SDK](#)
- [使用的 Route 53 網域註冊範例 適用於 .NET 的 SDK](#)
- [使用的 Amazon S3 範例 適用於 .NET 的 SDK](#)
- [使用的 SageMaker AI 範例 適用於 .NET 的 SDK](#)
- [使用的 Secrets Manager 範例 適用於 .NET 的 SDK](#)
- [使用的 Amazon SES 範例 適用於 .NET 的 SDK](#)
- [使用的 Amazon SES API v2 範例 適用於 .NET 的 SDK](#)
- [使用的 Amazon SNS 範例 適用於 .NET 的 SDK](#)
- [使用的 Amazon SQS 範例 適用於 .NET 的 SDK](#)
- [使用的 Step Functions 範例 適用於 .NET 的 SDK](#)
- [AWS STS 使用的範例 適用於 .NET 的 SDK](#)
- [支援使用的範例 適用於 .NET 的 SDK](#)
- [使用的 Amazon Textract 範例 適用於 .NET 的 SDK](#)
- [使用的 Amazon Transcribe 範例 適用於 .NET 的 SDK](#)
- [使用的 Amazon Translate 範例 適用於 .NET 的 SDK](#)

使用的 ACM 範例 適用於 .NET 的 SDK

下列程式碼範例示範如何使用 適用於 .NET 的 AWS SDK 搭配 ACM 來執行動作和實作常見案例。

Actions 是大型程式的程式碼摘錄，必須在內容中執行。雖然動作會告訴您如何呼叫個別服務函數，但您可以在其相關情境中查看內容中的動作。

每個範例均包含完整原始碼的連結，您可在連結中找到如何設定和執行內容中程式碼的相關指示。

主題

- [動作](#)

動作

DescribeCertificate

以下程式碼範例顯示如何使用 DescribeCertificate。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
using System;
using System.Threading.Tasks;
using Amazon;
using Amazon.CertificateManager;
using Amazon.CertificateManager.Model;

namespace DescribeCertificate
{
    class DescribeCertificate
    {
        // The following example retrieves and displays the metadata for a
        // certificate using the AWS Certificate Manager (ACM) service.

        // Specify your AWS Region (an example Region is shown).
        private static readonly RegionEndpoint ACMRegion = RegionEndpoint.USEast1;
        private static AmazonCertificateManagerClient _client;

        static void Main(string[] args)
        {
            _client = new
                Amazon.CertificateManager.AmazonCertificateManagerClient(ACMRegion);
```

```

        var describeCertificateReq = new DescribeCertificateRequest();
        // The ARN used here is just an example. Replace it with the ARN of
        // a certificate that exists on your account.
        describeCertificateReq.CertificateArn =
            "arn:aws:acm:us-
east-1:123456789012:certificate/8cfd7dae-9b6a-2d07-92bc-1c309EXAMPLE";

        var certificateDetailResp =
            DescribeCertificateResponseAsync(client: _client, request:
describeCertificateReq);
        var certificateDetail = certificateDetailResp.Result.Certificate;

        if (certificateDetail is not null)
        {
            DisplayCertificateDetails(certificateDetail);
        }
    }

    /// <summary>
    /// Displays detailed metadata about a certificate retrieved
    /// using the ACM service.
    /// </summary>
    /// <param name="certificateDetail">The object that contains details
    /// returned from the call to DescribeCertificateAsync.</param>
    static void DisplayCertificateDetails(CertificateDetail certificateDetail)
    {
        Console.WriteLine("\nCertificate Details: ");
        Console.WriteLine($"Certificate Domain:
{certificateDetail.DomainName}");
        Console.WriteLine($"Certificate Arn:
{certificateDetail.CertificateArn}");
        Console.WriteLine($"Certificate Subject: {certificateDetail.Subject}");
        Console.WriteLine($"Certificate Status: {certificateDetail.Status}");
        foreach (var san in certificateDetail.SubjectAlternativeNames)
        {
            Console.WriteLine($"Certificate SubjectAlternativeName: {san}");
        }
    }

    /// <summary>
    /// Retrieves the metadata associated with the ACM service certificate.
    /// </summary>
    /// <param name="client">An AmazonCertificateManagerClient object
    /// used to call DescribeCertificateResponse.</param>

```

```
    /// <param name="request">The DescribeCertificateRequest object that
    /// will be passed to the method call.</param>
    /// <returns></returns>
    static async Task<DescribeCertificateResponse>
DescribeCertificateResponseAsync(
    AmazonCertificateManagerClient client, DescribeCertificateRequest
request)
    {
        var response = new DescribeCertificateResponse();

        try
        {
            response = await client.DescribeCertificateAsync(request);
        }
        catch (InvalidArnException)
        {
            Console.WriteLine($"Error: The ARN specified is invalid.");
        }
        catch (ResourceNotFoundException)
        {
            Console.WriteLine($"Error: The specified certificate could not be
found.");
        }

        return response;
    }
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [DescribeCertificate](#)。

ListCertificates

以下程式碼範例顯示如何使用 ListCertificates。

適用於 .NET 的 SDK

 Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
using System;
using System.Threading.Tasks;
using Amazon;
using Amazon.CertificateManager;
using Amazon.CertificateManager.Model;

namespace ListCertificates
{
    // The following example retrieves and displays a list of the
    // certificates defined for the default account using the AWS
    // Certificate Manager (ACM) service.
    class ListCertificates
    {
        // Specify your AWS Region (an example Region is shown).

        private static readonly RegionEndpoint ACMRegion = RegionEndpoint.USEast1;
        private static AmazonCertificateManagerClient _client;

        static void Main(string[] args)
        {
            _client = new AmazonCertificateManagerClient(ACMRegion);
            var certificateList = ListCertificatesResponseAsync(client: _client);

            Console.WriteLine("Certificate Summary List\n");

            foreach (var certificate in
certificateList.Result.CertificateSummaryList)
            {
                Console.WriteLine($"Certificate Domain: {certificate.DomainName}");
                Console.WriteLine($"Certificate ARN:
{certificate.CertificateArn}\n");
            }
        }
    }
}
```

```
    /// <summary>
    /// Retrieves a list of the certificates defined in this Region.
    /// </summary>
    /// <param name="client">The ACM client object passed to the
    /// ListCertificateResAsync method call.</param>
    /// <param name="request"></param>
    /// <returns>The ListCertificatesResponse.</returns>
    static async Task<ListCertificatesResponse> ListCertificatesResponseAsync(
        AmazonCertificateManagerClient client)
    {
        var request = new ListCertificatesRequest();

        var response = await client.ListCertificatesAsync(request);
        return response;
    }
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [ListCertificates](#)。

使用的 API Gateway 範例 適用於 .NET 的 SDK

下列程式碼範例示範如何使用 適用於 .NET 的 AWS SDK 搭配 API Gateway 執行動作和實作常見案例。

案例是向您展示如何呼叫服務中的多個函數或與其他 AWS 服務組合來完成特定任務的程式碼範例。

AWS 社群貢獻是由多個團隊所建立和維護的範例 AWS。若要提供意見回饋，請使用連結儲存庫中提供的機制。

每個範例均包含完整原始碼的連結，您可在連結中找到如何設定和執行內容中程式碼的相關指示。

主題

- [案例](#)
- [AWS 社群貢獻](#)

案例

建立無伺服器應用程式來管理相片

下列程式碼範例示範如何建立無伺服器應用程式，讓使用者以標籤管理相片。

適用於 .NET 的 SDK

顯示如何開發照片資產管理應用程式，以便使用 Amazon Rekognition 偵測圖片中的標籤，並將其儲存以供日後擷取。

如需完整的原始碼和如何設定及執行的指示，請參閱 [GitHub](#) 上的完整範例。

如要深入探索此範例的來源，請參閱 [AWS 社群](#) 上的文章。

此範例中使用的服務

- API Gateway
- DynamoDB
- Lambda
- Amazon Rekognition
- Amazon S3
- Amazon SNS

AWS 社群貢獻

建置和測試無伺服器應用程式

下列程式碼範例示範如何搭配 Lambda 和 DynamoDB 使用 API Gateway，建置和測試無伺服器應用程式

適用於 .NET 的 SDK

示範如何使用 .NET SDK 建置和測試無伺服器應用程式，而該應用程式是由具有 Lambda 和 DynamoDB 的 API Gateway 組成。

如需完整的原始碼和如何設定及執行的指示，請參閱 [GitHub](#) 上的完整範例。

此範例中使用的服務

- API Gateway
- DynamoDB

- Lambda

使用的 Aurora 範例 適用於 .NET 的 SDK

下列程式碼範例示範如何使用 適用於 .NET 的 AWS SDK 搭配 Aurora 執行動作和實作常見案例。

案例是向您展示如何呼叫服務中的多個函數或與其他 AWS 服務組合來完成特定任務的程式碼範例。

每個範例均包含完整原始碼的連結，您可在連結中找到如何設定和執行內容中程式碼的相關指示。

主題

- [案例](#)

案例

建立 Aurora 無伺服器工作項目追蹤器

下列程式碼示範如何建立一個 Web 應用程式，該應用程式會追蹤 Amazon Aurora Serverless 資料庫中的工作項目，並使用 Amazon Simple Email Service (Amazon SES) 傳送報告。

適用於 .NET 的 SDK

示範如何使用 適用於 .NET 的 AWS SDK 建立 Web 應用程式，以使用 Amazon Simple Email Service (Amazon SES) 追蹤 Amazon Aurora 資料庫中的工作項目和電子郵件報告。這個範例使用以 React.js 建置的前端與 RESTful .NET 後端互動。

- 將 React Web 應用程式與 AWS 服務整合。
- 列出、新增、更新和刪除 Aurora 資料表中的項目。
- 使用 Amazon SES 傳送篩選工作項目的電子郵件報告。
- 使用隨附的 AWS CloudFormation 指令碼部署和管理範例資源。

如需完整的原始碼和如何設定及執行的指示，請參閱 [GitHub](#) 上的完整範例。

此範例中使用的服務

- Aurora
- Amazon RDS
- Amazon RDS 資料服務
- Amazon SES

使用的 Auto Scaling 範例 適用於 .NET 的 SDK

下列程式碼範例示範如何使用 適用於 .NET 的 AWS SDK 搭配 Auto Scaling 來執行動作和實作常見案例。

Actions 是大型程式的程式碼摘錄，必須在內容中執行。雖然動作會告訴您如何呼叫個別服務函數，但您可以在其相關情境中查看內容中的動作。

案例是向您展示如何呼叫服務中的多個函數或與其他 AWS 服務組合來完成特定任務的程式碼範例。

每個範例均包含完整原始碼的連結，您可在連結中找到如何設定和執行內容中程式碼的相關指示。

主題

- [動作](#)
- [案例](#)

動作

AttachLoadBalancerTargetGroups

以下程式碼範例顯示如何使用 AttachLoadBalancerTargetGroups。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Attaches an Elastic Load Balancing (ELB) target group to this EC2 Auto
Scaling group.
/// The
/// </summary>
/// <param name="autoScalingGroupName">The name of the Auto Scaling group.</
param>
/// <param name="targetGroupArn">The Arn for the target group.</param>
/// <returns>Async task.</returns>
```



```
public async Task AttachLoadBalancerToGroup(string autoScalingGroupName, string
targetGroupArn)
{
    await _amazonAutoScaling.AttachLoadBalancerTargetGroupsAsync(
        new AttachLoadBalancerTargetGroupsRequest()
        {
            AutoScalingGroupName = autoScalingGroupName,
            TargetGroupARNs = new List<string>() { targetGroupArn }
        });
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [AttachLoadBalancerTargetGroups](#)。

DeleteAutoScalingGroup

以下程式碼範例顯示如何使用 DeleteAutoScalingGroup。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

將 Auto Scaling 群組的最小大小更新為零，終止群組中的所有執行個體，然後刪除該群組。

```
/// <summary>
/// Try to terminate an instance by its Id.
/// </summary>
/// <param name="instanceId">The Id of the instance to terminate.</param>
/// <returns>Async task.</returns>
public async Task TryTerminateInstanceById(string instanceId)
{
    var stopping = false;
    Console.WriteLine($"Stopping {instanceId}...");
    while (!stopping)
    {
        try
        {
```

```

        await _amazonAutoScaling.TerminateInstanceInAutoScalingGroupAsync(
            new TerminateInstanceInAutoScalingGroupRequest()
            {
                InstanceId = instanceId,
                ShouldDecrementDesiredCapacity = false
            });
        stopping = true;
    }
    catch (ScalingActivityInProgressException)
    {
        Console.WriteLine($"Scaling activity in progress for {instanceId}.
Waiting...");
        Thread.Sleep(10000);
    }
}

/// <summary>
/// Tries to delete the EC2 Auto Scaling group. If the group is in use or in
progress,
/// waits and retries until the group is successfully deleted.
/// </summary>
/// <param name="groupName">The name of the group to try to delete.</param>
/// <returns>Async task.</returns>
public async Task TryDeleteGroupByName(string groupName)
{
    var stopped = false;
    while (!stopped)
    {
        try
        {
            await _amazonAutoScaling.DeleteAutoScalingGroupAsync(
                new DeleteAutoScalingGroupRequest()
                {
                    AutoScalingGroupName = groupName
                });
            stopped = true;
        }
        catch (Exception e)
            when ((e is ScalingActivityInProgressException)
                || (e is Amazon.AutoScaling.Model.ResourceInUseException))
        {
            Console.WriteLine($"Some instances are still running. Waiting...");
            Thread.Sleep(10000);
        }
    }
}

```

```

    }
}

/// <summary>
/// Terminate instances and delete the Auto Scaling group by name.
/// </summary>
/// <param name="groupName">The name of the group to delete.</param>
/// <returns>Async task.</returns>
public async Task TerminateAndDeleteAutoScalingGroupWithName(string groupName)
{
    var describeGroupsResponse = await
        _amazonAutoScaling.DescribeAutoScalingGroupsAsync(
            new DescribeAutoScalingGroupsRequest()
            {
                AutoScalingGroupNames = new List<string>() { groupName }
            });
    if (describeGroupsResponse.AutoScalingGroups.Any())
    {
        // Update the size to 0.
        await _amazonAutoScaling.UpdateAutoScalingGroupAsync(
            new UpdateAutoScalingGroupRequest()
            {
                AutoScalingGroupName = groupName,
                MinSize = 0
            });
        var group = describeGroupsResponse.AutoScalingGroups[0];
        foreach (var instance in group.Instances)
        {
            await TryTerminateInstanceById(instance.InstanceId);
        }

        await TryDeleteGroupByName(groupName);
    }
    else
    {
        Console.WriteLine($"No groups found with name {groupName}.");
    }
}

```

```
/// <summary>
```

```
/// Delete an Auto Scaling group.
/// </summary>
/// <param name="groupName">The name of the Amazon EC2 Auto Scaling group.</
param>
/// <returns>A Boolean value indicating the success of the action.</returns>
public async Task<bool> DeleteAutoScalingGroupAsync(
    string groupName)
{
    var deleteAutoScalingGroupRequest = new DeleteAutoScalingGroupRequest
    {
        AutoScalingGroupName = groupName,
        ForceDelete = true,
    };

    var response = await
        _amazonAutoScaling.DeleteAutoScalingGroupAsync(deleteAutoScalingGroupRequest);
    if (response.HttpStatusCode == System.Net.HttpStatusCode.OK)
    {
        Console.WriteLine($"You successfully deleted {groupName}");
        return true;
    }

    Console.WriteLine($"Couldn't delete {groupName}.");
    return false;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [DeleteAutoScalingGroup](#)。

案例

建置及管理彈性服務

下列程式碼範例會示範如何建立負載平衡的 Web 服務，以傳回書籍、影片和歌曲建議。此範例顯示服務如何回應失故障，以及如何在發生故障時重組服務以提高復原能力。

- 使用 Amazon EC2 Auto Scaling 群組根據啟動範本建立 Amazon Elastic Compute Cloud (Amazon EC2) 執行個體，並將執行個體數量保持在指定範圍內。
- 使用 Elastic Load Balancing 處理和分發 HTTP 請求。

- 監控 Auto Scaling 群組中執行個體的運作狀態，並且只將請求轉送給運作良好的執行個體。
- 在每個 EC2 執行個體上執行一個 Python Web 伺服器來處理 HTTP 請求。Web 伺服器會回應建議和運作狀態檢查。
- 使用 Amazon DynamoDB 資料表模擬建議服務。
- 透過更新 AWS Systems Manager 參數來控制 Web 伺服器對請求和運作狀態檢查的回應。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

在命令提示中執行互動式案例。

```
static async Task Main(string[] args)
{
    _configuration = new ConfigurationBuilder()
        .SetBasePath(Directory.GetCurrentDirectory())
        .AddJsonFile("settings.json") // Load settings from .json file.
        .AddJsonFile("settings.local.json",
            true) // Optionally, load local settings.
        .Build();

    // Set up dependency injection for the AWS services.
    using var host = Host.CreateDefaultBuilder(args)
        .ConfigureLogging(logging =>
            logging.AddFilter("System", LogLevel.Debug)
                .AddFilter<DebugLoggerProvider>("Microsoft",
                    LogLevel.Information)
                .AddFilter<ConsoleLoggerProvider>("Microsoft", LogLevel.Trace))
        .ConfigureServices((_, services) =>
            services.AddAWSService<IAmazonIdentityManagementService>()
                .AddAWSService<IAmazonDynamoDB>()
                .AddAWSService<IAmazonElasticLoadBalancingV2>()
                .AddAWSService<IAmazonSimpleSystemsManagement>()
                .AddAWSService<IAmazonAutoScaling>()
                .AddAWSService<IAmazonEC2>())
```

```

        .AddTransient<AutoScalerWrapper>()
        .AddTransient<ElasticLoadBalancerWrapper>()
        .AddTransient<SmParameterWrapper>()
        .AddTransient<Recommendations>()
        .AddSingleton<IConfiguration>(_configuration)
    )
    .Build();

ServicesSetup(host);
ResourcesSetup();

try
{
    Console.WriteLine(new string('-', 80));
    Console.WriteLine("Welcome to the Resilient Architecture Example
Scenario.");
    Console.WriteLine(new string('-', 80));
    await Deploy(true);

    Console.WriteLine("Now let's begin the scenario.");
    Console.WriteLine(new string('-', 80));
    await Demo(true);

    Console.WriteLine(new string('-', 80));
    Console.WriteLine("Finally, let's clean up our resources.");
    Console.WriteLine(new string('-', 80));

    await DestroyResources(true);

    Console.WriteLine(new string('-', 80));
    Console.WriteLine("Resilient Architecture Example Scenario is
complete.");
    Console.WriteLine(new string('-', 80));
}
catch (Exception ex)
{
    Console.WriteLine(new string('-', 80));
    Console.WriteLine($"There was a problem running the scenario:
{ex.Message}");
    await DestroyResources(true);
    Console.WriteLine(new string('-', 80));
}
}

```

```

    /// <summary>
    /// Setup any common resources, also used for integration testing.
    /// </summary>
    public static void ResourcesSetup()
    {
        _httpClient = new HttpClient();
    }

    /// <summary>
    /// Populate the services for use within the console application.
    /// </summary>
    /// <param name="host">The services host.</param>
    private static void ServicesSetup(IHost host)
    {
        _elasticLoadBalancerWrapper =
host.Services.GetRequiredService<ElasticLoadBalancerWrapper>();
        _iamClient =
host.Services.GetRequiredService<IAmazonIdentityManagementService>();
        _recommendations = host.Services.GetRequiredService<Recommendations>();
        _autoScalerWrapper = host.Services.GetRequiredService<AutoScalerWrapper>();
        _smParameterWrapper =
host.Services.GetRequiredService<SmParameterWrapper>();
    }

    /// <summary>
    /// Deploy necessary resources for the scenario.
    /// </summary>
    /// <param name="interactive">True to run as interactive.</param>
    /// <returns>True if successful.</returns>
    public static async Task<bool> Deploy(bool interactive)
    {
        var protocol = "HTTP";
        var port = 80;
        var sshPort = 22;

        Console.WriteLine(
            "\nFor this demo, we'll use the AWS SDK for .NET to create several AWS
resources\n" +
            "to set up a load-balanced web service endpoint and explore some ways to
make it resilient\n" +
            "against various kinds of failures.\n\n" +
            "Some of the resources create by this demo are:\n");

        Console.WriteLine(

```

```

        "\t* A DynamoDB table that the web service depends on to provide book,
movie, and song recommendations.");
        Console.WriteLine(
            "\t* An EC2 launch template that defines EC2 instances that each contain
a Python web server.");
        Console.WriteLine(
            "\t* An EC2 Auto Scaling group that manages EC2 instances across several
Availability Zones.");
        Console.WriteLine(
            "\t* An Elastic Load Balancing (ELB) load balancer that targets the Auto
Scaling group to distribute requests.");
        Console.WriteLine(new string('-', 80));
        Console.WriteLine("Press Enter when you're ready to start deploying
resources.");
        if (interactive)
            Console.ReadLine();

        // Create and populate the DynamoDB table.
        var databaseTableName = _configuration["databaseName"];
        var recommendationsPath = Path.Join(_configuration["resourcePath"],
            "recommendations_objects.json");
        Console.WriteLine($"Creating and populating a DynamoDB table named
{databaseTableName}.");
        await _recommendations.CreateDatabaseWithName(databaseTableName);
        await _recommendations.PopulateDatabase(databaseTableName,
recommendationsPath);
        Console.WriteLine(new string('-', 80));

        // Create the EC2 Launch Template.

        Console.WriteLine(
            $"Creating an EC2 launch template that runs 'server_startup_script.sh'
when an instance starts.\n"
            + "\nThis script starts a Python web server defined in the `server.py`
script. The web server\n"
            + "listens to HTTP requests on port 80 and responds to requests to '/'
and to '/healthcheck'.\n"
            + "For demo purposes, this server is run as the root user. In
production, the best practice is to\n"
            + "run a web server, such as Apache, with least-privileged
credentials.");
        Console.WriteLine(
            "\n\nThe template also defines an IAM policy that each instance uses to
assume a role that grants\n"

```



```

        + "permissions to access the DynamoDB recommendation table and Systems
Manager parameters\n"
        + "that control the flow of the demo.");

var startupScriptPath = Path.Join(_configuration["resourcePath"],
    "server_startup_script.sh");
var instancePolicyPath = Path.Join(_configuration["resourcePath"],
    "instance_policy.json");
await _autoScalerWrapper.CreateTemplate(startupScriptPath,
instancePolicyPath);
Console.WriteLine(new string('-', 80));

Console.WriteLine(
    "Creating an EC2 Auto Scaling group that maintains three EC2 instances,
each in a different\n"
    + "Availability Zone.\n");
var zones = await _autoScalerWrapper.DescribeAvailabilityZones();
await _autoScalerWrapper.CreateGroupOfSize(3, _autoScalerWrapper.GroupName,
zones);
Console.WriteLine(new string('-', 80));

Console.WriteLine(
    "At this point, you have EC2 instances created. Once each instance
starts, it listens for\n"
    + "HTTP requests. You can see these instances in the console or continue
with the demo.\n");

Console.WriteLine(new string('-', 80));
Console.WriteLine("Press Enter when you're ready to continue.");
if (interactive)
    Console.ReadLine();

Console.WriteLine("Creating variables that control the flow of the demo.");
await _smParameterWrapper.Reset();

Console.WriteLine(
    "\nCreating an Elastic Load Balancing target group and load balancer.
The target group\n"
    + "defines how the load balancer connects to instances. The load
balancer provides a\n"
    + "single endpoint where clients connect and dispatches requests to
instances in the group.");

var defaultVpc = await _autoScalerWrapper.GetDefaultVpc();

```

```

        var subnets = await
_autoScalerWrapper.GetAllVpcSubnetsForZones(defaultVpc.VpcId, zones);
        var subnetIds = subnets.Select(s => s.SubnetId).ToList();
        var targetGroup = await
_elasticLoadBalancerWrapper.CreateTargetGroupOnVpc(_elasticLoadBalancerWrapper.TargetGroupM
protocol, port, defaultVpc.VpcId);

        await
_elasticLoadBalancerWrapper.CreateLoadBalancerAndListener(_elasticLoadBalancerWrapper.Lo
subnetIds, targetGroup);
        await
_autoScalerWrapper.AttachLoadBalancerToGroup(_autoScalerWrapper.GroupName,
targetGroup.TargetGroupArn);
        Console.WriteLine("\nVerifying access to the load balancer endpoint...");
        var endPoint = await
_elasticLoadBalancerWrapper.GetEndpointForLoadBalancerByName(_elasticLoadBalancerWrapper.Lo
        var loadBalancerAccess = await
_elasticLoadBalancerWrapper.VerifyLoadBalancerEndpoint(endPoint);

        if (!loadBalancerAccess)
        {
            Console.WriteLine("\nCouldn't connect to the load balancer, verifying
that the port is open...");

            var ipString = await _httpClient.GetStringAsync("https://
checkip.amazonaws.com");
            ipString = ipString.Trim();

            var defaultSecurityGroup = await
_autoScalerWrapper.GetDefaultSecurityGroupForVpc(defaultVpc);
            var portIsOpen =
_autoScalerWrapper.VerifyInboundPortForGroup(defaultSecurityGroup, port, ipString);
            var sshPortIsOpen =
_autoScalerWrapper.VerifyInboundPortForGroup(defaultSecurityGroup, sshPort,
ipString);

            if (!portIsOpen)
            {
                Console.WriteLine(
                    "\nFor this example to work, the default security group for your
default VPC must\n"
                    + "allows access from this computer. You can either add it
automatically from this\n"

```

```

        + "example or add it yourself using the AWS Management Console.
\n");

        if (!interactive || GetYesNoResponse(
            "Do you want to add a rule to the security group to allow
inbound traffic from your computer's IP address?"))
        {
            await
_autoScalerWrapper.OpenInboundPort(defaultSecurityGroup.GroupId, port, ipString);
        }

        if (!sshPortIsOpen)
        {
            if (!interactive || GetYesNoResponse(
                "Do you want to add a rule to the security group to allow
inbound SSH traffic for debugging from your computer's IP address?"))
            {
                await
_autoScalerWrapper.OpenInboundPort(defaultSecurityGroup.GroupId, sshPort,
ipString);
            }
        }

        loadBalancerAccess = await
_elasticLoadBalancerWrapper.VerifyLoadBalancerEndpoint(endPoint);
    }

    if (loadBalancerAccess)
    {
        Console.WriteLine("Your load balancer is ready. You can access it by
browsing to:");
        Console.WriteLine($"http://{endPoint}\n");
    }
    else
    {
        Console.WriteLine(
            "\nCouldn't get a successful response from the load balancer
endpoint. Troubleshoot by\n"
            + "manually verifying that your VPC and security group are
configured correctly and that\n"
            + "you can successfully make a GET request to the load balancer
endpoint:\n");
        Console.WriteLine($"http://{endPoint}\n");
    }
}

```

```

        Console.WriteLine(new string('-', 80));
        Console.WriteLine("Press Enter when you're ready to continue with the
demo.");
        if (interactive)
            Console.ReadLine();
        return true;
    }

    /// <summary>
    /// Demonstrate the steps of the scenario.
    /// </summary>
    /// <param name="interactive">True to run as an interactive scenario.</param>
    /// <returns>Async task.</returns>
    public static async Task<bool> Demo(bool interactive)
    {
        var ssmOnlyPolicy = Path.Join(_configuration["resourcePath"],
            "ssm_only_policy.json");

        Console.WriteLine(new string('-', 80));
        Console.WriteLine("Resetting parameters to starting values for demo.");
        await _smParameterWrapper.Reset();

        Console.WriteLine("\nThis part of the demonstration shows how to toggle
different parts of the system\n" +
            "to create situations where the web service fails, and
shows how using a resilient\n" +
            "architecture can keep the web service running in spite of
these failures.");
        Console.WriteLine(new string('-', 88));
        Console.WriteLine("At the start, the load balancer endpoint returns
recommendations and reports that all targets are healthy.");
        if (interactive)
            await DemoActionChoices();

        Console.WriteLine($"The web service running on the EC2 instances gets
recommendations by querying a DynamoDB table.\n" +
            $"The table name is contained in a Systems Manager
parameter named '{_smParameterWrapper.TableParameter}'.\n" +
            $"To simulate a failure of the recommendation service,
let's set this parameter to name a non-existent table.\n");
        await
            _smParameterWrapper.PutParameterByName(_smParameterWrapper.TableParameter, "this-
is-not-a-table");
    }

```

```

        Console.WriteLine("\nNow, sending a GET request to the load balancer
endpoint returns a failure code. But, the service reports as\n" +
            "healthy to the load balancer because shallow health
checks don't check for failure of the recommendation service.");
        if (interactive)
            await DemoActionChoices();

        Console.WriteLine("Instead of failing when the recommendation service fails,
the web service can return a static response.");
        Console.WriteLine("While this is not a perfect solution, it presents the
customer with a somewhat better experience than failure.");

        await
_smParameterWrapper.PutParameterByName(_smParameterWrapper.FailureResponseParameter,
"static");

        Console.WriteLine("\nNow, sending a GET request to the load balancer
endpoint returns a static response.");
        Console.WriteLine("The service still reports as healthy because health
checks are still shallow.");
        if (interactive)
            await DemoActionChoices();

        Console.WriteLine("Let's reinstate the recommendation service.\n");
        await
_smParameterWrapper.PutParameterByName(_smParameterWrapper.TableParameter,
_smParameterWrapper.TableName);
        Console.WriteLine(
            "\nLet's also substitute bad credentials for one of the instances in the
target group so that it can't\n" +
            "access the DynamoDB recommendation table.\n"
        );
        await _autoScalerWrapper.CreateInstanceProfileWithName(
            _autoScalerWrapper.BadCredsPolicyName,
            _autoScalerWrapper.BadCredsRoleName,
            _autoScalerWrapper.BadCredsProfileName,
            ssmOnlyPolicy,
            new List<string> { "AmazonSSMManagedInstanceCore" }
        );
        var instances = await
_autoScalerWrapper.GetInstancesByGroupName(_autoScalerWrapper.GroupName);
        var badInstanceId = instances.First();
        var instanceProfile = await
_autoScalerWrapper.GetInstanceProfile(badInstanceId);

```

```

        Console.WriteLine(
            $"Replacing the profile for instance {badInstanceId} with a profile that
contains\n" +
            "bad credentials...\n"
        );
        await _autoScalerWrapper.ReplaceInstanceProfile(
            badInstanceId,
            _autoScalerWrapper.BadCredsProfileName,
            instanceProfile.AssociationId
        );
        Console.WriteLine(
            "Now, sending a GET request to the load balancer endpoint returns either
a recommendation or a static response,\n" +
            "depending on which instance is selected by the load balancer.\n"
        );
        if (interactive)
            await DemoActionChoices();

        Console.WriteLine("\nLet's implement a deep health check. For this demo, a
deep health check tests whether");
        Console.WriteLine("the web service can access the DynamoDB table that it
depends on for recommendations. Note that");
        Console.WriteLine("the deep health check is only for ELB routing and not for
Auto Scaling instance health.");
        Console.WriteLine("This kind of deep health check is not recommended for
Auto Scaling instance health, because it");
        Console.WriteLine("risks accidental termination of all instances in the Auto
Scaling group when a dependent service fails.");

        Console.WriteLine("\nBy implementing deep health checks, the load balancer
can detect when one of the instances is failing");
        Console.WriteLine("and take that instance out of rotation.");

        await
_smParameterWrapper.PutParameterByName(_smParameterWrapper.HealthCheckParameter,
"deep");

        Console.WriteLine($"Now, checking target health indicates that the
instance with bad credentials ({badInstanceId})");
        Console.WriteLine("is unhealthy. Note that it might take a minute or two for
the load balancer to detect the unhealthy");
        Console.WriteLine("instance. Sending a GET request to the load balancer
endpoint always returns a recommendation, because");

```

```
        Console.WriteLine("the load balancer takes unhealthy instances out of its
rotation.");

        if (interactive)
            await DemoActionChoices();

        Console.WriteLine("\nBecause the instances in this demo are controlled by an
auto scaler, the simplest way to fix an unhealthy");
        Console.WriteLine("instance is to terminate it and let the auto scaler start
a new instance to replace it.");

        await _autoScalerWrapper.TryTerminateInstanceById(badInstanceId);

        Console.WriteLine($"Even while the instance is terminating and the new
instance is starting, sending a GET");
        Console.WriteLine("request to the web service continues to get a successful
recommendation response because");
        Console.WriteLine("starts and reports as healthy, it is included in the load
balancing rotation.");
        Console.WriteLine("Note that terminating and replacing an instance typically
takes several minutes, during which time you");
        Console.WriteLine("can see the changing health check status until the new
instance is running and healthy.");

        if (interactive)
            await DemoActionChoices();

        Console.WriteLine("\nIf the recommendation service fails now, deep health
checks mean all instances report as unhealthy.");

        await
        _smParameterWrapper.PutParameterByName(_smParameterWrapper.TableParameter, "this-
is-not-a-table");

        Console.WriteLine($"When all instances are unhealthy, the load balancer
continues to route requests even to");
        Console.WriteLine("unhealthy instances, allowing them to fail open and
return a static response rather than fail");
        Console.WriteLine("closed and report failure to the customer.");

        if (interactive)
            await DemoActionChoices();
        await _smParameterWrapper.Reset();
```

```

        Console.WriteLine(new string('-', 80));
        return true;
    }

    /// <summary>
    /// Clean up the resources from the scenario.
    /// </summary>
    /// <param name="interactive">True to ask the user for cleanup.</param>
    /// <returns>Async task.</returns>
    public static async Task<bool> DestroyResources(bool interactive)
    {
        Console.WriteLine(new string('-', 80));
        Console.WriteLine(
            "To keep things tidy and to avoid unwanted charges on your account, we
can clean up all AWS resources\n" +
            "that were created for this demo."
        );

        if (!interactive || GetYesNoResponse("Do you want to clean up all demo
resources? (y/n) "))
        {
            await
            _elasticLoadBalancerWrapper.DeleteLoadBalancerByName(_elasticLoadBalancerWrapper.LoadBalancerName);
            await
            _elasticLoadBalancerWrapper.DeleteTargetGroupByName(_elasticLoadBalancerWrapper.TargetGroupName);
            await
            _autoScalerWrapper.TerminateAndDeleteAutoScalingGroupWithName(_autoScalerWrapper.GroupName);
            await
            _autoScalerWrapper.DeleteKeyPairByName(_autoScalerWrapper.KeyPairName);
            await
            _autoScalerWrapper.DeleteTemplateByName(_autoScalerWrapper.LaunchTemplateName);
            await _autoScalerWrapper.DeleteInstanceProfile(
                _autoScalerWrapper.BadCredsProfileName,
                _autoScalerWrapper.BadCredsRoleName
            );
            await
            _recommendations.DestroyDatabaseByName(_recommendations.TableName);
        }
        else
        {
            Console.WriteLine(
                "Ok, we'll leave the resources intact.\n" +
                "Don't forget to delete them when you're done with them or you might
incur unexpected charges."
            );
        }
    }

```



```

        );
    }

    Console.WriteLine(new string('-', 80));
    return true;
}

```

建立包裝 Auto Scaling 和 Amazon EC2 動作的類別。

```

/// <summary>
/// Encapsulates Amazon EC2 Auto Scaling and EC2 management methods.
/// </summary>
public class AutoScalerWrapper
{
    private readonly IAmazonAutoScaling _amazonAutoScaling;
    private readonly IAmazonEC2 _amazonEc2;
    private readonly IAmazonSimpleSystemsManagement _amazonSsm;
    private readonly IAmazonIdentityManagementService _amazonIam;
    private readonly ILogger<AutoScalerWrapper> _logger;

    private readonly string _instanceType = "";
    private readonly string _amiParam = "";
    private readonly string _launchTemplateName = "";
    private readonly string _groupName = "";
    private readonly string _instancePolicyName = "";
    private readonly string _instanceRoleName = "";
    private readonly string _instanceProfileName = "";
    private readonly string _badCredsProfileName = "";
    private readonly string _badCredsRoleName = "";
    private readonly string _badCredsPolicyName = "";
    private readonly string _keyPairName = "";

    public string GroupName => _groupName;
    public string KeyPairName => _keyPairName;
    public string LaunchTemplateName => _launchTemplateName;
    public string InstancePolicyName => _instancePolicyName;
    public string BadCredsProfileName => _badCredsProfileName;
    public string BadCredsRoleName => _badCredsRoleName;
    public string BadCredsPolicyName => _badCredsPolicyName;

    /// <summary>
    /// Constructor for the AutoScalerWrapper.

```

```

/// </summary>
/// <param name="amazonAutoScaling">The injected AutoScaling client.</param>
/// <param name="amazonEc2">The injected EC2 client.</param>
/// <param name="amazonIam">The injected IAM client.</param>
/// <param name="amazonSsm">The injected SSM client.</param>
public AutoScalerWrapper(
    IAmazonAutoScaling amazonAutoScaling,
    IAmazonEC2 amazonEc2,
    IAmazonSimpleSystemsManagement amazonSsm,
    IAmazonIdentityManagementService amazonIam,
    IConfiguration configuration,
    ILogger<AutoScalerWrapper> logger)
{
    _amazonAutoScaling = amazonAutoScaling;
    _amazonEc2 = amazonEc2;
    _amazonSsm = amazonSsm;
    _amazonIam = amazonIam;
    _logger = logger;

    var prefix = configuration["resourcePrefix"];
    _instanceType = configuration["instanceType"];
    _amiParam = configuration["amiParam"];

    _launchTemplateName = prefix + "-template";
    _groupName = prefix + "-group";
    _instancePolicyName = prefix + "-pol";
    _instanceRoleName = prefix + "-role";
    _instanceProfileName = prefix + "-prof";
    _badCredsPolicyName = prefix + "-bc-pol";
    _badCredsRoleName = prefix + "-bc-role";
    _badCredsProfileName = prefix + "-bc-prof";
    _keyPairName = prefix + "-key-pair";
}

/// <summary>
/// Create a policy, role, and profile that is associated with instances with a
specified name.
/// An instance's associated profile defines a role that is assumed by the
/// instance. The role has attached policies that specify the AWS permissions
granted to
/// clients that run on the instance.
/// </summary>
/// <param name="policyName">Name to use for the policy.</param>
/// <param name="roleName">Name to use for the role.</param>

```

```

    /// <param name="profileName">Name to use for the profile.</param>
    /// <param name="ssmOnlyPolicyFile">Path to a policy file for SSM.</param>
    /// <param name="awsManagedPolicies">AWS Managed policies to be attached to the
role.</param>
    /// <returns>The Arn of the profile.</returns>
    public async Task<string> CreateInstanceProfileWithName(
        string policyName,
        string roleName,
        string profileName,
        string ssmOnlyPolicyFile,
        List<string>? awsManagedPolicies = null)
    {

        var assumeRoleDoc = "{" +
            "\"Version\": \"2012-10-17\", " +
            "\"Statement\": [{" +
                "\"Effect\": \"Allow\", " +
                "\"Principal\": {" +
                "\"Service\": [" +
                    "\"ec2.amazonaws.com\"" +
                "]" +
                "}, " +
                "\"Action\": \"sts:AssumeRole\"" +
            "}]" +
            "};

        var policyDocument = await File.ReadAllTextAsync(ssmOnlyPolicyFile);

        var policyArn = "";

        try
        {
            var createPolicyResult = await _amazonIam.CreatePolicyAsync(
                new CreatePolicyRequest
                {
                    PolicyName = policyName,
                    PolicyDocument = policyDocument
                });
            policyArn = createPolicyResult.Policy.Arn;
        }
        catch (EntityAlreadyExistsException)
        {
            // The policy already exists, so we look it up to get the Arn.
            var policiesPaginator = _amazonIam.Paginators.ListPolicies(

```

```

        new ListPoliciesRequest()
        {
            Scope = PolicyScopeType.Local
        });
    // Get the entire list using the paginator.
    await foreach (var policy in policiesPaginator.Policies)
    {
        if (policy.PolicyName.Equals(policyName))
        {
            policyArn = policy.Arn;
        }
    }

    if (policyArn == null)
    {
        throw new InvalidOperationException("Policy not found");
    }
}

try
{
    await _amazonIam.CreateRoleAsync(new CreateRoleRequest()
    {
        RoleName = roleName,
        AssumeRolePolicyDocument = assumeRoleDoc,
    });
    await _amazonIam.AttachRolePolicyAsync(new AttachRolePolicyRequest()
    {
        RoleName = roleName,
        PolicyArn = policyArn
    });
    if (awsManagedPolicies != null)
    {
        foreach (var awsPolicy in awsManagedPolicies)
        {
            await _amazonIam.AttachRolePolicyAsync(new
AttachRolePolicyRequest()
            {
                PolicyArn = $"arn:aws:iam::aws:policy/{awsPolicy}",
                RoleName = roleName
            });
        }
    }
}
}

```

```

        catch (EntityAlreadyExistsException)
        {
            Console.WriteLine("Role already exists.");
        }

        string profileArn = "";
        try
        {
            var profileCreateResponse = await _amazonIam.CreateInstanceProfileAsync(
                new CreateInstanceProfileRequest()
                {
                    InstanceProfileName = profileName
                });
            // Allow time for the profile to be ready.
            profileArn = profileCreateResponse.InstanceProfile.Arn;
            Thread.Sleep(10000);
            await _amazonIam.AddRoleToInstanceProfileAsync(
                new AddRoleToInstanceProfileRequest()
                {
                    InstanceProfileName = profileName,
                    RoleName = roleName
                });
        }
        catch (EntityAlreadyExistsException)
        {
            Console.WriteLine("Policy already exists.");
            var profileGetResponse = await _amazonIam.GetInstanceProfileAsync(
                new GetInstanceProfileRequest()
                {
                    InstanceProfileName = profileName
                });
            profileArn = profileGetResponse.InstanceProfile.Arn;
        }
        return profileArn;
    }

    /// <summary>
    /// Create a new key pair and save the file.
    /// </summary>
    /// <param name="newKeyPairName">The name of the new key pair.</param>
    /// <returns>Async task.</returns>
    public async Task CreateKeyPair(string newKeyPairName)
    {

```

```

        try
        {
            var keyResponse = await _amazonEc2.CreateKeyPairAsync(
                new CreateKeyPairRequest() { KeyName = newKeyPairName });
            await File.WriteAllTextAsync($"{newKeyPairName}.pem",
                keyResponse.KeyPair.KeyMaterial);
            Console.WriteLine($"Created key pair {newKeyPairName}.");
        }
        catch (AlreadyExistsException)
        {
            Console.WriteLine("Key pair already exists.");
        }
    }

    /// <summary>
    /// Delete the key pair and file by name.
    /// </summary>
    /// <param name="deleteKeyPairName">The key pair to delete.</param>
    /// <returns>Async task.</returns>
    public async Task DeleteKeyPairByName(string deleteKeyPairName)
    {
        try
        {
            await _amazonEc2.DeleteKeyPairAsync(
                new DeleteKeyPairRequest() { KeyName = deleteKeyPairName });
            File.Delete($"{deleteKeyPairName}.pem");
        }
        catch (FileNotFoundException)
        {
            Console.WriteLine($"Key pair {deleteKeyPairName} not found.");
        }
    }

    /// <summary>
    /// Creates an Amazon EC2 launch template to use with Amazon EC2 Auto Scaling.
    /// The launch template specifies a Bash script in its user data field that runs
    after
    /// the instance is started. This script installs the Python packages and starts
    a Python
    /// web server on the instance.
    /// </summary>
    /// <param name="startupScriptPath">The path to a Bash script file that is
    run.</param>

```

```

    /// <param name="instancePolicyPath">The path to a permissions policy to create
    and attach to the profile.</param>
    /// <returns>The template object.</returns>
    public async Task<Amazon.EC2.Model.LaunchTemplate> CreateTemplate(string
startupScriptPath, string instancePolicyPath)
    {
        try
        {
            await CreateKeyPair(_keyPairName);
            await CreateInstanceProfileWithName(_instancePolicyName,
instanceRoleName,
instanceProfileName, instancePolicyPath);

            var startServerText = await File.ReadAllTextAsync(startupScriptPath);
            var plainTextBytes =
System.Text.Encoding.UTF8.GetBytes(startServerText);

            var amiLatest = await _amazonSsm.GetParameterAsync(
                new GetParameterRequest() { Name = _amiParam });
            var amiId = amiLatest.Parameter.Value;
            var launchTemplateResponse = await _amazonEc2.CreateLaunchTemplateAsync(
                new CreateLaunchTemplateRequest()
                {
                    LaunchTemplateName = _launchTemplateName,
                    LaunchTemplateData = new RequestLaunchTemplateData()
                    {
                        InstanceType = _instanceType,
                        ImageId = amiId,
                        IamInstanceProfile =
                            new
LaunchTemplateIamInstanceProfileSpecificationRequest()
                            {
                                Name = _instanceProfileName
                            },
                        KeyName = _keyPairName,
                        UserData = System.Convert.ToBase64String(plainTextBytes)
                    }
                });
            return launchTemplateResponse.LaunchTemplate;
        }
        catch (AmazonEC2Exception ec2Exception)
        {

```

```

        if (ec2Exception.ErrorCode ==
"InvalidLaunchTemplateName.AlreadyExistsException")
        {
            _logger.LogError($"Could not create the template, the name
{_launchTemplateName} already exists. " +
                $"Please try again with a unique name.");
        }

        throw;
    }
    catch (Exception ex)
    {
        _logger.LogError($"An error occurred while creating the template.:
{ex.Message}");
        throw;
    }
}

/// <summary>
/// Get a list of Availability Zones in the AWS Region of the Amazon EC2 Client.
/// </summary>
/// <returns>A list of availability zones.</returns>
public async Task<List<string>> DescribeAvailabilityZones()
{
    try
    {
        var zoneResponse = await _amazonEc2.DescribeAvailabilityZonesAsync(
            new DescribeAvailabilityZonesRequest());
        return zoneResponse.AvailabilityZones.Select(z => z.ZoneName).ToList();
    }
    catch (AmazonEC2Exception ec2Exception)
    {
        _logger.LogError($"An Amazon EC2 error occurred while listing
availability zones.: {ec2Exception.Message}");
        throw;
    }
    catch (Exception ex)
    {
        _logger.LogError($"An error occurred while listing availability zones.:
{ex.Message}");
        throw;
    }
}

```



```

    /// <summary>
    /// Create an EC2 Auto Scaling group of a specified size and name.
    /// </summary>
    /// <param name="groupSize">The size for the group.</param>
    /// <param name="groupName">The name for the group.</param>
    /// <param name="availabilityZones">The availability zones for the group.</
param>
    /// <returns>Async task.</returns>
    public async Task CreateGroupOfSize(int groupSize, string groupName,
    List<string> availabilityZones)
    {
        try
        {
            await _amazonAutoScaling.CreateAutoScalingGroupAsync(
                new CreateAutoScalingGroupRequest()
                {
                    AutoScalingGroupName = groupName,
                    AvailabilityZones = availabilityZones,
                    LaunchTemplate =
                        new Amazon.AutoScaling.Model.LaunchTemplateSpecification()
                        {
                            LaunchTemplateName = _launchTemplateName,
                            Version = "$Default"
                        },
                    MaxSize = groupSize,
                    MinSize = groupSize
                });
            Console.WriteLine($"Created EC2 Auto Scaling group {groupName} with size
{groupSize}.");
        }
        catch (EntityAlreadyExistsException)
        {
            Console.WriteLine($"EC2 Auto Scaling group {groupName} already
exists.");
        }
    }

    /// <summary>
    /// Get the default VPC for the account.
    /// </summary>
    /// <returns>The default VPC object.</returns>
    public async Task<Vpc> GetDefaultVpc()
    {
        try

```

```

        {
            var vpcResponse = await _amazonEc2.DescribeVpcsAsync(
                new DescribeVpcsRequest()
                {
                    Filters = new List<Amazon.EC2.Model.Filter>()
                    {
                        new("is-default", new List<string>() { "true" })
                    }
                });
            return vpcResponse.Vpcs[0];
        }
        catch (AmazonEC2Exception ec2Exception)
        {
            if (ec2Exception.ErrorCode == "UnauthorizedOperation")
            {
                _logger.LogError(ec2Exception, $"You do not have the necessary
permissions to describe VPCs.");
            }

            throw;
        }
        catch (Exception ex)
        {
            _logger.LogError(ex, $"An error occurred while describing the vpcs.:
{ex.Message}");
            throw;
        }
    }

    /// <summary>
    /// Get all the subnets for a Vpc in a set of availability zones.
    /// </summary>
    /// <param name="vpcId">The Id of the Vpc.</param>
    /// <param name="availabilityZones">The list of availability zones.</param>
    /// <returns>The collection of subnet objects.</returns>
    public async Task<List<Subnet>> GetAllVpcSubnetsForZones(string vpcId,
List<string> availabilityZones)
    {
        try
        {
            var subnets = new List<Subnet>();
            var subnetPaginator = _amazonEc2.Paginators.DescribeSubnets(
                new DescribeSubnetsRequest()
                {

```

```

        Filters = new List<Amazon.EC2.Model.Filter>()
        {
            new("vpc-id", new List<string>() { vpcId }),
            new("availability-zone", availabilityZones),
            new("default-for-az", new List<string>() { "true" })
        }
    });

    // Get the entire list using the paginator.
    await foreach (var subnet in subnetPaginator.Subnets)
    {
        subnets.Add(subnet);
    }

    return subnets;
}
catch (AmazonEC2Exception ec2Exception)
{
    if (ec2Exception.ErrorCode == "InvalidVpcID.NotFound")
    {
        _logger.LogError(ec2Exception, $"The specified VPC ID {vpcId} does
not exist.");
    }

    throw;
}
catch (Exception ex)
{
    _logger.LogError(ex, $"An error occurred while describing the subnets.:
{ex.Message}");
    throw;
}
}

/// <summary>
/// Delete a launch template by name.
/// </summary>
/// <param name="templateName">The name of the template to delete.</param>
/// <returns>Async task.</returns>
public async Task DeleteTemplateByName(string templateName)
{
    try
    {
        await _amazonEc2.DeleteLaunchTemplateAsync(

```

```

        new DeleteLaunchTemplateRequest()
        {
            LaunchTemplateName = templateName
        });
    }
    catch (AmazonEC2Exception ec2Exception)
    {
        if (ec2Exception.ErrorCode ==
            "InvalidLaunchTemplateName.NotFoundException")
        {
            _logger.LogError(
                $"Could not delete the template, the name {_launchTemplateName}
was not found.");
        }

        throw;
    }
    catch (Exception ex)
    {
        _logger.LogError($"An error occurred while deleting the template.:
{ex.Message}");
        throw;
    }
}

/// <summary>
/// Detaches a role from an instance profile, detaches policies from the role,
/// and deletes all the resources.
/// </summary>
/// <param name="profileName">The name of the profile to delete.</param>
/// <param name="roleName">The name of the role to delete.</param>
/// <returns>Async task.</returns>
public async Task DeleteInstanceProfile(string profileName, string roleName)
{
    try
    {
        await _amazonIam.RemoveRoleFromInstanceProfileAsync(
            new RemoveRoleFromInstanceProfileRequest()
            {
                InstanceProfileName = profileName,
                RoleName = roleName
            });
        await _amazonIam.DeleteInstanceProfileAsync(

```

```

        new DeleteInstanceProfileRequest() { InstanceProfileName =
profileName });
        var attachedPolicies = await _amazonIam.ListAttachedRolePoliciesAsync(
            new ListAttachedRolePoliciesRequest() { RoleName = roleName });
        foreach (var policy in attachedPolicies.AttachedPolicies)
        {
            await _amazonIam.DetachRolePolicyAsync(
                new DetachRolePolicyRequest()
                {
                    RoleName = roleName,
                    PolicyArn = policy.PolicyArn
                });
            // Delete the custom policies only.
            if (!policy.PolicyArn.StartsWith("arn:aws:iam::aws"))
            {
                await _amazonIam.DeletePolicyAsync(
                    new Amazon.IdentityManagement.Model.DeletePolicyRequest()
                    {
                        PolicyArn = policy.PolicyArn
                    });
            }
        }

        await _amazonIam.DeleteRoleAsync(
            new DeleteRoleRequest() { RoleName = roleName });
    }
    catch (NoSuchEntityException)
    {
        Console.WriteLine($"Instance profile {profileName} does not exist.");
    }
}

/// <summary>
/// Gets data about the instances in an EC2 Auto Scaling group by its group
name.
/// </summary>
/// <param name="group">The name of the auto scaling group.</param>
/// <returns>A collection of instance Ids.</returns>
public async Task<IEnumerable<string>> GetInstancesByGroupName(string group)
{
    var instanceResponse = await
_amazonAutoScaling.DescribeAutoScalingGroupsAsync(
        new DescribeAutoScalingGroupsRequest()
        {

```

```

        AutoScalingGroupNames = new List<string>() { group }
    });
    var instanceIds = instanceResponse.AutoScalingGroups.SelectMany(
        g => g.Instances.Select(i => i.InstanceId));
    return instanceIds;
}

/// <summary>
/// Get the instance profile association data for an instance.
/// </summary>
/// <param name="instanceId">The Id of the instance.</param>
/// <returns>Instance profile associations data.</returns>
public async Task<IamInstanceProfileAssociation> GetInstanceProfile(string
instanceId)
{
    try
    {
        var response = await
        _amazonEc2.DescribeIamInstanceProfileAssociationsAsync(
            new DescribeIamInstanceProfileAssociationsRequest()
            {
                Filters = new List<Amazon.EC2.Model.Filter>()
                {
                    new("instance-id", new List<string>() { instanceId })
                },
            });
        return response.IamInstanceProfileAssociations[0];
    }
    catch (AmazonEC2Exception ec2Exception)
    {
        if (ec2Exception.ErrorCode == "InvalidInstanceID.NotFound")
        {
            _logger.LogError(ec2Exception, $"Instance {instanceId} not found");
        }

        throw;
    }
    catch (Exception ex)
    {
        _logger.LogError(ex, $"An error occurred while creating the template.:
{ex.Message}");
        throw;
    }
}
}

```

```

    /// <summary>
    /// Replace the profile associated with a running instance. After the profile is
    replaced, the instance
    /// is rebooted to ensure that it uses the new profile. When the instance is
    ready, Systems Manager is
    /// used to restart the Python web server.
    /// </summary>
    /// <param name="instanceId">The Id of the instance to update.</param>
    /// <param name="credsProfileName">The name of the new profile to associate with
    the specified instance.</param>
    /// <param name="associationId">The Id of the existing profile association for
    the instance.</param>
    /// <returns>Async task.</returns>
    public async Task ReplaceInstanceProfile(string instanceId, string
    credsProfileName, string associationId)
    {
        try
        {
            await _amazonEc2.ReplaceIamInstanceProfileAssociationAsync(
                new ReplaceIamInstanceProfileAssociationRequest()
                {
                    AssociationId = associationId,
                    IamInstanceProfile = new IamInstanceProfileSpecification()
                    {
                        Name = credsProfileName
                    }
                });
            // Allow time before resetting.
            Thread.Sleep(25000);

            await _amazonEc2.RebootInstancesAsync(
                new RebootInstancesRequest(new List<string>() { instanceId }));
            Thread.Sleep(25000);
            var instanceReady = false;
            var retries = 5;
            while (retries-- > 0 && !instanceReady)
            {
                var instancesPaginator =
                    _amazonSsm.Paginators.DescribeInstanceInformation(
                        new DescribeInstanceInformationRequest());
                // Get the entire list using the paginator.
                await foreach (var instance in
                    instancesPaginator.InstanceInformationList)

```

```

        {
            instanceReady = instance.InstanceId == instanceId;
            if (instanceReady)
            {
                break;
            }
        }
    }
    Console.WriteLine("Waiting for instance to be running.");
    await WaitForInstanceState(instanceId, InstanceStateName.Running);
    Console.WriteLine("Instance ready.");
    Console.WriteLine($"Sending restart command to instance {instanceId}");
    await _amazonSsm.SendCommandAsync(
        new SendCommandRequest()
        {
            InstanceIds = new List<string>() { instanceId },
            DocumentName = "AWS-RunShellScript",
            Parameters = new Dictionary<string, List<string>>()
            {
                {
                    "commands",
                    new List<string>() { "cd / && sudo python3 server.py"
80" }
                }
            }
        });
    Console.WriteLine($"Restarted the web server on instance {instanceId}");
}
catch (AmazonEC2Exception ec2Exception)
{
    if (ec2Exception.ErrorCode == "InvalidInstanceID.NotFound")
    {
        _logger.LogError(ec2Exception, $"Instance {instanceId} not found");
    }

    throw;
}
catch (Exception ex)
{
    _logger.LogError(ex, $"An error occurred while replacing the template.:
{ex.Message}");
    throw;
}
}

```



```

    /// <summary>
    /// Try to terminate an instance by its Id.
    /// </summary>
    /// <param name="instanceId">The Id of the instance to terminate.</param>
    /// <returns>Async task.</returns>
    public async Task TryTerminateInstanceById(string instanceId)
    {
        var stopping = false;
        Console.WriteLine($"Stopping {instanceId}...");
        while (!stopping)
        {
            try
            {
                await _amazonAutoScaling.TerminateInstanceInAutoScalingGroupAsync(
                    new TerminateInstanceInAutoScalingGroupRequest()
                    {
                        InstanceId = instanceId,
                        ShouldDecrementDesiredCapacity = false
                    });
                stopping = true;
            }
            catch (ScalingActivityInProgressException)
            {
                Console.WriteLine($"Scaling activity in progress for {instanceId}.
Waiting...");
                Thread.Sleep(10000);
            }
        }
    }

    /// <summary>
    /// Tries to delete the EC2 Auto Scaling group. If the group is in use or in
    progress,
    /// waits and retries until the group is successfully deleted.
    /// </summary>
    /// <param name="groupName">The name of the group to try to delete.</param>
    /// <returns>Async task.</returns>
    public async Task TryDeleteGroupByName(string groupName)
    {
        var stopped = false;
        while (!stopped)
        {
            try

```

```

        {
            await _amazonAutoScaling.DeleteAutoScalingGroupAsync(
                new DeleteAutoScalingGroupRequest()
                {
                    AutoScalingGroupName = groupName
                });
            stopped = true;
        }
        catch (Exception e)
            when ((e is ScalingActivityInProgressException)
                || (e is Amazon.AutoScaling.Model.ResourceInUseException))
        {
            Console.WriteLine($"Some instances are still running. Waiting...");
            Thread.Sleep(10000);
        }
    }
}

/// <summary>
/// Terminate instances and delete the Auto Scaling group by name.
/// </summary>
/// <param name="groupName">The name of the group to delete.</param>
/// <returns>Async task.</returns>
public async Task TerminateAndDeleteAutoScalingGroupWithName(string groupName)
{
    var describeGroupsResponse = await
        _amazonAutoScaling.DescribeAutoScalingGroupsAsync(
            new DescribeAutoScalingGroupsRequest()
            {
                AutoScalingGroupNames = new List<string>() { groupName }
            });
    if (describeGroupsResponse.AutoScalingGroups.Any())
    {
        // Update the size to 0.
        await _amazonAutoScaling.UpdateAutoScalingGroupAsync(
            new UpdateAutoScalingGroupRequest()
            {
                AutoScalingGroupName = groupName,
                MinSize = 0
            });
        var group = describeGroupsResponse.AutoScalingGroups[0];
        foreach (var instance in group.Instances)
        {
            await TryTerminateInstanceById(instance.InstanceId);
        }
    }
}

```

```

    }

    await TryDeleteGroupByName(groupName);
}
else
{
    Console.WriteLine($"No groups found with name {groupName}.");
}
}

/// <summary>
/// Get the default security group for a specified Vpc.
/// </summary>
/// <param name="vpc">The Vpc to search.</param>
/// <returns>The default security group.</returns>
public async Task<SecurityGroup> GetDefaultSecurityGroupForVpc(Vpc vpc)
{
    var groupResponse = await _amazonEc2.DescribeSecurityGroupsAsync(
        new DescribeSecurityGroupsRequest()
        {
            Filters = new List<Amazon.EC2.Model.Filter>()
            {
                new ("group-name", new List<string>() { "default" }),
                new ("vpc-id", new List<string>() { vpc.VpcId })
            }
        });
    return groupResponse.SecurityGroups[0];
}

/// <summary>
/// Verify the default security group of a Vpc allows ingress from the calling
computer.
/// This can be done by allowing ingress from this computer's IP address.
/// In some situations, such as connecting from a corporate network, you must
instead specify
/// a prefix list Id. You can also temporarily open the port to any IP address
while running this example.
/// If you do, be sure to remove public access when you're done.
/// </summary>
/// <param name="vpc">The group to check.</param>
/// <param name="port">The port to verify.</param>
/// <param name="ipAddress">This computer's IP address.</param>
/// <returns>True if the ip address is allowed on the group.</returns>

```

```

    public bool VerifyInboundPortForGroup(SecurityGroup group, int port, string
ipAddress)
    {
        var portIsOpen = false;
        foreach (var ipPermission in group.IpPermissions)
        {
            if (ipPermission.FromPort == port)
            {
                foreach (var ipRange in ipPermission.Ipv4Ranges)
                {
                    var cidr = ipRange.CidrIp;
                    if (cidr.StartsWith(ipAddress) || cidr == "0.0.0.0/0")
                    {
                        portIsOpen = true;
                    }
                }

                if (ipPermission.PrefixListIds.Any())
                {
                    portIsOpen = true;
                }

                if (!portIsOpen)
                {
                    Console.WriteLine("The inbound rule does not appear to be open
to either this computer's IP\n" +
                                     "address, to all IP addresses (0.0.0.0/0), or
to a prefix list ID.");
                }
                else
                {
                    break;
                }
            }
        }

        return portIsOpen;
    }

    /// <summary>
    /// Add an ingress rule to the specified security group that allows access on
the
    /// specified port from the specified IP address.
    /// </summary>

```

```

    /// <param name="groupId">The Id of the security group to modify.</param>
    /// <param name="port">The port to open.</param>
    /// <param name="ipAddress">The IP address to allow access.</param>
    /// <returns>Async task.</returns>
    public async Task OpenInboundPort(string groupId, int port, string ipAddress)
    {
        await _amazonEc2.AuthorizeSecurityGroupIngressAsync(
            new AuthorizeSecurityGroupIngressRequest()
            {
                GroupId = groupId,
                IpPermissions = new List<IpPermission>()
                {
                    new IpPermission()
                    {
                        FromPort = port,
                        ToPort = port,
                        IpProtocol = "tcp",
                        Ipv4Ranges = new List<IpRange>()
                        {
                            new IpRange() { CidrIp = $"{ipAddress}/32" }
                        }
                    }
                }
            });
    }

    /// <summary>
    /// Attaches an Elastic Load Balancing (ELB) target group to this EC2 Auto
    Scaling group.
    /// The
    /// </summary>
    /// <param name="autoScalingGroupName">The name of the Auto Scaling group.</
param>
    /// <param name="targetGroupArn">The Arn for the target group.</param>
    /// <returns>Async task.</returns>
    public async Task AttachLoadBalancerToGroup(string autoScalingGroupName, string
targetGroupArn)
    {
        await _amazonAutoScaling.AttachLoadBalancerTargetGroupsAsync(
            new AttachLoadBalancerTargetGroupsRequest()
            {
                AutoScalingGroupName = autoScalingGroupName,
                TargetGroupARNs = new List<string>() { targetGroupArn }
            });
    }

```

```

    }

    /// <summary>
    /// Wait until an EC2 instance is in a specified state.
    /// </summary>
    /// <param name="instanceId">The instance Id.</param>
    /// <param name="stateName">The state to wait for.</param>
    /// <returns>A Boolean value indicating the success of the action.</returns>
    public async Task<bool> WaitForInstanceState(string instanceId,
InstanceStateName stateName)
    {
        var request = new DescribeInstancesRequest
        {
            InstanceIds = new List<string> { instanceId }
        };

        // Wait until the instance is in the specified state.
        var hasState = false;
        do
        {
            // Wait 5 seconds.
            Thread.Sleep(5000);

            // Check for the desired state.
            var response = await _amazonEc2.DescribeInstancesAsync(request);
            var instance = response.Reservations[0].Instances[0];
            hasState = instance.State.Name == stateName;
            Console.WriteLine(". ");
        } while (!hasState);

        return hasState;
    }
}

```

建立包裝 Elastic Load Balancing 動作的類別。

```

/// <summary>
/// Encapsulates Elastic Load Balancer actions.
/// </summary>
public class ElasticLoadBalancerWrapper
{

```

```

private readonly IAmazonElasticLoadBalancingV2 _amazonElasticLoadBalancingV2;
private string? _endpoint = null;
private readonly string _targetGroupName = "";
private readonly string _loadBalancerName = "";
HttpClient _httpClient = new();

public string TargetGroupName => _targetGroupName;
public string LoadBalancerName => _loadBalancerName;

/// <summary>
/// Constructor for the Elastic Load Balancer wrapper.
/// </summary>
/// <param name="amazonElasticLoadBalancingV2">The injected load balancing v2
client.</param>
/// <param name="configuration">The injected configuration.</param>
public ElasticLoadBalancerWrapper(
    IAmazonElasticLoadBalancingV2 amazonElasticLoadBalancingV2,
    IConfiguration configuration)
{
    _amazonElasticLoadBalancingV2 = amazonElasticLoadBalancingV2;
    var prefix = configuration["resourcePrefix"];
    _targetGroupName = prefix + "-tg";
    _loadBalancerName = prefix + "-lb";
}

/// <summary>
/// Get the HTTP Endpoint of a load balancer by its name.
/// </summary>
/// <param name="loadBalancerName">The name of the load balancer.</param>
/// <returns>The HTTP endpoint.</returns>
public async Task<string> GetEndpointForLoadBalancerByName(string
loadBalancerName)
{
    if (_endpoint == null)
    {
        var endpointResponse =
            await _amazonElasticLoadBalancingV2.DescribeLoadBalancersAsync(
                new DescribeLoadBalancersRequest()
                {
                    Names = new List<string>() { loadBalancerName }
                });
        _endpoint = endpointResponse.LoadBalancers[0].DNSName;
    }
}

```

```

        return _endpoint;
    }

    /// <summary>
    /// Return the GET response for an endpoint as text.
    /// </summary>
    /// <param name="endpoint">The endpoint for the request.</param>
    /// <returns>The request response.</returns>
    public async Task<string> GetEndPointResponse(string endpoint)
    {
        var endpointResponse = await _httpClient.GetAsync($"http://{endpoint}");
        var textResponse = await endpointResponse.Content.ReadAsStringAsync();
        return textResponse!;
    }

    /// <summary>
    /// Get the target health for a group by name.
    /// </summary>
    /// <param name="groupName">The name of the group.</param>
    /// <returns>The collection of health descriptions.</returns>
    public async Task<List<TargetHealthDescription>>
    CheckTargetHealthForGroup(string groupName)
    {
        List<TargetHealthDescription> result = null!;
        try
        {
            var groupResponse =
                await _amazonElasticLoadBalancingV2.DescribeTargetGroupsAsync(
                    new DescribeTargetGroupsRequest()
                    {
                        Names = new List<string>() { groupName }
                    });
            var healthResponse =
                await _amazonElasticLoadBalancingV2.DescribeTargetHealthAsync(
                    new DescribeTargetHealthRequest()
                    {
                        TargetGroupArn =
groupResponse.TargetGroups[0].TargetGroupArn
                    });
            ;
            result = healthResponse.TargetHealthDescriptions;
        }
        catch (TargetGroupNotFoundException)
        {

```



```

        Console.WriteLine($"Target group {groupName} not found.");
    }
    return result;
}

/// <summary>
/// Create an Elastic Load Balancing target group. The target group specifies
how the load balancer forwards
/// requests to instances in the group and how instance health is checked.
///
/// To speed up this demo, the health check is configured with shortened times
and lower thresholds. In production,
/// you might want to decrease the sensitivity of your health checks to avoid
unwanted failures.
/// </summary>
/// <param name="groupName">The name for the group.</param>
/// <param name="protocol">The protocol, such as HTTP.</param>
/// <param name="port">The port to use to forward requests, such as 80.</param>
/// <param name="vpcId">The Id of the Vpc in which the load balancer exists.</
param>
/// <returns>The new TargetGroup object.</returns>
public async Task<TargetGroup> CreateTargetGroupOnVpc(string groupName,
ProtocolEnum protocol, int port, string vpcId)
{
    var createResponse = await
_amazonElasticLoadBalancingV2.CreateTargetGroupAsync(
    new CreateTargetGroupRequest()
    {
        Name = groupName,
        Protocol = protocol,
        Port = port,
        HealthCheckPath = "/healthcheck",
        HealthCheckIntervalSeconds = 10,
        HealthCheckTimeoutSeconds = 5,
        HealthyThresholdCount = 2,
        UnhealthyThresholdCount = 2,
        VpcId = vpcId
    });
    var targetGroup = createResponse.TargetGroups[0];
    return targetGroup;
}

/// <summary>

```

```

    /// Create an Elastic Load Balancing load balancer that uses the specified
subnets
    /// and forwards requests to the specified target group.
    /// </summary>
    /// <param name="name">The name for the new load balancer.</param>
    /// <param name="subnetIds">Subnets for the load balancer.</param>
    /// <param name="targetGroup">Target group for forwarded requests.</param>
    /// <returns>The new LoadBalancer object.</returns>
    public async Task<LoadBalancer> CreateLoadBalancerAndListener(string name,
List<string> subnetIds, TargetGroup targetGroup)
    {
        var createLbResponse = await
        _amazonElasticLoadBalancingV2.CreateLoadBalancerAsync(
            new CreateLoadBalancerRequest()
            {
                Name = name,
                Subnets = subnetIds
            });
        var loadBalancerArn = createLbResponse.LoadBalancers[0].LoadBalancerArn;

        // Wait for load balancer to be available.
        var loadBalancerReady = false;
        while (!loadBalancerReady)
        {
            try
            {
                var describeResponse =
                    await _amazonElasticLoadBalancingV2.DescribeLoadBalancersAsync(
                        new DescribeLoadBalancersRequest()
                        {
                            Names = new List<string>() { name }
                        });

                var loadBalancerState =
describeResponse.LoadBalancers[0].State.Code;

                loadBalancerReady = loadBalancerState ==
LoadBalancerStateEnum.Active;
            }
            catch (LoadBalancerNotFoundException)
            {
                loadBalancerReady = false;
            }
            Thread.Sleep(10000);
        }
    }

```

```

    }
    // Create the listener.
    await _amazonElasticLoadBalancingV2.CreateListenerAsync(
        new CreateListenerRequest()
        {
            LoadBalancerArn = loadBalancerArn,
            Protocol = targetGroup.Protocol,
            Port = targetGroup.Port,
            DefaultActions = new List<Action>()
            {
                new Action()
                {
                    Type = ActionTypeEnum.Forward,
                    TargetGroupArn = targetGroup.TargetGroupArn
                }
            }
        });
    return createLbResponse.LoadBalancers[0];
}

/// <summary>
/// Verify this computer can successfully send a GET request to the
/// load balancer endpoint.
/// </summary>
/// <param name="endpoint">The endpoint to check.</param>
/// <returns>True if successful.</returns>
public async Task<bool> VerifyLoadBalancerEndpoint(string endpoint)
{
    var success = false;
    var retries = 3;
    while (!success && retries > 0)
    {
        try
        {
            var endpointResponse = await _httpClient.GetAsync($"http://{
{endpoint}");
            Console.WriteLine($"Response: {endpointResponse.StatusCode}.");

            if (endpointResponse.IsSuccessStatusCode)
            {
                success = true;
            }
            else
            {

```

```

        retries = 0;
    }
}
catch (HttpRequestException)
{
    Console.WriteLine("Connection error, retrying...");
    retries--;
    Thread.Sleep(10000);
}
}

return success;
}

/// <summary>
/// Delete a load balancer by its specified name.
/// </summary>
/// <param name="name">The name of the load balancer to delete.</param>
/// <returns>Async task.</returns>
public async Task DeleteLoadBalancerByName(string name)
{
    try
    {
        var describeLoadBalancerResponse =
            await _amazonElasticLoadBalancingV2.DescribeLoadBalancersAsync(
                new DescribeLoadBalancersRequest()
                {
                    Names = new List<string>() { name }
                });
        var lbArn =
            describeLoadBalancerResponse.LoadBalancers[0].LoadBalancerArn;
        await _amazonElasticLoadBalancingV2.DeleteLoadBalancerAsync(
            new DeleteLoadBalancerRequest()
            {
                LoadBalancerArn = lbArn
            }
        );
    }
    catch (LoadBalancerNotFoundException)
    {
        Console.WriteLine($"Load balancer {name} not found.");
    }
}
}

```

```

    /// <summary>
    /// Delete a TargetGroup by its specified name.
    /// </summary>
    /// <param name="groupName">Name of the group to delete.</param>
    /// <returns>Async task.</returns>
    public async Task DeleteTargetGroupByName(string groupName)
    {
        var done = false;
        while (!done)
        {
            try
            {
                var groupResponse =
                    await _amazonElasticLoadBalancingV2.DescribeTargetGroupsAsync(
                        new DescribeTargetGroupsRequest()
                        {
                            Names = new List<string>() { groupName }
                        });

                var targetArn = groupResponse.TargetGroups[0].TargetGroupArn;
                await _amazonElasticLoadBalancingV2.DeleteTargetGroupAsync(
                    new DeleteTargetGroupRequest() { TargetGroupArn = targetArn });
                Console.WriteLine($"Deleted load balancing target group
{groupName}.");
                done = true;
            }
            catch (TargetGroupNotFoundException)
            {
                Console.WriteLine(
                    $"Target group {groupName} not found, could not delete.");
                done = true;
            }
            catch (ResourceInUseException)
            {
                Console.WriteLine("Target group not yet released, waiting...");
                Thread.Sleep(10000);
            }
        }
    }
}

```

建立使用 DynamoDB 模擬建議服務的類別。

```

/// <summary>
/// Encapsulates a DynamoDB table to use as a service that recommends books, movies,
/// and songs.
/// </summary>
public class Recommendations
{
    private readonly IAmazonDynamoDB _amazonDynamoDb;
    private readonly DynamoDBContext _context;
    private readonly string _tableName;

    public string TableName => _tableName;

    /// <summary>
    /// Constructor for the Recommendations service.
    /// </summary>
    /// <param name="amazonDynamoDb">The injected DynamoDb client.</param>
    /// <param name="configuration">The injected configuration.</param>
    public Recommendations(IAmazonDynamoDB amazonDynamoDb, IConfiguration
configuration)
    {
        _amazonDynamoDb = amazonDynamoDb;
        _context = new DynamoDBContext(_amazonDynamoDb);
        _tableName = configuration["databaseName"]!;
    }

    /// <summary>
    /// Create the DynamoDb table with a specified name.
    /// </summary>
    /// <param name="tableName">The name for the table.</param>
    /// <returns>True when ready.</returns>
    public async Task<bool> CreateDatabaseWithName(string tableName)
    {
        try
        {
            Console.WriteLine($"Creating table {tableName}...");
            var createRequest = new CreateTableRequest()
            {
                TableName = tableName,
                AttributeDefinitions = new List<AttributeDefinition>()
                {
                    new AttributeDefinition()
                    {
                        AttributeName = "MediaType",

```

```

        AttributeType = ScalarAttributeType.S
    },
    new AttributeDefinition()
    {
        AttributeName = "ItemId",
        AttributeType = ScalarAttributeType.N
    }
},
KeySchema = new List<KeySchemaElement>()
{
    new KeySchemaElement()
    {
        AttributeName = "MediaTypeId",
        KeyType = KeyType.HASH
    },
    new KeySchemaElement()
    {
        AttributeName = "ItemId",
        KeyType = KeyType.RANGE
    }
},
ProvisionedThroughput = new ProvisionedThroughput()
{
    ReadCapacityUnits = 5,
    WriteCapacityUnits = 5
}
};
await _amazonDynamoDb.CreateTableAsync(createRequest);

// Wait until the table is ACTIVE and then report success.
Console.WriteLine("\nWaiting for table to become active...");

var request = new DescribeTableRequest
{
    TableName = tableName
};

TableStatus status;
do
{
    Thread.Sleep(2000);

    var describeTableResponse = await
        _amazonDynamoDb.DescribeTableAsync(request);

```

```

        status = describeTableResponse.Table.TableStatus;

        Console.Write(".");
    }
    while (status != "ACTIVE");

    return status == TableStatus.ACTIVE;
}
catch (ResourceInUseException)
{
    Console.WriteLine($"Table {tableName} already exists.");
    return false;
}
}

/// <summary>
/// Populate the database table with data from a specified path.
/// </summary>
/// <param name="databaseTableName">The name of the table.</param>
/// <param name="recommendationsPath">The path of the recommendations data.</
param>
/// <returns>Async task.</returns>
public async Task PopulateDatabase(string databaseTableName, string
recommendationsPath)
{
    var recommendationsText = await File.ReadAllTextAsync(recommendationsPath);
    var records =
        JsonSerializer.Deserialize<RecommendationModel[]>(recommendationsText);
    var batchWrite = _context.CreateBatchWrite<RecommendationModel>();

    foreach (var record in records!)
    {
        batchWrite.AddPutItem(record);
    }

    await batchWrite.ExecuteAsync();
}

/// <summary>
/// Delete the recommendation table by name.
/// </summary>
/// <param name="tableName">The name of the recommendation table.</param>
/// <returns>Async task.</returns>
public async Task DestroyDatabaseByName(string tableName)

```



```
{
    try
    {
        await _amazonDynamoDb.DeleteTableAsync(
            new DeleteTableRequest() { TableName = tableName });
        Console.WriteLine($"Table {tableName} was deleted.");
    }
    catch (ResourceNotFoundException)
    {
        Console.WriteLine($"Table {tableName} not found");
    }
}
}
```

建立包裝 Systems Manager 動作的類別。

```
/// <summary>
/// Encapsulates Systems Manager parameter operations. This example uses these
/// parameters
/// to drive the demonstration of resilient architecture, such as failure of a
/// dependency or
/// how the service responds to a health check.
/// </summary>
public class SmParameterWrapper
{
    private readonly IAmazonSimpleSystemsManagement _amazonSimpleSystemsManagement;

    private readonly string _tableParameter = "doc-example-resilient-architecture-
table";
    private readonly string _failureResponseParameter = "doc-example-resilient-
architecture-failure-response";
    private readonly string _healthCheckParameter = "doc-example-resilient-
architecture-health-check";
    private readonly string _tableName = "";

    public string TableParameter => _tableParameter;
    public string TableName => _tableName;
    public string HealthCheckParameter => _healthCheckParameter;
    public string FailureResponseParameter => _failureResponseParameter;

    /// <summary>
    /// Constructor for the SmParameterWrapper.
}
```

```

    /// </summary>
    /// <param name="amazonSimpleSystemsManagement">The injected Simple Systems
Management client.</param>
    /// <param name="configuration">The injected configuration.</param>
    public SmParameterWrapper(IAmazonSimpleSystemsManagement
amazonSimpleSystemsManagement, IConfiguration configuration)
    {
        _amazonSimpleSystemsManagement = amazonSimpleSystemsManagement;
        _tableName = configuration["databaseName"]!;
    }

    /// <summary>
    /// Reset the Systems Manager parameters to starting values for the demo.
    /// </summary>
    /// <returns>Async task.</returns>
    public async Task Reset()
    {
        await this.PutParameterByName(_tableParameter, _tableName);
        await this.PutParameterByName(_failureResponseParameter, "none");
        await this.PutParameterByName(_healthCheckParameter, "shallow");
    }

    /// <summary>
    /// Set the value of a named Systems Manager parameter.
    /// </summary>
    /// <param name="name">The name of the parameter.</param>
    /// <param name="value">The value to set.</param>
    /// <returns>Async task.</returns>
    public async Task PutParameterByName(string name, string value)
    {
        await _amazonSimpleSystemsManagement.PutParameterAsync(
            new PutParameterRequest() { Name = name, Value = value, Overwrite =
true });
    }
}

```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的下列主題。
- [AttachLoadBalancerTargetGroups](#)
- [CreateAutoScalingGroup](#)
- [CreateInstanceProfile](#)
- [CreateLaunchTemplate](#)

- [CreateListener](#)
- [CreateLoadBalancer](#)
- [CreateTargetGroup](#)
- [DeleteAutoScalingGroup](#)
- [DeleteInstanceProfile](#)
- [DeleteLaunchTemplate](#)
- [DeleteLoadBalancer](#)
- [DeleteTargetGroup](#)
- [DescribeAutoScalingGroups](#)
- [DescribeAvailabilityZones](#)
- [DescribeIamInstanceProfileAssociations](#)
- [DescribeInstances](#)
- [DescribeLoadBalancers](#)
- [DescribeSubnets](#)
- [DescribeTargetGroups](#)
- [DescribeTargetHealth](#)
- [DescribeVpcs](#)
- [RebootInstances](#)
- [ReplaceIamInstanceProfileAssociation](#)
- [TerminateInstanceInAutoScalingGroup](#)
- [UpdateAutoScalingGroup](#)

使用的 Amazon Bedrock 執行期範例 適用於 .NET 的 SDK

下列程式碼範例示範如何使用 適用於 .NET 的 AWS SDK 搭配 Amazon Bedrock 執行期來執行動作和實作常見案例。

案例是向您展示如何呼叫服務中的多個函數或與其他 AWS 服務組合來完成特定任務的程式碼範例。

每個範例均包含完整原始碼的連結，您可在連結中找到如何設定和執行內容中程式碼的相關指示。

主題

- [案例](#)

- [Amazon Nova](#)
- [Amazon Nova Canvas](#)
- [Anthropic Claude](#)
- [Cohere Command](#)
- [Meta Llama](#)
- [Mistral AI](#)

案例

建立演練場應用程式，與 Amazon Bedrock 基礎模型互動

下列程式碼範例示範如何建立演練場，透過不同的模態與 Amazon Bedrock 基礎模型互動。

適用於 .NET 的 SDK

.NET 基礎模型 (FM) 演練場是 .NET MAUI Blazor 範例應用程式，展示如何從 C# 程式碼使用 Amazon Bedrock。此範例顯示 .NET 和 C# 開發人員如何使用 Amazon Bedrock 建置啟用生成式 AI 技術的應用程式。您可以使用下列四個演練場，測試 Amazon Bedrock 基礎模型並與之互動：

- 文字演練場。
- 聊天演練場。
- 語音聊天演練場。
- 影像演練場。

此範例也列出並顯示您有權存取的基礎模型及其特性。如需原始程式碼和部署的說明，請參閱 [GitHub](#) 中的專案。

此範例中使用的服務

- Amazon Bedrock 執行時期

搭配 Converse API 使用工具

下列程式碼範例示範如何在應用程式、生成式 AI 模型和連線工具或 API 之間建立典型的互動，以媒介 AI 與外部世界之間的互動。其使用將外部天氣 API 連接線至 AI 模型的範例，以根據使用者輸入提供即時天氣資訊。

適用於 .NET 的 SDK

 Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

案例流程的主要執行。此案例會協調使用者、Amazon Bedrock Converse API 和天氣工具之間的對話。

```
using Amazon;
using Amazon.BedrockRuntime;
using Amazon.BedrockRuntime.Model;
using Amazon.Runtime.Documents;
using Microsoft.Extensions.DependencyInjection;
using Microsoft.Extensions.DependencyInjection.Extensions;
using Microsoft.Extensions.Hosting;
using Microsoft.Extensions.Http;
using Microsoft.Extensions.Logging;
using Microsoft.Extensions.Logging.Console;

namespace ConverseToolScenario;

public static class ConverseToolScenario
{
    /*
        Before running this .NET code example, set up your development environment,
        including your credentials.

        This demo illustrates a tool use scenario using Amazon Bedrock's Converse API
        and a weather tool.

        The script interacts with a foundation model on Amazon Bedrock to provide
        weather information based on user
        input. It uses the Open-Meteo API (https://open-meteo.com) to retrieve current
        weather data for a given location.
    */

    public static BedrockActionsWrapper _bedrockActionsWrapper = null!;
    public static WeatherTool _weatherTool = null!;
    public static bool _interactive = true;
```

```
// Change this string to use a different model with Converse API.
private static string model_id = "amazon.nova-lite-v1:0";

private static string system_prompt = @"
    You are a weather assistant that provides current weather data for user-
specified locations using only
    the Weather_Tool, which expects latitude and longitude. Infer the
coordinates from the location yourself.
    If the user specifies a state, country, or region, infer the locations of
cities within that state.
    If the user provides coordinates, infer the approximate location and refer
to it in your response.
    To use the tool, you strictly apply the provided tool specification.

    - Explain your step-by-step process, and give brief updates before each
step.
    - Only use the Weather_Tool for data. Never guess or make up information.
    - Repeat the tool use for subsequent requests if necessary.
    - If the tool errors, apologize, explain weather is unavailable, and suggest
other options.
    - Report temperatures in °C (°F) and wind in km/h (mph). Keep weather
reports concise. Sparingly use
    emojis where appropriate.
    - Only respond to weather queries. Remind off-topic users of your purpose.
    - Never claim to search online, access external data, or use tools besides
Weather_Tool.
    - Complete the entire process until you have all required data before
sending the complete response.
"
;

private static string default_prompt = "What is the weather like in Seattle?";

// The maximum number of recursive calls allowed in the tool use function.
// This helps prevent infinite loops and potential performance issues.
private static int max_recurions = 5;

public static async Task Main(string[] args)
{
    // Set up dependency injection for the Amazon service.
    using var host = Host.CreateDefaultBuilder(args)
        .ConfigureLogging(logging =>
            logging.AddFilter("System", LogLevel.Error)

```

```

        .AddFilter<ConsoleLoggerProvider>("Microsoft", LogLevel.Trace))
    .ConfigureServices((_, services) =>
        services.AddHttpClient()
            .AddSingleton<IAmazonBedrockRuntime>(_ => new
AmazonBedrockRuntimeClient(RegionEndpoint.USEast1)) // Specify a region that has
access to the chosen model.
            .AddTransient<BedrockActionsWrapper>()
            .AddTransient<WeatherTool>()
            .RemoveAll<IHttpMessageHandlerBuilderFilter>()
    )
    .Build();

ServicesSetup(host);

try
{
    await RunConversationAsync();
}
catch (Exception ex)
{
    Console.WriteLine(new string('-', 80));
    Console.WriteLine($"There was a problem running the scenario:
{ex.Message}");
    Console.WriteLine(new string('-', 80));
}
finally
{
    Console.WriteLine(
        "Amazon Bedrock Converse API with Tool Use Feature Scenario is
complete.");
    Console.WriteLine(new string('-', 80));
}
}

/// <summary>
/// Populate the services for use within the console application.
/// </summary>
/// <param name="host">The services host.</param>
private static void ServicesSetup(IHost host)
{
    _bedrockActionsWrapper =
host.Services.GetRequiredService<BedrockActionsWrapper>();
    _weatherTool = host.Services.GetRequiredService<WeatherTool>();
}

```

```
}

/// <summary>
/// Starts the conversation with the user and handles the interaction with
Bedrock.
/// </summary>
/// <returns>The conversation array.</returns>
public static async Task<List<Message>> RunConversationAsync()
{
    // Print the greeting and a short user guide
    PrintHeader();

    // Start with an empty conversation
    var conversation = new List<Message>();

    // Get the first user input
    var userInput = await Get userInputAsync();

    while (userInput != null)
    {
        // Create a new message with the user input and append it to the
conversation
        var message = new Message { Role = ConversationRole.User, Content = new
List<ContentBlock> { new ContentBlock { Text = userInput } } };
        conversation.Add(message);

        // Send the conversation to Amazon Bedrock
        var bedrockResponse = await SendConversationToBedrock(conversation);

        // Recursively handle the model's response until the model has returned
its final response or the recursion counter has reached 0
        await ProcessModelResponseAsync(bedrockResponse, conversation,
max_recurions);

        // Repeat the loop until the user decides to exit the application
        userInput = await Get userInputAsync();
    }

    PrintFooter();
    return conversation;
}

/// <summary>
```



```

    /// Sends the conversation, the system prompt, and the tool spec to Amazon
    Bedrock, and returns the response.
    /// </summary>
    /// <param name="conversation">The conversation history including the next
    message to send.</param>
    /// <returns>The response from Amazon Bedrock.</returns>
    private static async Task<ConverseResponse>
    SendConversationToBedrock(List<Message> conversation)
    {
        Console.WriteLine("\tCalling Bedrock...");

        // Send the conversation, system prompt, and tool configuration, and return
        the response
        return await _bedrockActionsWrapper.SendConverseRequestAsync(model_id,
        system_prompt, conversation, _weatherTool.GetToolSpec());
    }

    /// <summary>
    /// Processes the response received via Amazon Bedrock and performs the
    necessary actions based on the stop reason.
    /// </summary>
    /// <param name="modelResponse">The model's response returned via Amazon
    Bedrock.</param>
    /// <param name="conversation">The conversation history.</param>
    /// <param name="maxRecursion">The maximum number of recursive calls allowed.</
    param>
    private static async Task ProcessModelResponseAsync(ConverseResponse
    modelResponse, List<Message> conversation, int maxRecursion)
    {
        if (maxRecursion <= 0)
        {
            // Stop the process, the number of recursive calls could indicate an
            infinite loop
            Console.WriteLine("\tWarning: Maximum number of recursions reached.
            Please try again.");
        }

        // Append the model's response to the ongoing conversation
        conversation.Add(modelResponse.Output.Message);

        if (modelResponse.StopReason == "tool_use")
        {
            // If the stop reason is "tool_use", forward everything to the tool use
            handler

```

```

        await HandleToolUseAsync(modelResponse.Output, conversation,
maxRecursion - 1);
    }

    if (modelResponse.StopReason == "end_turn")
    {
        // If the stop reason is "end_turn", print the model's response text,
and finish the process
        PrintModelResponse(modelResponse.Output.Message.Content[0].Text);
        if (!_interactive)
        {
            default_prompt = "x";
        }
    }
}

/// <summary>
/// Handles the tool use case by invoking the specified tool and sending the
tool's response back to Bedrock.
/// The tool response is appended to the conversation, and the conversation is
sent back to Amazon Bedrock for further processing.
/// </summary>
/// <param name="modelResponse">The model's response containing the tool use
request.</param>
/// <param name="conversation">The conversation history.</param>
/// <param name="maxRecursion">The maximum number of recursive calls allowed.</
param>
public static async Task HandleToolUseAsync(ConverseOutput modelResponse,
List<Message> conversation, int maxRecursion)
{
    // Initialize an empty list of tool results
    var toolResults = new List<ContentBlock>();

    // The model's response can consist of multiple content blocks
    foreach (var contentBlock in modelResponse.Message.Content)
    {
        if (!String.IsNullOrEmpty(contentBlock.Text))
        {
            // If the content block contains text, print it to the console
            PrintModelResponse(contentBlock.Text);
        }

        if (contentBlock.ToolUse != null)
        {

```

```

        // If the content block is a tool use request, forward it to the
tool
        var toolResponse = await InvokeTool(contentBlock.ToolUse);

        // Add the tool use ID and the tool's response to the list of
results
        toolResults.Add(new ContentBlock
        {
            ToolResult = new ToolResultBlock()
            {
                ToolUseId = toolResponse.ToolUseId,
                Content = new List<ToolResultContentBlock>()
                { new ToolResultContentBlock { Json =
toolResponse.Content } }
            }
        });
    }
}

// Embed the tool results in a new user message
var message = new Message() { Role = ConversationRole.User, Content =
toolResults };

// Append the new message to the ongoing conversation
conversation.Add(message);

// Send the conversation to Amazon Bedrock
var response = await SendConversationToBedrock(conversation);

// Recursively handle the model's response until the model has returned its
final response or the recursion counter has reached 0
await ProcessModelResponseAsync(response, conversation, maxRecursion);
}

/// <summary>
/// Invokes the specified tool with the given payload and returns the tool's
response.
/// If the requested tool does not exist, an error message is returned.
/// </summary>
/// <param name="payload">The payload containing the tool name and input data.</
param>
/// <returns>The tool's response or an error message.</returns>
public static async Task<ToolResponse> InvokeTool(ToolUseBlock payload)
{

```

```

        var toolName = payload.Name;

        if (toolName == "Weather_Tool")
        {
            var inputData = payload.Input.AsDictionary();
            PrintToolUse(toolName, inputData);

            // Invoke the weather tool with the input data provided
            var weatherResponse = await
_weatherTool.FetchWeatherDataAsync(inputData["latitude"].ToString(),
inputData["longitude"].ToString());
            return new ToolResponse { ToolUseId = payload.ToolUseId, Content =
weatherResponse };
        }
        else
        {
            var errorMessage = $"\\tThe requested tool with name '{toolName}' does
not exist.";
            return new ToolResponse { ToolUseId = payload.ToolUseId, Content = new
{ error = true, message = errorMessage } };
        }
    }

    /// <summary>
    /// Prompts the user for input and returns the user's response.
    /// Returns null if the user enters 'x' to exit.
    /// </summary>
    /// <param name="prompt">The prompt to display to the user.</param>
    /// <returns>The user's input or null if the user chooses to exit.</returns>
    private static async Task<string?> Get userInputAsync(string prompt = "\\tYour
weather info request:")
    {
        var userInput = default_prompt;
        if (_interactive)
        {
            Console.WriteLine(new string('*', 80));
            Console.WriteLine($"{prompt} (x to exit): \\n\\t");
            userInput = Console.ReadLine();
        }

        if (string.IsNullOrEmpty(userInput))
        {

```

```

        prompt = "\tPlease enter your weather info request, e.g. the name of a
city";
        return await Get userInputAsync(prompt);
    }

    if (userInput.ToLowerInvariant() == "x")
    {
        return null;
    }

    return userInput;
}

/// <summary>
/// Logs the welcome message and usage guide for the tool use demo.
/// </summary>
public static void PrintHeader()
{
    Console.WriteLine(@"
=====
Welcome to the Amazon Bedrock Tool Use demo!
=====

This assistant provides current weather information for user-specified
locations.

You can ask for weather details by providing the location name or
coordinates. Weather information
will be provided using a custom Tool and open-meteo API.

Example queries:
- What's the weather like in New York?
- Current weather for latitude 40.70, longitude -74.01
- Is it warmer in Rome or Barcelona today?

To exit the program, simply type 'x' and press Enter.

P.S.: You're not limited to single locations, or even to using English!
Have fun and experiment with the app!
");
}

/// <summary>
/// Logs the footer information for the tool use demo.
/// </summary>

```

```

public static void PrintFooter()
{
    Console.WriteLine(@"
=====
Thank you for checking out the Amazon Bedrock Tool Use demo. We hope you
learned something new, or got some inspiration for your own apps today!

For more Bedrock examples in different programming languages, have a look
at:
    https://docs.aws.amazon.com/bedrock/latest/userguide/
service_code_examples.html
=====
");
}

/// <summary>
/// Logs information about the tool use.
/// </summary>
/// <param name="toolName">The name of the tool being used.</param>
/// <param name="inputData">The input data for the tool.</param>
public static void PrintToolUse(string toolName, Dictionary<string, Document>
inputData)
{
    Console.WriteLine($"\\n\\tInvoking tool: {toolName} with input:
{inputData["latitude"].ToString()}, {inputData["longitude"].ToString()}...\\n");
}

/// <summary>
/// Logs the model's response.
/// </summary>
/// <param name="message">The model's response message.</param>
public static void PrintModelResponse(string message)
{
    Console.WriteLine("\\tThe model's response:\\n");
    Console.WriteLine(message);
    Console.WriteLine();
}
}

```

示範時使用的天氣工具。此檔案定義工具規格，並實作邏輯，以從 Open-Meteo API 用來擷取天氣資料。

```

using Amazon.BedrockRuntime.Model;
using Amazon.Runtime.Documents;
using Microsoft.Extensions.Logging;

namespace ConverseToolScenario;

/// <summary>
/// Weather tool that will be invoked when requested by the Bedrock response.
/// </summary>
public class WeatherTool
{
    private readonly ILogger<WeatherTool> _logger;
    private readonly IHttpClientFactory _httpClientFactory;

    public WeatherTool(ILogger<WeatherTool> logger, IHttpClientFactory
httpClientFactory)
    {
        _logger = logger;
        _httpClientFactory = httpClientFactory;
    }

    /// <summary>
    /// Returns the JSON Schema specification for the Weather tool. The tool
specification
    /// defines the input schema and describes the tool's functionality.
    /// For more information, see https://json-schema.org/understanding-json-schema/
reference.
    /// </summary>
    /// <returns>The tool specification for the Weather tool.</returns>
    public ToolSpecification GetToolSpec()
    {
        ToolSpecification toolSpecification = new ToolSpecification();

        toolSpecification.Name = "Weather_Tool";
        toolSpecification.Description = "Get the current weather for a given
location, based on its WGS84 coordinates.";

        Document toolSpecDocument = Document.FromObject(
            new
            {
                type = "object",
                properties = new

```

```

        {
            latitude = new
            {
                type = "string",
                description = "Geographical WGS84 latitude of the location."
            },
            longitude = new
            {
                type = "string",
                description = "Geographical WGS84 longitude of the
location."
            }
        },
        required = new[] { "latitude", "longitude" }
    });

    toolSpecification.InputSchema = new ToolInputSchema() { Json =
toolSpecDocument };
    return toolSpecification;
}

/// <summary>
/// Fetches weather data for the given latitude and longitude using the Open-
Meteo API.
/// Returns the weather data or an error message if the request fails.
/// </summary>
/// <param name="latitude">The latitude of the location.</param>
/// <param name="longitude">The longitude of the location.</param>
/// <returns>The weather data or an error message.</returns>
public async Task<Document> FetchWeatherDataAsync(string latitude, string
longitude)
{
    string endpoint = "https://api.open-meteo.com/v1/forecast";

    try
    {
        var httpClient = _httpClientFactory.CreateClient();
        var response = await httpClient.GetAsync($"{endpoint}?
latitude={latitude}&longitude={longitude}&current_weather=True");
        response.EnsureSuccessStatusCode();
        var weatherData = await response.Content.ReadAsStringAsync();

        Document weatherDocument = Document.FromObject(
            new { weather_data = weatherData });
    }
}

```



```

        return weatherDocument;
    }
    catch (HttpRequestException e)
    {
        _logger.LogError(e, "Error fetching weather data: {Message}",
e.Message);
        throw;
    }
    catch (Exception e)
    {
        _logger.LogError(e, "Unexpected error fetching weather data: {Message}",
e.Message);
        throw;
    }
}
}

```

具有工具組態的 Converse API 動作。

```

/// <summary>
/// Wrapper class for interacting with the Amazon Bedrock Converse API.
/// </summary>
public class BedrockActionsWrapper
{
    private readonly IAmazonBedrockRuntime _bedrockClient;
    private readonly ILogger<BedrockActionsWrapper> _logger;

    /// <summary>
    /// Initializes a new instance of the <see cref="BedrockActionsWrapper"/> class.
    /// </summary>
    /// <param name="bedrockClient">The Bedrock Converse API client.</param>
    /// <param name="logger">The logger instance.</param>
    public BedrockActionsWrapper(IAmazonBedrockRuntime bedrockClient,
    ILogger<BedrockActionsWrapper> logger)
    {
        _bedrockClient = bedrockClient;
        _logger = logger;
    }

    /// <summary>

```

```
/// Sends a Converse request to the Amazon Bedrock Converse API.
/// </summary>
/// <param name="modelId">The Bedrock Model Id.</param>
/// <param name="systemPrompt">A system prompt instruction.</param>
/// <param name="conversation">The array of messages in the conversation.</
param>
/// <param name="toolSpec">The specification for a tool.</param>
/// <returns>The response of the model.</returns>
public async Task<ConverseResponse> SendConverseRequestAsync(string modelId,
string systemPrompt, List<Message> conversation, ToolSpecification toolSpec)
{
    try
    {
        var request = new ConverseRequest()
        {
            ModelId = modelId,
            System = new List<SystemContentBlock>()
            {
                new SystemContentBlock()
                {
                    Text = systemPrompt
                }
            },
            Messages = conversation,
            ToolConfig = new ToolConfiguration()
            {
                Tools = new List<Tool>()
                {
                    new Tool()
                    {
                        ToolSpec = toolSpec
                    }
                }
            }
        };

        var response = await _bedrockClient.ConverseAsync(request);

        return response;
    }
    catch (ModelNotReadyException ex)
    {
        _logger.LogError(ex, "Model not ready, please wait and try again.");
        throw;
    }
}
```

```
    }  
    catch (AmazonBedrockRuntimeException ex)  
    {  
        _logger.LogError(ex, "Error occurred while sending Converse request.");  
        throw;  
    }  
}  
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [Converse](#)。

Amazon Nova

Converse

下列程式碼範例示範如何使用 Bedrock 的 Converse API，將文字訊息傳送至 Amazon Nova。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

使用 Bedrock 的 Converse API，將文字訊息傳送至 Amazon Nova。

```
// Use the Converse API to send a text message to Amazon Nova.  
  
using System;  
using System.Collections.Generic;  
using Amazon;  
using Amazon.BedrockRuntime;  
using Amazon.BedrockRuntime.Model;  
  
// Create a Bedrock Runtime client in the AWS Region you want to use.  
var client = new AmazonBedrockRuntimeClient(RegionEndpoint.USEast1);  
  
// Set the model ID, e.g., Amazon Nova Lite.  
var modelId = "amazon.nova-lite-v1:0";
```

```
// Define the user message.
var userMessage = "Describe the purpose of a 'hello world' program in one line.";

// Create a request with the model ID, the user message, and an inference
// configuration.
var request = new ConverseRequest
{
    ModelId = modelId,
    Messages = new List<Message>
    {
        new Message
        {
            Role = ConversationRole.User,
            Content = new List<ContentBlock> { new ContentBlock { Text =
userMessage } }
        }
    },
    InferenceConfig = new InferenceConfiguration()
    {
        MaxTokens = 512,
        Temperature = 0.5F,
        TopP = 0.9F
    }
};

try
{
    // Send the request to the Bedrock Runtime and wait for the result.
    var response = await client.ConverseAsync(request);

    // Extract and print the response text.
    string responseText = response?.Output?.Message?.Content?[0]?.Text ?? "";
    Console.WriteLine(responseText);
}
catch (AmazonBedrockRuntimeException e)
{
    Console.WriteLine($"ERROR: Can't invoke '{modelId}'. Reason: {e.Message}");
    throw;
}
```

搭配使用 Bedrock 的 Converse API 和工具組態，將訊息對話傳送至 Amazon Nova。

```

/// <summary>
/// Wrapper class for interacting with the Amazon Bedrock Converse API.
/// </summary>
public class BedrockActionsWrapper
{
    private readonly IAmazonBedrockRuntime _bedrockClient;
    private readonly ILogger<BedrockActionsWrapper> _logger;

    /// <summary>
    /// Initializes a new instance of the <see cref="BedrockActionsWrapper"/> class.
    /// </summary>
    /// <param name="bedrockClient">The Bedrock Converse API client.</param>
    /// <param name="logger">The logger instance.</param>
    public BedrockActionsWrapper(IAmazonBedrockRuntime bedrockClient,
    ILogger<BedrockActionsWrapper> logger)
    {
        _bedrockClient = bedrockClient;
        _logger = logger;
    }

    /// <summary>
    /// Sends a Converse request to the Amazon Bedrock Converse API.
    /// </summary>
    /// <param name="modelId">The Bedrock Model Id.</param>
    /// <param name="systemPrompt">A system prompt instruction.</param>
    /// <param name="conversation">The array of messages in the conversation.</
param>
    /// <param name="toolSpec">The specification for a tool.</param>
    /// <returns>The response of the model.</returns>
    public async Task<ConverseResponse> SendConverseRequestAsync(string modelId,
    string systemPrompt, List<Message> conversation, ToolSpecification toolSpec)
    {
        try
        {
            var request = new ConverseRequest()
            {
                ModelId = modelId,
                System = new List<SystemContentBlock>()
                {
                    new SystemContentBlock()
                    {
                        Text = systemPrompt

```

```

        }
    },
    Messages = conversation,
    ToolConfig = new ToolConfiguration()
    {
        Tools = new List<Tool>()
        {
            new Tool()
            {
                ToolSpec = toolSpec
            }
        }
    }
};

var response = await _bedrockClient.ConverseAsync(request);

return response;
}
catch (ModelNotReadyException ex)
{
    _logger.LogError(ex, "Model not ready, please wait and try again.");
    throw;
}
catch (AmazonBedrockRuntimeException ex)
{
    _logger.LogError(ex, "Error occurred while sending Converse request.");
    throw;
}
}
}

```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [Converse](#)。

ConverseStream

下列程式碼範例示範如何使用 Bedrock 的 Converse API 將文字訊息傳送至 Amazon Nova，並即時處理回應串流。

適用於 .NET 的 SDK

 Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

使用 Bedrock 的 Converse API 將文字訊息傳送至 Amazon Nova，並即時處理回應串流。

```
// Use the Converse API to send a text message to Amazon Nova
// and print the response stream.

using System;
using System.Collections.Generic;
using System.Linq;
using Amazon;
using Amazon.BedrockRuntime;
using Amazon.BedrockRuntime.Model;

// Create a Bedrock Runtime client in the AWS Region you want to use.
var client = new AmazonBedrockRuntimeClient(RegionEndpoint.USEast1);

// Set the model ID, e.g., Amazon Nova Lite.
var modelId = "amazon.nova-lite-v1:0";

// Define the user message.
var userMessage = "Describe the purpose of a 'hello world' program in one line.";

// Create a request with the model ID, the user message, and an inference
// configuration.
var request = new ConverseStreamRequest
{
    ModelId = modelId,
    Messages = new List<Message>
    {
        new Message
        {
            Role = ConversationRole.User,
            Content = new List<ContentBlock> { new ContentBlock { Text =
userMessage } }
        }
    },
};
```

```
InferenceConfig = new InferenceConfiguration()
{
    MaxTokens = 512,
    Temperature = 0.5F,
    TopP = 0.9F
};

try
{
    // Send the request to the Bedrock Runtime and wait for the result.
    var response = await client.ConverseStreamAsync(request);

    // Extract and print the streamed response text in real-time.
    foreach (var chunk in response.Stream.AsEnumerable())
    {
        if (chunk is ContentBlockDeltaEvent)
        {
            Console.Write((chunk as ContentBlockDeltaEvent).Delta.Text);
        }
    }
}
catch (AmazonBedrockRuntimeException e)
{
    Console.WriteLine($"ERROR: Can't invoke '{modelId}'. Reason: {e.Message}");
    throw;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [ConverseStream](#)。

案例：工具與 Converse API 搭配使用

下列程式碼範例示範如何在應用程式、生成式 AI 模型和連線工具或 API 之間建立典型的互動，以媒介 AI 與外部世界之間的互動。其使用將外部天氣 API 連接線至 AI 模型的範例，以根據使用者輸入提供即時天氣資訊。

適用於 .NET 的 SDK

 Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

案例流程的主要執行。此案例會協調使用者、Amazon Bedrock Converse API 和天氣工具之間的對話。

```
using Amazon;
using Amazon.BedrockRuntime;
using Amazon.BedrockRuntime.Model;
using Amazon.Runtime.Documents;
using Microsoft.Extensions.DependencyInjection;
using Microsoft.Extensions.DependencyInjection.Extensions;
using Microsoft.Extensions.Hosting;
using Microsoft.Extensions.Http;
using Microsoft.Extensions.Logging;
using Microsoft.Extensions.Logging.Console;

namespace ConverseToolScenario;

public static class ConverseToolScenario
{
    /*
        Before running this .NET code example, set up your development environment,
        including your credentials.

        This demo illustrates a tool use scenario using Amazon Bedrock's Converse API
        and a weather tool.

        The script interacts with a foundation model on Amazon Bedrock to provide
        weather information based on user
        input. It uses the Open-Meteo API (https://open-meteo.com) to retrieve current
        weather data for a given location.
    */

    public static BedrockActionsWrapper _bedrockActionsWrapper = null!;
    public static WeatherTool _weatherTool = null!;
    public static bool _interactive = true;
```

```
// Change this string to use a different model with Converse API.
private static string model_id = "amazon.nova-lite-v1:0";

private static string system_prompt = @"
    You are a weather assistant that provides current weather data for user-
specified locations using only
    the Weather_Tool, which expects latitude and longitude. Infer the
coordinates from the location yourself.
    If the user specifies a state, country, or region, infer the locations of
cities within that state.
    If the user provides coordinates, infer the approximate location and refer
to it in your response.
    To use the tool, you strictly apply the provided tool specification.

    - Explain your step-by-step process, and give brief updates before each
step.
    - Only use the Weather_Tool for data. Never guess or make up information.
    - Repeat the tool use for subsequent requests if necessary.
    - If the tool errors, apologize, explain weather is unavailable, and suggest
other options.
    - Report temperatures in °C (°F) and wind in km/h (mph). Keep weather
reports concise. Sparingly use
    emojis where appropriate.
    - Only respond to weather queries. Remind off-topic users of your purpose.
    - Never claim to search online, access external data, or use tools besides
Weather_Tool.
    - Complete the entire process until you have all required data before
sending the complete response.
"
;

private static string default_prompt = "What is the weather like in Seattle?";

// The maximum number of recursive calls allowed in the tool use function.
// This helps prevent infinite loops and potential performance issues.
private static int max_recursions = 5;

public static async Task Main(string[] args)
{
    // Set up dependency injection for the Amazon service.
    using var host = Host.CreateDefaultBuilder(args)
        .ConfigureLogging(logging =>
            logging.AddFilter("System", LogLevel.Error)

```

```

        .AddFilter<ConsoleLoggerProvider>("Microsoft", LogLevel.Trace))
    .ConfigureServices((_, services) =>
        services.AddHttpClient()
            .AddSingleton<IAmazonBedrockRuntime>(_ => new
AmazonBedrockRuntimeClient(RegionEndpoint.USEast1)) // Specify a region that has
access to the chosen model.
            .AddTransient<BedrockActionsWrapper>()
            .AddTransient<WeatherTool>()
            .RemoveAll<IHttpMessageHandlerBuilderFilter>()
    )
    .Build();

ServicesSetup(host);

try
{
    await RunConversationAsync();
}
catch (Exception ex)
{
    Console.WriteLine(new string('-', 80));
    Console.WriteLine($"There was a problem running the scenario:
{ex.Message}");
    Console.WriteLine(new string('-', 80));
}
finally
{
    Console.WriteLine(
        "Amazon Bedrock Converse API with Tool Use Feature Scenario is
complete.");
    Console.WriteLine(new string('-', 80));
}
}

/// <summary>
/// Populate the services for use within the console application.
/// </summary>
/// <param name="host">The services host.</param>
private static void ServicesSetup(IHost host)
{
    _bedrockActionsWrapper =
host.Services.GetRequiredService<BedrockActionsWrapper>();
    _weatherTool = host.Services.GetRequiredService<WeatherTool>();
}

```

```
}

/// <summary>
/// Starts the conversation with the user and handles the interaction with
Bedrock.
/// </summary>
/// <returns>The conversation array.</returns>
public static async Task<List<Message>> RunConversationAsync()
{
    // Print the greeting and a short user guide
    PrintHeader();

    // Start with an empty conversation
    var conversation = new List<Message>();

    // Get the first user input
    var userInput = await GetUserInputAsync();

    while (userInput != null)
    {
        // Create a new message with the user input and append it to the
conversation
        var message = new Message { Role = ConversationRole.User, Content = new
List<ContentBlock> { new ContentBlock { Text = userInput } } };
        conversation.Add(message);

        // Send the conversation to Amazon Bedrock
        var bedrockResponse = await SendConversationToBedrock(conversation);

        // Recursively handle the model's response until the model has returned
its final response or the recursion counter has reached 0
        await ProcessModelResponseAsync(bedrockResponse, conversation,
max_recurions);

        // Repeat the loop until the user decides to exit the application
        userInput = await GetUserInputAsync();
    }

    PrintFooter();
    return conversation;
}

/// <summary>
```

```

    /// Sends the conversation, the system prompt, and the tool spec to Amazon
    Bedrock, and returns the response.
    /// </summary>
    /// <param name="conversation">The conversation history including the next
    message to send.</param>
    /// <returns>The response from Amazon Bedrock.</returns>
    private static async Task<ConverseResponse>
    SendConversationToBedrock(List<Message> conversation)
    {
        Console.WriteLine("\tCalling Bedrock...");

        // Send the conversation, system prompt, and tool configuration, and return
        the response
        return await _bedrockActionsWrapper.SendConverseRequestAsync(model_id,
        system_prompt, conversation, _weatherTool.GetToolSpec());
    }

    /// <summary>
    /// Processes the response received via Amazon Bedrock and performs the
    necessary actions based on the stop reason.
    /// </summary>
    /// <param name="modelResponse">The model's response returned via Amazon
    Bedrock.</param>
    /// <param name="conversation">The conversation history.</param>
    /// <param name="maxRecursion">The maximum number of recursive calls allowed.</
    param>
    private static async Task ProcessModelResponseAsync(ConverseResponse
    modelResponse, List<Message> conversation, int maxRecursion)
    {
        if (maxRecursion <= 0)
        {
            // Stop the process, the number of recursive calls could indicate an
            infinite loop
            Console.WriteLine("\tWarning: Maximum number of recursions reached.
            Please try again.");
        }

        // Append the model's response to the ongoing conversation
        conversation.Add(modelResponse.Output.Message);

        if (modelResponse.StopReason == "tool_use")
        {
            // If the stop reason is "tool_use", forward everything to the tool use
            handler

```

```

        await HandleToolUseAsync(modelResponse.Output, conversation,
maxRecursion - 1);
    }

    if (modelResponse.StopReason == "end_turn")
    {
        // If the stop reason is "end_turn", print the model's response text,
and finish the process
        PrintModelResponse(modelResponse.Output.Message.Content[0].Text);
        if (!_interactive)
        {
            default_prompt = "x";
        }
    }
}

/// <summary>
/// Handles the tool use case by invoking the specified tool and sending the
tool's response back to Bedrock.
/// The tool response is appended to the conversation, and the conversation is
sent back to Amazon Bedrock for further processing.
/// </summary>
/// <param name="modelResponse">The model's response containing the tool use
request.</param>
/// <param name="conversation">The conversation history.</param>
/// <param name="maxRecursion">The maximum number of recursive calls allowed.</
param>
public static async Task HandleToolUseAsync(ConverseOutput modelResponse,
List<Message> conversation, int maxRecursion)
{
    // Initialize an empty list of tool results
    var toolResults = new List<ContentBlock>();

    // The model's response can consist of multiple content blocks
    foreach (var contentBlock in modelResponse.Message.Content)
    {
        if (!String.IsNullOrEmpty(contentBlock.Text))
        {
            // If the content block contains text, print it to the console
            PrintModelResponse(contentBlock.Text);
        }

        if (contentBlock.ToolUse != null)
        {

```

```

        // If the content block is a tool use request, forward it to the
tool
        var toolResponse = await InvokeTool(contentBlock.ToolUse);

        // Add the tool use ID and the tool's response to the list of
results
        toolResults.Add(new ContentBlock
        {
            ToolResult = new ToolResultBlock()
            {
                ToolUseId = toolResponse.ToolUseId,
                Content = new List<ToolResultContentBlock>()
                { new ToolResultContentBlock { Json =
toolResponse.Content } }
            }
        });
    }
}

// Embed the tool results in a new user message
var message = new Message() { Role = ConversationRole.User, Content =
toolResults };

// Append the new message to the ongoing conversation
conversation.Add(message);

// Send the conversation to Amazon Bedrock
var response = await SendConversationToBedrock(conversation);

// Recursively handle the model's response until the model has returned its
final response or the recursion counter has reached 0
await ProcessModelResponseAsync(response, conversation, maxRecursion);
}

/// <summary>
/// Invokes the specified tool with the given payload and returns the tool's
response.
/// If the requested tool does not exist, an error message is returned.
/// </summary>
/// <param name="payload">The payload containing the tool name and input data.</
param>
/// <returns>The tool's response or an error message.</returns>
public static async Task<ToolResponse> InvokeTool(ToolUseBlock payload)
{

```

```

        var toolName = payload.Name;

        if (toolName == "Weather_Tool")
        {
            var inputData = payload.Input.AsDictionary();
            PrintToolUse(toolName, inputData);

            // Invoke the weather tool with the input data provided
            var weatherResponse = await
_weatherTool.FetchWeatherDataAsync(inputData["latitude"].ToString(),
inputData["longitude"].ToString());
            return new ToolResponse { ToolUseId = payload.ToolUseId, Content =
weatherResponse };
        }
        else
        {
            var errorMessage = $"{\tThe requested tool with name '{toolName}' does
not exist.";
            return new ToolResponse { ToolUseId = payload.ToolUseId, Content = new
{ error = true, message = errorMessage } };
        }
    }

    /// <summary>
    /// Prompts the user for input and returns the user's response.
    /// Returns null if the user enters 'x' to exit.
    /// </summary>
    /// <param name="prompt">The prompt to display to the user.</param>
    /// <returns>The user's input or null if the user chooses to exit.</returns>
    private static async Task<string?> Get userInputAsync(string prompt = "\tYour
weather info request:")
    {
        var userInput = default_prompt;
        if (_interactive)
        {
            Console.WriteLine(new string('*', 80));
            Console.WriteLine($"{prompt} (x to exit): \n\t");
            userInput = Console.ReadLine();
        }

        if (string.IsNullOrEmpty(userInput))
        {

```



```

        prompt = "\tPlease enter your weather info request, e.g. the name of a
city";
        return await Get userInputAsync(prompt);
    }

    if (userInput.ToLowerInvariant() == "x")
    {
        return null;
    }

    return userInput;
}

/// <summary>
/// Logs the welcome message and usage guide for the tool use demo.
/// </summary>
public static void PrintHeader()
{
    Console.WriteLine(@"
=====
Welcome to the Amazon Bedrock Tool Use demo!
=====

    This assistant provides current weather information for user-specified
locations.

    You can ask for weather details by providing the location name or
coordinates. Weather information
    will be provided using a custom Tool and open-meteo API.

    Example queries:
    - What's the weather like in New York?
    - Current weather for latitude 40.70, longitude -74.01
    - Is it warmer in Rome or Barcelona today?

    To exit the program, simply type 'x' and press Enter.

    P.S.: You're not limited to single locations, or even to using English!
    Have fun and experiment with the app!
    ");
}

/// <summary>
/// Logs the footer information for the tool use demo.
/// </summary>

```

```

public static void PrintFooter()
{
    Console.WriteLine(@"
=====
Thank you for checking out the Amazon Bedrock Tool Use demo. We hope you
learned something new, or got some inspiration for your own apps today!

For more Bedrock examples in different programming languages, have a look
at:
    https://docs.aws.amazon.com/bedrock/latest/userguide/
service_code_examples.html
=====
");
}

/// <summary>
/// Logs information about the tool use.
/// </summary>
/// <param name="toolName">The name of the tool being used.</param>
/// <param name="inputData">The input data for the tool.</param>
public static void PrintToolUse(string toolName, Dictionary<string, Document>
inputData)
{
    Console.WriteLine($"\\n\\tInvoking tool: {toolName} with input:
{inputData["latitude"].ToString()}, {inputData["longitude"].ToString()}...\\n");
}

/// <summary>
/// Logs the model's response.
/// </summary>
/// <param name="message">The model's response message.</param>
public static void PrintModelResponse(string message)
{
    Console.WriteLine("\\tThe model's response:\\n");
    Console.WriteLine(message);
    Console.WriteLine();
}
}

```

示範時使用的天氣工具。此檔案定義工具規格，並實作邏輯，以從 Open-Meteo API 用來擷取天氣資料。

```

using Amazon.BedrockRuntime.Model;
using Amazon.Runtime.Documents;
using Microsoft.Extensions.Logging;

namespace ConverseToolScenario;

/// <summary>
/// Weather tool that will be invoked when requested by the Bedrock response.
/// </summary>
public class WeatherTool
{
    private readonly ILogger<WeatherTool> _logger;
    private readonly IHttpClientFactory _httpClientFactory;

    public WeatherTool(ILogger<WeatherTool> logger, IHttpClientFactory
httpClientFactory)
    {
        _logger = logger;
        _httpClientFactory = httpClientFactory;
    }

    /// <summary>
    /// Returns the JSON Schema specification for the Weather tool. The tool
specification
    /// defines the input schema and describes the tool's functionality.
    /// For more information, see https://json-schema.org/understanding-json-schema/
reference.
    /// </summary>
    /// <returns>The tool specification for the Weather tool.</returns>
    public ToolSpecification GetToolSpec()
    {
        ToolSpecification toolSpecification = new ToolSpecification();

        toolSpecification.Name = "Weather_Tool";
        toolSpecification.Description = "Get the current weather for a given
location, based on its WGS84 coordinates.";

        Document toolSpecDocument = Document.FromObject(
            new
            {
                type = "object",
                properties = new

```

```

        {
            latitude = new
            {
                type = "string",
                description = "Geographical WGS84 latitude of the location."
            },
            longitude = new
            {
                type = "string",
                description = "Geographical WGS84 longitude of the
location."
            }
        },
        required = new[] { "latitude", "longitude" }
    });

    toolSpecification.InputSchema = new ToolInputSchema() { Json =
toolSpecDocument };
    return toolSpecification;
}

/// <summary>
/// Fetches weather data for the given latitude and longitude using the Open-
Meteo API.
/// Returns the weather data or an error message if the request fails.
/// </summary>
/// <param name="latitude">The latitude of the location.</param>
/// <param name="longitude">The longitude of the location.</param>
/// <returns>The weather data or an error message.</returns>
public async Task<Document> FetchWeatherDataAsync(string latitude, string
longitude)
{
    string endpoint = "https://api.open-meteo.com/v1/forecast";

    try
    {
        var httpClient = _httpClientFactory.CreateClient();
        var response = await httpClient.GetAsync($"{endpoint}?
latitude={latitude}&longitude={longitude}&current_weather=True");
        response.EnsureSuccessStatusCode();
        var weatherData = await response.Content.ReadAsStringAsync();

        Document weatherDocument = Document.FromObject(
            new { weather_data = weatherData });
    }
}

```

```

        return weatherDocument;
    }
    catch (HttpRequestException e)
    {
        _logger.LogError(e, "Error fetching weather data: {Message}",
e.Message);
        throw;
    }
    catch (Exception e)
    {
        _logger.LogError(e, "Unexpected error fetching weather data: {Message}",
e.Message);
        throw;
    }
}
}

```

具有工具組態的 Converse API 動作。

```

/// <summary>
/// Wrapper class for interacting with the Amazon Bedrock Converse API.
/// </summary>
public class BedrockActionsWrapper
{
    private readonly IAmazonBedrockRuntime _bedrockClient;
    private readonly ILogger<BedrockActionsWrapper> _logger;

    /// <summary>
    /// Initializes a new instance of the <see cref="BedrockActionsWrapper"/> class.
    /// </summary>
    /// <param name="bedrockClient">The Bedrock Converse API client.</param>
    /// <param name="logger">The logger instance.</param>
    public BedrockActionsWrapper(IAmazonBedrockRuntime bedrockClient,
    ILogger<BedrockActionsWrapper> logger)
    {
        _bedrockClient = bedrockClient;
        _logger = logger;
    }

    /// <summary>

```

```

    /// Sends a Converse request to the Amazon Bedrock Converse API.
    /// </summary>
    /// <param name="modelId">The Bedrock Model Id.</param>
    /// <param name="systemPrompt">A system prompt instruction.</param>
    /// <param name="conversation">The array of messages in the conversation.</
param>
    /// <param name="toolSpec">The specification for a tool.</param>
    /// <returns>The response of the model.</returns>
    public async Task<ConverseResponse> SendConverseRequestAsync(string modelId,
string systemPrompt, List<Message> conversation, ToolSpecification toolSpec)
    {
        try
        {
            var request = new ConverseRequest()
            {
                ModelId = modelId,
                System = new List<SystemContentBlock>()
                {
                    new SystemContentBlock()
                    {
                        Text = systemPrompt
                    }
                },
                Messages = conversation,
                ToolConfig = new ToolConfiguration()
                {
                    Tools = new List<Tool>()
                    {
                        new Tool()
                        {
                            ToolSpec = toolSpec
                        }
                    }
                }
            };

            var response = await _bedrockClient.ConverseAsync(request);

            return response;
        }
        catch (ModelNotReadyException ex)
        {
            _logger.LogError(ex, "Model not ready, please wait and try again.");
            throw;
        }
    }

```

```
    }  
    catch (AmazonBedrockRuntimeException ex)  
    {  
        _logger.LogError(ex, "Error occurred while sending Converse request.");  
        throw;  
    }  
}  
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [Converse](#)。

Amazon Nova Canvas

InvokeModel

下列程式碼範例示範如何在 Amazon Bedrock 上調用 Amazon Nova Canvas 來產生映像。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

使用 Amazon Nova Canvas 建立映像。

```
// Use the native inference API to create an image with Amazon Nova Canvas.  
  
using System;  
using System.IO;  
using System.Text.Json;  
using System.Text.Json.Nodes;  
using Amazon;  
using Amazon.BedrockRuntime;  
using Amazon.BedrockRuntime.Model;  
  
// Create a Bedrock Runtime client in the AWS Region you want to use.  
var client = new AmazonBedrockRuntimeClient(RegionEndpoint.USEast1);  
  
// Set the model ID.
```

```
var modelId = "amazon.nova-canvas-v1:0";

// Define the image generation prompt for the model.
var prompt = "A stylized picture of a cute old steampunk robot.";

// Create a random seed between 0 and 858,993,459
int seed = new Random().Next(0, 858993460);

//Format the request payload using the model's native structure.
var nativeRequest = JsonSerializer.Serialize(new
{
    taskType = "TEXT_IMAGE",
    textToImageParams = new
    {
        text = prompt
    },
    imageGenerationConfig = new
    {
        seed,
        quality = "standard",
        width = 512,
        height = 512,
        numberOfImages = 1
    }
});

// Create a request with the model ID and the model's native request payload.
var request = new InvokeModelRequest()
{
    ModelId = modelId,
    Body = new MemoryStream(System.Text.Encoding.UTF8.GetBytes(nativeRequest)),
    ContentType = "application/json"
};

try
{
    // Send the request to the Bedrock Runtime and wait for the response.
    var response = await client.InvokeModelAsync(request);

    // Decode the response body.
    var modelResponse = await JsonNode.ParseAsync(response.Body);

    // Extract the image data.
    var base64Image = modelResponse["images"]?[0].ToString() ?? "";
```



```
// Save the image in a local folder
string savedPath = AmazonNovaCanvas.InvokeModel.SaveBase64Image(base64Image);
Console.WriteLine($"Image saved to: {savedPath}");
}
catch (AmazonBedrockRuntimeException e)
{
    Console.WriteLine($"ERROR: Can't invoke '{modelId}'. Reason: {e.Message}");
    throw;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [InvokeModel](#)。

Anthropic Claude

InvokeModelWithResponseStream

下列程式碼範例示範如何使用調用模型 API 將文字訊息傳送至 Anthropic Claude 模型，並列印回應串流。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

使用調用模型 API 傳送文字訊息，並即時處理回應串流。

```
// Use the native inference API to send a text message to Anthropic Claude
// and print the response stream.

using System;
using System.IO;
using System.Text.Json;
using System.Text.Json.Nodes;
using Amazon;
using Amazon.BedrockRuntime;
using Amazon.BedrockRuntime.Model;
```

```
// Create a Bedrock Runtime client in the AWS Region you want to use.
var client = new AmazonBedrockRuntimeClient(RegionEndpoint.USEast1);

// Set the model ID, e.g., Claude 3 Haiku.
var modelId = "anthropic.claude-3-haiku-20240307-v1:0";

// Define the user message.
var userMessage = "Describe the purpose of a 'hello world' program in one line.";

//Format the request payload using the model's native structure.
var nativeRequest = JsonSerializer.Serialize(new
{
    anthropic_version = "bedrock-2023-05-31",
    max_tokens = 512,
    temperature = 0.5,
    messages = new[]
    {
        new { role = "user", content = userMessage }
    }
});

// Create a request with the model ID, the user message, and an inference
// configuration.
var request = new InvokeModelWithResponseStreamRequest()
{
    ModelId = modelId,
    Body = new MemoryStream(System.Text.Encoding.UTF8.GetBytes(nativeRequest)),
    ContentType = "application/json"
};

try
{
    // Send the request to the Bedrock Runtime and wait for the response.
    var streamingResponse = await
        client.InvokeModelWithResponseStreamAsync(request);

    // Extract and print the streamed response text in real-time.
    foreach (var item in streamingResponse.Body)
    {
        var chunk = JsonSerializer.Deserialize<JsonObject>((item as
            PayloadPart).Bytes);
        var text = chunk["delta"]?["text"] ?? "";
        Console.Write(text);
    }
}
```

```
    }  
}  
catch (AmazonBedrockRuntimeException e)  
{  
    Console.WriteLine($"ERROR: Can't invoke '{modelId}'. Reason: {e.Message}");  
    throw;  
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [InvokeModelWithResponseStream](#)。

Cohere Command

InvokeModel : Command R 和 R+

下列程式碼範例示範如何使用調用模型 API，將文字訊息傳送至 Cohere Command R 和 R+。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

使用調用模型 API 傳送文字訊息。

```
// Use the native inference API to send a text message to Cohere Command R.  
  
using System;  
using System.IO;  
using System.Text.Json;  
using System.Text.Json.Nodes;  
using Amazon;  
using Amazon.BedrockRuntime;  
using Amazon.BedrockRuntime.Model;  
  
// Create a Bedrock Runtime client in the AWS Region you want to use.  
var client = new AmazonBedrockRuntimeClient(RegionEndpoint.USEast1);
```

```
// Set the model ID, e.g., Command R.
var modelId = "cohere.command-r-v1:0";

// Define the user message.
var userMessage = "Describe the purpose of a 'hello world' program in one line.";

//Format the request payload using the model's native structure.
var nativeRequest = JsonSerializer.Serialize(new
{
    message = userMessage,
    max_tokens = 512,
    temperature = 0.5
});

// Create a request with the model ID and the model's native request payload.
var request = new InvokeModelRequest()
{
    ModelId = modelId,
    Body = new MemoryStream(System.Text.Encoding.UTF8.GetBytes(nativeRequest)),
    ContentType = "application/json"
};

try
{
    // Send the request to the Bedrock Runtime and wait for the response.
    var response = await client.InvokeModelAsync(request);

    // Decode the response body.
    var modelResponse = await JsonNode.ParseAsync(response.Body);

    // Extract and print the response text.
    var responseText = modelResponse["text"] ?? "";
    Console.WriteLine(responseText);
}
catch (AmazonBedrockRuntimeException e)
{
    Console.WriteLine($"ERROR: Can't invoke '{modelId}'. Reason: {e.Message}");
    throw;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [InvokeModel](#)。

InvokeModelWithResponseStream : Command R 和 R+

下列程式碼範例示範如何使用調用模型 API 和回應串流，將文字訊息傳送至 Cohere Command。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

使用調用模型 API 傳送文字訊息，並即時處理回應串流。

```
// Use the native inference API to send a text message to Cohere Command R
// and print the response stream.

using System;
using System.IO;
using System.Text.Json;
using System.Text.Json.Nodes;
using Amazon;
using Amazon.BedrockRuntime;
using Amazon.BedrockRuntime.Model;

// Create a Bedrock Runtime client in the AWS Region you want to use.
var client = new AmazonBedrockRuntimeClient(RegionEndpoint.USEast1);

// Set the model ID, e.g., Command R.
var modelId = "cohere.command-r-v1:0";

// Define the user message.
var userMessage = "Describe the purpose of a 'hello world' program in one line.";

//Format the request payload using the model's native structure.
var nativeRequest = JsonSerializer.Serialize(new
{
    message = userMessage,
    max_tokens = 512,
    temperature = 0.5
});

// Create a request with the model ID and the model's native request payload.
```

```
var request = new InvokeModelWithResponseStreamRequest()
{
    ModelId = modelId,
    Body = new MemoryStream(System.Text.Encoding.UTF8.GetBytes(nativeRequest)),
    ContentType = "application/json"
};

try
{
    // Send the request to the Bedrock Runtime and wait for the response.
    var streamingResponse = await
        client.InvokeModelWithResponseStreamAsync(request);

    // Extract and print the streamed response text in real-time.
    foreach (var item in streamingResponse.Body)
    {
        var chunk = JsonSerializer.Deserialize<JsonObject>((item as
            PayloadPart).Bytes);
        var text = chunk["text"] ?? "";
        Console.Write(text);
    }
}
catch (AmazonBedrockRuntimeException e)
{
    Console.WriteLine($"ERROR: Can't invoke '{modelId}'. Reason: {e.Message}");
    throw;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [InvokeModel](#)。

Meta Llama

InvokeModel

下列程式碼範例示範如何使用調用模型 API，將文字訊息傳送至 Meta Llama。

適用於 .NET 的 SDK

 Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

使用調用模型 API 傳送文字訊息。

```
// Use the native inference API to send a text message to Meta Llama 3.

using System;
using System.IO;
using System.Text.Json;
using System.Text.Json.Nodes;
using Amazon;
using Amazon.BedrockRuntime;
using Amazon.BedrockRuntime.Model;

// Create a Bedrock Runtime client in the AWS Region you want to use.
var client = new AmazonBedrockRuntimeClient(RegionEndpoint.USWest2);

// Set the model ID, e.g., Llama 3 70b Instruct.
var modelId = "meta.llama3-70b-instruct-v1:0";

// Define the prompt for the model.
var prompt = "Describe the purpose of a 'hello world' program in one line.";

// Embed the prompt in Llama 2's instruction format.
var formattedPrompt = $"
<|begin_of_text|><|start_header_id|>user<|end_header_id|>
{prompt}
<|eot_id|>
<|start_header_id|>assistant<|end_header_id|>
";

//Format the request payload using the model's native structure.
var nativeRequest = JsonSerializer.Serialize(new
{
    prompt = formattedPrompt,
    max_gen_len = 512,
    temperature = 0.5
});
```

```
});

// Create a request with the model ID and the model's native request payload.
var request = new InvokeModelRequest()
{
    ModelId = modelId,
    Body = new MemoryStream(System.Text.Encoding.UTF8.GetBytes(nativeRequest)),
    ContentType = "application/json"
};

try
{
    // Send the request to the Bedrock Runtime and wait for the response.
    var response = await client.InvokeModelAsync(request);

    // Decode the response body.
    var modelResponse = await JsonNode.ParseAsync(response.Body);

    // Extract and print the response text.
    var responseText = modelResponse["generation"] ?? "";
    Console.WriteLine(responseText);
}
catch (AmazonBedrockRuntimeException e)
{
    Console.WriteLine($"ERROR: Can't invoke '{modelId}'. Reason: {e.Message}");
    throw;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [InvokeModel](#)。

InvokeModelWithResponseStream

下列程式碼範例示範如何使用調用模型 API 將文字訊息傳送至 Meta Llama，並列印回應串流。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

使用調用模型 API 傳送文字訊息，並即時處理回應串流。

```
// Use the native inference API to send a text message to Meta Llama 3
// and print the response stream.

using System;
using System.IO;
using System.Text.Json;
using System.Text.Json.Nodes;
using Amazon;
using Amazon.BedrockRuntime;
using Amazon.BedrockRuntime.Model;

// Create a Bedrock Runtime client in the AWS Region you want to use.
var client = new AmazonBedrockRuntimeClient(RegionEndpoint.USWest2);

// Set the model ID, e.g., Llama 3 70b Instruct.
var modelId = "meta.llama3-70b-instruct-v1:0";

// Define the prompt for the model.
var prompt = "Describe the purpose of a 'hello world' program in one line.";

// Embed the prompt in Llama 2's instruction format.
var formattedPrompt = $"
<|begin_of_text|><|start_header_id|>user<|end_header_id|>
{prompt}
<|eot_id|>
<|start_header_id|>assistant<|end_header_id|>
";

//Format the request payload using the model's native structure.
var nativeRequest = JsonSerializer.Serialize(new
{
    prompt = formattedPrompt,
    max_gen_len = 512,
    temperature = 0.5
});

// Create a request with the model ID and the model's native request payload.
var request = new InvokeModelWithResponseStreamRequest()
{
    ModelId = modelId,
    Body = new MemoryStream(System.Text.Encoding.UTF8.GetBytes(nativeRequest)),
    ContentType = "application/json"
```

```
};

try
{
    // Send the request to the Bedrock Runtime and wait for the response.
    var streamingResponse = await
    client.InvokeModelWithResponseStreamAsync(request);

    // Extract and print the streamed response text in real-time.
    foreach (var item in streamingResponse.Body)
    {
        var chunk = JsonSerializer.Deserialize<JsonObject>((item as
        PayloadPart).Bytes);
        var text = chunk["generation"] ?? "";
        Console.Write(text);
    }
}
catch (AmazonBedrockRuntimeException e)
{
    Console.WriteLine($"ERROR: Can't invoke '{modelId}'. Reason: {e.Message}");
    throw;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [InvokeModelWithResponseStream](#)。

Mistral AI

InvokeModel

下列程式碼範例示範如何使用調用模型 API，將文字訊息傳送至 Mistral 模型。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

使用調用模型 API 傳送文字訊息。

```
// Use the native inference API to send a text message to Mistral.

using System;
using System.IO;
using System.Text.Json;
using System.Text.Json.Nodes;
using Amazon;
using Amazon.BedrockRuntime;
using Amazon.BedrockRuntime.Model;

// Create a Bedrock Runtime client in the AWS Region you want to use.
var client = new AmazonBedrockRuntimeClient(RegionEndpoint.USEast1);

// Set the model ID, e.g., Mistral Large.
var modelId = "mistral.mistral-large-2402-v1:0";

// Define the prompt for the model.
var prompt = "Describe the purpose of a 'hello world' program in one line.";

// Embed the prompt in Mistral's instruction format.
var formattedPrompt = $"<s>[INST] {prompt} [/INST]";

//Format the request payload using the model's native structure.
var nativeRequest = JsonSerializer.Serialize(new
{
    prompt = formattedPrompt,
    max_tokens = 512,
    temperature = 0.5
});

// Create a request with the model ID and the model's native request payload.
var request = new InvokeModelRequest()
{
    ModelId = modelId,
    Body = new MemoryStream(System.Text.Encoding.UTF8.GetBytes(nativeRequest)),
    ContentType = "application/json"
};

try
{
    // Send the request to the Bedrock Runtime and wait for the response.
    var response = await client.InvokeModelAsync(request);
}
```

```
// Decode the response body.
var modelResponse = await JsonNode.ParseAsync(response.Body);

// Extract and print the response text.
var responseText = modelResponse["outputs"]?[0]?["text"] ?? "";
Console.WriteLine(responseText);
}
catch (AmazonBedrockRuntimeException e)
{
    Console.WriteLine($"ERROR: Can't invoke '{modelId}'. Reason: {e.Message}");
    throw;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [InvokeModel](#)。

InvokeModelWithResponseStream

下列程式碼範例示範如何使用調用模型 API 將文字訊息傳送至 Mistral AI 模型，並列印回應串流。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

使用調用模型 API 傳送文字訊息，並即時處理回應串流。

```
// Use the native inference API to send a text message to Mistral
// and print the response stream.

using System;
using System.IO;
using System.Text.Json;
using System.Text.Json.Nodes;
using Amazon;
using Amazon.BedrockRuntime;
using Amazon.BedrockRuntime.Model;
```

```
// Create a Bedrock Runtime client in the AWS Region you want to use.
var client = new AmazonBedrockRuntimeClient(RegionEndpoint.USEast1);

// Set the model ID, e.g., Mistral Large.
var modelId = "mistral.mistral-large-2402-v1:0";

// Define the prompt for the model.
var prompt = "Describe the purpose of a 'hello world' program in one line.";

// Embed the prompt in Mistral's instruction format.
var formattedPrompt = $"<s>[INST] {prompt} [/INST]";

//Format the request payload using the model's native structure.
var nativeRequest = JsonSerializer.Serialize(new
{
    prompt = formattedPrompt,
    max_tokens = 512,
    temperature = 0.5
});

// Create a request with the model ID and the model's native request payload.
var request = new InvokeModelWithResponseStreamRequest()
{
    ModelId = modelId,
    Body = new MemoryStream(System.Text.Encoding.UTF8.GetBytes(nativeRequest)),
    ContentType = "application/json"
};

try
{
    // Send the request to the Bedrock Runtime and wait for the response.
    var streamingResponse = await
        client.InvokeModelWithResponseStreamAsync(request);

    // Extract and print the streamed response text in real-time.
    foreach (var item in streamingResponse.Body)
    {
        var chunk = JsonSerializer.Deserialize<JsonObject>((item as
        PayloadPart).Bytes);
        var text = chunk["outputs"]?[0]?["text"] ?? "";
        Console.Write(text);
    }
}
```

```
catch (AmazonBedrockRuntimeException e)
{
    Console.WriteLine($"ERROR: Can't invoke '{modelId}'. Reason: {e.Message}");
    throw;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [InvokeModelWithResponseStream](#)。

使用的 CloudWatch Logs 範例 適用於 .NET 的 SDK

下列程式碼範例示範如何使用 適用於 .NET 的 AWS SDK 搭配 CloudWatch Logs 執行動作和實作常見案例。

Actions 是大型程式的程式碼摘錄，必須在內容中執行。雖然動作會告訴您如何呼叫個別服務函數，但您可以在其相關情境中查看內容中的動作。

每個範例均包含完整原始碼的連結，您可在連結中找到如何設定和執行內容中程式碼的相關指示。

主題

- [動作](#)

動作

AssociateKmsKey

以下程式碼範例顯示如何使用 AssociateKmsKey。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
using System;
```

```
using System.Threading.Tasks;
using Amazon.CloudWatchLogs;
using Amazon.CloudWatchLogs.Model;

/// <summary>
/// Shows how to associate an AWS Key Management Service (AWS KMS) key with
/// an Amazon CloudWatch Logs log group.
/// </summary>
public class AssociateKmsKey
{
    public static async Task Main()
    {
        // This client object will be associated with the same AWS Region
        // as the default user on this system. If you need to use a
        // different AWS Region, pass it as a parameter to the client
        // constructor.
        var client = new AmazonCloudWatchLogsClient();

        string kmsKeyId = "arn:aws:kms:us-west-2:<account-
number>:key/7c9eccc2-38cb-4c4f-9db3-766ee8dd3ad4";
        string groupName = "cloudwatchlogs-example-loggroup";

        var request = new AssociateKmsKeyRequest
        {
            KmsKeyId = kmsKeyId,
            LogGroupName = groupName,
        };

        var response = await client.AssociateKmsKeyAsync(request);

        if (response.HttpStatusCode == System.Net.HttpStatusCode.OK)
        {
            Console.WriteLine($"Successfully associated KMS key ID: {kmsKeyId}
with log group: {groupName}.");
        }
        else
        {
            Console.WriteLine("Could not make the association between:
{kmsKeyId} and {groupName}.");
        }
    }
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [AssociateKmsKey](#)。

CancelExportTask

以下程式碼範例顯示如何使用 CancelExportTask。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
using System;
using System.Threading.Tasks;
using Amazon.CloudWatchLogs;
using Amazon.CloudWatchLogs.Model;

/// <summary>
/// Shows how to cancel an Amazon CloudWatch Logs export task.
/// </summary>
public class CancelExportTask
{
    public static async Task Main()
    {
        // This client object will be associated with the same AWS Region
        // as the default user on this system. If you need to use a
        // different AWS Region, pass it as a parameter to the client
        // constructor.
        var client = new AmazonCloudWatchLogsClient();
        string taskId = "exampleTaskId";

        var request = new CancelExportTaskRequest
        {
            TaskId = taskId,
        };

        var response = await client.CancelExportTaskAsync(request);
```



```
        if (response.HttpStatusCode == System.Net.HttpStatusCode.OK)
        {
            Console.WriteLine($"{taskId} successfully canceled.");
        }
        else
        {
            Console.WriteLine($"{taskId} could not be canceled.");
        }
    }
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [CancelExportTask](#)。

CreateExportTask

以下程式碼範例顯示如何使用 CreateExportTask。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
using System;
using System.Threading.Tasks;
using Amazon.CloudWatchLogs;
using Amazon.CloudWatchLogs.Model;

/// <summary>
/// Shows how to create an Export Task to export the contents of the Amazon
/// CloudWatch Logs to the specified Amazon Simple Storage Service (Amazon S3)
/// bucket.
/// </summary>
public class CreateExportTask
{
    public static async Task Main()
```

```
{
    // This client object will be associated with the same AWS Region
    // as the default user on this system. If you need to use a
    // different AWS Region, pass it as a parameter to the client
    // constructor.
    var client = new AmazonCloudWatchLogsClient();
    string taskName = "export-task-example";
    string logGroupName = "cloudwatchlogs-example-loggroup";
    string destination = "amzn-s3-demo-bucket";
    var fromTime = 1437584472382;
    var toTime = 1437584472833;

    var request = new CreateExportTaskRequest
    {
        From = fromTime,
        To = toTime,
        TaskName = taskName,
        LogGroupName = logGroupName,
        Destination = destination,
    };

    var response = await client.CreateExportTaskAsync(request);

    if (response.HttpStatusCode == System.Net.HttpStatusCode.OK)
    {
        Console.WriteLine($"The task, {taskName} with ID: " +
            $"{response.TaskId} has been created
successfully.");
    }
}
```

- 如需 API 詳細資訊，請參閱適用於 .NET 的 AWS SDK API 參考中的 [CreateExportTask](#)。

CreateLogGroup

以下程式碼範例顯示如何使用 CreateLogGroup。

適用於 .NET 的 SDK

 Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
using System;
using System.Threading.Tasks;
using Amazon.CloudWatchLogs;
using Amazon.CloudWatchLogs.Model;

/// <summary>
/// Shows how to create an Amazon CloudWatch Logs log group.
/// </summary>
public class CreateLogGroup
{
    public static async Task Main()
    {
        // This client object will be associated with the same AWS Region
        // as the default user on this system. If you need to use a
        // different AWS Region, pass it as a parameter to the client
        // constructor.
        var client = new AmazonCloudWatchLogsClient();

        string logGroupName = "cloudwatchlogs-example-loggroup";

        var request = new CreateLogGroupRequest
        {
            LogGroupName = logGroupName,
        };

        var response = await client.CreateLogGroupAsync(request);

        if (response.HttpStatusCode == System.Net.HttpStatusCode.OK)
        {
            Console.WriteLine($"Successfully create log group with ID:
{logGroupName}.");
        }
        else
        {

```

```
        Console.WriteLine("Could not create log group.");  
    }  
}  
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [CreateLogGroup](#)。

CreateLogStream

以下程式碼範例顯示如何使用 CreateLogStream。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
using System;  
using System.Threading.Tasks;  
using Amazon.CloudWatchLogs;  
using Amazon.CloudWatchLogs.Model;  
  
/// <summary>  
/// Shows how to create an Amazon CloudWatch Logs stream for a CloudWatch  
/// log group.  
/// </summary>  
public class CreateLogStream  
{  
    public static async Task Main()  
    {  
        // This client object will be associated with the same AWS Region  
        // as the default user on this system. If you need to use a  
        // different AWS Region, pass it as a parameter to the client  
        // constructor.  
        var client = new AmazonCloudWatchLogsClient();  
        string logGroupName = "cloudwatchlogs-example-loggroup";  
        string logStreamName = "cloudwatchlogs-example-logstream";  
    }  
}
```

```
var request = new CreateLogStreamRequest
{
    LogGroupName = logGroupName,
    LogStreamName = logStreamName,
};

var response = await client.CreateLogStreamAsync(request);

if (response.HttpStatusCode == System.Net.HttpStatusCode.OK)
{
    Console.WriteLine($"{logStreamName} successfully created for
{logGroupName}.");
}
else
{
    Console.WriteLine("Could not create stream.");
}
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [CreateLogStream](#)。

DeleteLogGroup

以下程式碼範例顯示如何使用 DeleteLogGroup。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
using System;
using System.Threading.Tasks;
using Amazon.CloudWatchLogs;
using Amazon.CloudWatchLogs.Model;

/// <summary>
```

```
/// Uses the Amazon CloudWatch Logs Service to delete an existing
/// CloudWatch Logs log group.
/// </summary>
public class DeleteLogGroup
{
    public static async Task Main()
    {
        var client = new AmazonCloudWatchLogsClient();
        string logGroupName = "cloudwatchlogs-example-loggroup";

        var request = new DeleteLogGroupRequest
        {
            LogGroupName = logGroupName,
        };

        var response = await client.DeleteLogGroupAsync(request);

        if (response.HttpStatusCode == System.Net.HttpStatusCode.OK)
        {
            Console.WriteLine($"Successfully deleted CloudWatch log group,
{logGroupName}.");
        }
    }
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [DeleteLogGroup](#)。

DescribeExportTasks

以下程式碼範例顯示如何使用 DescribeExportTasks。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
using System;
```

```
using System.Threading.Tasks;
using Amazon.CloudWatchLogs;
using Amazon.CloudWatchLogs.Model;

/// <summary>
/// Shows how to retrieve a list of information about Amazon CloudWatch
/// Logs export tasks.
/// </summary>
public class DescribeExportTasks
{
    public static async Task Main()
    {
        // This client object will be associated with the same AWS Region
        // as the default user on this system. If you need to use a
        // different AWS Region, pass it as a parameter to the client
        // constructor.
        var client = new AmazonCloudWatchLogsClient();

        var request = new DescribeExportTasksRequest
        {
            Limit = 5,
        };

        var response = new DescribeExportTasksResponse();

        do
        {
            response = await client.DescribeExportTasksAsync(request);
            response.ExportTasks.ForEach(t =>
            {
                Console.WriteLine($"{t.TaskName} with ID: {t.TaskId} has status:
{t.Status}");
            });
        } while (response.NextToken is not null);
    }
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [DescribeExportTasks](#)。

DescribeLogGroups

以下程式碼範例顯示如何使用 DescribeLogGroups。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
using System;
using System.Threading.Tasks;
using Amazon.CloudWatchLogs;
using Amazon.CloudWatchLogs.Model;

/// <summary>
/// Retrieves information about existing Amazon CloudWatch Logs log groups
/// and displays the information on the console.
/// </summary>
public class DescribeLogGroups
{
    public static async Task Main()
    {
        // Creates a CloudWatch Logs client using the default
        // user. If you need to work with resources in another
        // AWS Region than the one defined for the default user,
        // pass the AWS Region as a parameter to the client constructor.
        var client = new AmazonCloudWatchLogsClient();

        bool done = false;
        string newToken = null;

        var request = new DescribeLogGroupsRequest
        {
            Limit = 5,
        };

        DescribeLogGroupsResponse response;

        do
        {
```



```
        if (newToken is not null)
        {
            request.NextToken = newToken;
        }

        response = await client.DescribeLogGroupsAsync(request);

        response.LogGroups.ForEach(lg =>
        {
            Console.WriteLine($"{lg.LogGroupName} is associated with the
key: {lg.KmsKeyId}.");
            Console.WriteLine($"Created on: {lg.CreationTime.Date.Date}");
            Console.WriteLine($"Date for this group will be stored for:
{lg.RetentionInDays} days.\n");
        });

        if (response.NextToken is null)
        {
            done = true;
        }
        else
        {
            newToken = response.NextToken;
        }
    }
    while (!done);
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [DescribeLogGroups](#)。

StartLiveTail

以下程式碼範例顯示如何使用 StartLiveTail。

適用於 .NET 的 SDK

包括必需的檔案。

```
using Amazon;
using Amazon.CloudWatchLogs;
```

```
using Amazon.CloudWatchLogs.Model;
```

開始 Live Tail 工作階段。

```
var client = new AmazonCloudWatchLogsClient();
var request = new StartLiveTailRequest
{
    LogGroupIdentifiers = logGroupIdentifiers,
    LogStreamNames = logStreamNames,
    LogEventFilterPattern = filterPattern,
};

var response = await client.StartLiveTailAsync(request);

// Catch if request fails
if (response.HttpStatusCode != System.Net.HttpStatusCode.OK)
{
    Console.WriteLine("Failed to start live tail session");
    return;
}
```

您可以透過兩種方式處理 Live Tail 工作階段中的事件：

```
/* Method 1
 * 1). Asynchronously loop through the event stream
 * 2). Set a timer to dispose the stream and stop the Live Tail session
at the end.
*/
var eventStream = response.ResponseStream;
var task = Task.Run(() =>
{
    foreach (var item in eventStream)
    {
        if (item is LiveTailSessionUpdate liveTailSessionUpdate)
        {
            foreach (var sessionResult in
liveTailSessionUpdate.SessionResults)
            {
                Console.WriteLine("Message : {0}",
sessionResult.Message);
            }
        }
    }
}
```

```

    }
    if (item is LiveTailSessionStart)
    {
        Console.WriteLine("Live Tail session started");
    }
    // On-stream exceptions are processed here
    if (item is CloudWatchLogsEventStreamException)
    {
        Console.WriteLine($"ERROR: {item}");
    }
}
});
// Close the stream to stop the session after a timeout
if (!task.Wait(TimeSpan.FromSeconds(10))){
    eventStream.Dispose();
    Console.WriteLine("End of line");
}

```

```

/* Method 2
 * 1). Add event handlers to each event variable
 * 2). Start processing the stream and wait for a timeout using
AutoResetEvent
*/
AutoResetEvent endEvent = new AutoResetEvent(false);
var eventStream = response.ResponseStream;
using (eventStream) // automatically disposes the stream to stop the
session after execution finishes
{
    eventStream.SessionStartReceived += (sender, e) =>
    {
        Console.WriteLine("LiveTail session started");
    };
    eventStream.SessionUpdateReceived += (sender, e) =>
    {
        foreach (LiveTailSessionLogEvent logEvent in
e.EventStreamEvent.SessionResults){
            Console.WriteLine("Message: {0}", logEvent.Message);
        }
    };
    // On-stream exceptions are captured here
    eventStream.ExceptionReceived += (sender, e) =>
    {

```

```
        Console.WriteLine($"ERROR: {e.EventStreamException.Message}");
    };

    eventStream.StartProcessing();
    // Stream events for this amount of time.
    endEvent.WaitOne(TimeSpan.FromSeconds(10));
    Console.WriteLine("End of line");
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [StartLiveTail](#)。

使用的 Amazon Cognito 身分提供者範例 適用於 .NET 的 SDK

下列程式碼範例示範如何使用 適用於 .NET 的 AWS SDK 搭配 Amazon Cognito Identity Provider 執行動作和實作常見案例。

Actions 是大型程式的程式碼摘錄，必須在內容中執行。雖然動作會告訴您如何呼叫個別服務函數，但您可以在其相關情境中查看內容中的動作。

案例是向您展示如何呼叫服務中的多個函數或與其他 AWS 服務組合來完成特定任務的程式碼範例。

每個範例均包含完整原始碼的連結，您可在連結中找到如何設定和執行內容中程式碼的相關指示。

主題

- [動作](#)
- [案例](#)

動作

AdminGetUser

以下程式碼範例顯示如何使用 AdminGetUser。

適用於 .NET 的 SDK

 Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Get the specified user from an Amazon Cognito user pool with administrator
access.
/// </summary>
/// <param name="userName">The name of the user.</param>
/// <param name="poolId">The Id of the Amazon Cognito user pool.</param>
/// <returns>Async task.</returns>
public async Task<UserStatusType> GetAdminUserAsync(string userName, string
poolId)
{
    AdminGetUserRequest userRequest = new AdminGetUserRequest
    {
        Username = userName,
        UserPoolId = poolId,
    };

    var response = await _cognitoService.AdminGetUserAsync(userRequest);

    Console.WriteLine($"User status {response.UserStatus}");
    return response.UserStatus;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [AdminGetUser](#)。

AdminInitiateAuth

以下程式碼範例顯示如何使用 AdminInitiateAuth。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Initiate an admin auth request.
/// </summary>
/// <param name="clientId">The client ID to use.</param>
/// <param name="userPoolId">The ID of the user pool.</param>
/// <param name="userName">The username to authenticate.</param>
/// <param name="password">The user's password.</param>
/// <returns>The session to use in challenge-response.</returns>
public async Task<string> AdminInitiateAuthAsync(string clientId, string
userPoolId, string userName, string password)
{
    var authParameters = new Dictionary<string, string>();
    authParameters.Add("USERNAME", userName);
    authParameters.Add("PASSWORD", password);

    var request = new AdminInitiateAuthRequest
    {
        ClientId = clientId,
        UserPoolId = userPoolId,
        AuthParameters = authParameters,
        AuthFlow = AuthFlowType.ADMIN_USER_PASSWORD_AUTH,
    };

    var response = await _cognitoService.AdminInitiateAuthAsync(request);
    return response.Session;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [AdminInitiateAuth](#)。

AdminRespondToAuthChallenge

以下程式碼範例顯示如何使用 AdminRespondToAuthChallenge。

適用於 .NET 的 SDK

 Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Respond to an admin authentication challenge.
/// </summary>
/// <param name="userName">The name of the user.</param>
/// <param name="clientId">The client ID.</param>
/// <param name="mfaCode">The multi-factor authentication code.</param>
/// <param name="session">The current application session.</param>
/// <param name="clientId">The user pool ID.</param>
/// <returns>The result of the authentication response.</returns>
public async Task<AuthenticationResultType> AdminRespondToAuthChallengeAsync(
    string userName,
    string clientId,
    string mfaCode,
    string session,
    string userPoolId)
{
    Console.WriteLine("SOFTWARE_TOKEN_MFA challenge is generated");

    var challengeResponses = new Dictionary<string, string>();
    challengeResponses.Add("USERNAME", userName);
    challengeResponses.Add("SOFTWARE_TOKEN_MFA_CODE", mfaCode);

    var respondToAuthChallengeRequest = new AdminRespondToAuthChallengeRequest
    {
        ChallengeName = ChallengeNameType.SOFTWARE_TOKEN_MFA,
        ClientId = clientId,
        ChallengeResponses = challengeResponses,
        Session = session,
        UserPoolId = userPoolId,
    };

    var response = await
        _cognitoService.AdminRespondToAuthChallengeAsync(respondToAuthChallengeRequest);
```

```
        Console.WriteLine($"Response to Authentication  
{response.AuthenticationResult.TokenType}");  
        return response.AuthenticationResult;  
    }
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [AdminRespondToAuthChallenge](#)。

AssociateSoftwareToken

以下程式碼範例顯示如何使用 AssociateSoftwareToken。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>  
/// Get an MFA token to authenticate the user with the authenticator.  
/// </summary>  
/// <param name="session">The session name.</param>  
/// <returns>The session name.</returns>  
public async Task<string> AssociateSoftwareTokenAsync(string session)  
{  
    var softwareTokenRequest = new AssociateSoftwareTokenRequest  
    {  
        Session = session,  
    };  
  
    var tokenResponse = await  
_cognitoService.AssociateSoftwareTokenAsync(softwareTokenRequest);  
    var secretCode = tokenResponse.SecretCode;  
  
    Console.WriteLine($"Use the following secret code to set up the  
authenticator: {secretCode}");  
}
```



```
        return tokenResponse.Session;
    }
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [AssociateSoftwareToken](#)。

ConfirmDevice

以下程式碼範例顯示如何使用 ConfirmDevice。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Initiates and confirms tracking of the device.
/// </summary>
/// <param name="accessToken">The user's access token.</param>
/// <param name="deviceKey">The key of the device from Amazon Cognito.</param>
/// <param name="deviceName">The device name.</param>
/// <returns></returns>
public async Task<bool> ConfirmDeviceAsync(string accessToken, string deviceKey,
string deviceName)
{
    var request = new ConfirmDeviceRequest
    {
        AccessToken = accessToken,
        DeviceKey = deviceKey,
        DeviceName = deviceName
    };

    var response = await _cognitoService.ConfirmDeviceAsync(request);
    return response.UserConfirmationNecessary;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [ConfirmDevice](#)。

ConfirmSignUp

以下程式碼範例顯示如何使用 ConfirmSignUp。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Confirm that the user has signed up.
/// </summary>
/// <param name="clientId">The Id of this application.</param>
/// <param name="code">The confirmation code sent to the user.</param>
/// <param name="userName">The username.</param>
/// <returns>True if successful.</returns>
public async Task<bool> ConfirmSignUpAsync(string clientId, string code, string
userName)
{
    var signUpRequest = new ConfirmSignUpRequest
    {
        ClientId = clientId,
        ConfirmationCode = code,
        Username = userName,
    };

    var response = await _cognitoService.ConfirmSignUpAsync(signUpRequest);
    if (response.HttpStatusCode == HttpStatusCode.OK)
    {
        Console.WriteLine($"{userName} was confirmed");
        return true;
    }
    return false;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [ConfirmSignUp](#)。

InitiateAuth

以下程式碼範例顯示如何使用 InitiateAuth。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Initiate authorization.
/// </summary>
/// <param name="clientId">The client Id of the application.</param>
/// <param name="userName">The name of the user who is authenticating.</param>
/// <param name="password">The password for the user who is authenticating.</
param>
/// <returns>The response from the initiate auth request.</returns>
public async Task<InitiateAuthResponse> InitiateAuthAsync(string clientId,
string userName, string password)
{
    var authParameters = new Dictionary<string, string>();
    authParameters.Add("USERNAME", userName);
    authParameters.Add("PASSWORD", password);

    var authRequest = new InitiateAuthRequest

    {
        ClientId = clientId,
        AuthParameters = authParameters,
        AuthFlow = AuthFlowType.USER_PASSWORD_AUTH,
    };

    var response = await _cognitoService.InitiateAuthAsync(authRequest);
```

```
        Console.WriteLine($"Result Challenge is : {response.ChallengeName}");

        return response;
    }
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [InitiateAuth](#)。

ListUsers

以下程式碼範例顯示如何使用 ListUsers。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Get a list of users for the Amazon Cognito user pool.
/// </summary>
/// <param name="userPoolId">The user pool ID.</param>
/// <returns>A list of users.</returns>
public async Task<List<UserType>> ListUsersAsync(string userPoolId)
{
    var request = new ListUsersRequest
    {
        UserPoolId = userPoolId
    };

    var users = new List<UserType>();

    var usersPaginator = _cognitoService.Paginators.ListUsers(request);
    await foreach (var response in usersPaginator.Responses)
    {
        users.AddRange(response.Users);
    }

    return users;
}
```

```
}
```

- 如需 API 詳細資訊，請參閱 適用於 .NET 的 AWS SDK API Reference 中的 [ListUsers](#)。

ResendConfirmationCode

以下程式碼範例顯示如何使用 ResendConfirmationCode。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Send a new confirmation code to a user.
/// </summary>
/// <param name="clientId">The Id of the client application.</param>
/// <param name="userName">The username of user who will receive the code.</
param>
/// <returns>The delivery details.</returns>
public async Task<CodeDeliveryDetailsType> ResendConfirmationCodeAsync(string
clientId, string userName)
{
    var codeRequest = new ResendConfirmationCodeRequest
    {
        ClientId = clientId,
        Username = userName,
    };

    var response = await
_cognitoService.ResendConfirmationCodeAsync(codeRequest);

    Console.WriteLine($"Method of delivery is
{response.CodeDeliveryDetails.DeliveryMedium}");

    return response.CodeDeliveryDetails;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [ResendConfirmationCode](#)。

SignUp

以下程式碼範例顯示如何使用 SignUp。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Sign up a new user.
/// </summary>
/// <param name="clientId">The client Id of the application.</param>
/// <param name="userName">The username to use.</param>
/// <param name="password">The user's password.</param>
/// <param name="email">The email address of the user.</param>
/// <returns>A Boolean value indicating whether the user was confirmed.</
returns>
public async Task<bool> SignUpAsync(string clientId, string userName, string
password, string email)
{
    var userAttrs = new AttributeType
    {
        Name = "email",
        Value = email,
    };

    var userAttrsList = new List<AttributeType>();

    userAttrsList.Add(userAttrs);

    var signUpRequest = new SignUpRequest
```

```

    {
        UserAttributes = userAttrsList,
        Username = userName,
        ClientId = clientId,
        Password = password
    };

    var response = await _cognitoService.SignUpAsync(signUpRequest);
    return response.HttpStatusCode == HttpStatusCode.OK;
}

```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [SignUp](#)。

VerifySoftwareToken

以下程式碼範例顯示如何使用 VerifySoftwareToken。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```

/// <summary>
/// Verify the TOTP and register for MFA.
/// </summary>
/// <param name="session">The name of the session.</param>
/// <param name="code">The MFA code.</param>
/// <returns>The status of the software token.</returns>
public async Task<VerifySoftwareTokenResponseType>
VerifySoftwareTokenAsync(string session, string code)
{
    var tokenRequest = new VerifySoftwareTokenRequest
    {
        UserCode = code,
        Session = session,
    };
}

```

```
var verifyResponse = await
_cognitoService.VerifySoftwareTokenAsync(tokenRequest);

return verifyResponse.Status;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [VerifySoftwareToken](#)。

案例

使用需要 MFA 的使用者集區註冊使用者

以下程式碼範例顯示做法：

- 使用使用者名稱、密碼和電子郵件地址註冊並確認使用者。
- 透過將 MFA 應用程式與使用者建立關聯，以設定多重要素身分驗證。
- 使用密碼和 MFA 代碼登入。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
namespace CognitoBasics;

public class CognitoBasics
{
    private static ILogger logger = null!;

    static async Task Main(string[] args)
    {
        // Set up dependency injection for Amazon Cognito.
        using var host = Host.CreateDefaultBuilder(args)
            .ConfigureLogging(logging =>
```



```

        logging.AddFilter("System", LogLevel.Debug)
            .AddFilter<DebugLoggerProvider>("Microsoft",
LogLevel.Information)
            .AddFilter<ConsoleLoggerProvider>("Microsoft", LogLevel.Trace))
        .ConfigureServices((_, services) =>
services.AddAWSService<IAmazonCognitoIdentityProvider>()
        .AddTransient<CognitoWrapper>()
        )
        .Build();

logger = LoggerFactory.Create(builder => { builder.AddConsole(); })
    .CreateLogger<CognitoBasics>();

var configuration = new ConfigurationBuilder()
    .SetBasePath(Directory.GetCurrentDirectory())
    .AddJsonFile("settings.json") // Load settings from .json file.
    .AddJsonFile("settings.local.json",
        true) // Optionally load local settings.
    .Build();

var cognitoWrapper = host.Services.GetRequiredService<CognitoWrapper>();

Console.WriteLine(new string('-', 80));
UiMethods.DisplayOverview();
Console.WriteLine(new string('-', 80));

// clientId - The app client Id value that you get from the AWS CDK script.
var clientId = configuration["ClientId"]; // "**** REPLACE WITH CLIENT ID
VALUE FROM CDK SCRIPT";

// poolId - The pool Id that you get from the AWS CDK script.
var poolId = configuration["PoolId"]!; // "**** REPLACE WITH POOL ID VALUE
FROM CDK SCRIPT";
var userName = configuration["UserName"];
var password = configuration["Password"];
var email = configuration["Email"];

// If the username wasn't set in the configuration file,
// get it from the user now.
if (userName is null)
{
    do
    {
        Console.Write("Username: ");

```

```
        userName = Console.ReadLine();
    }
    while (string.IsNullOrEmpty(userName));
}
Console.WriteLine($"\\nUsername: {userName}");

// If the password wasn't set in the configuration file,
// get it from the user now.
if (password is null)
{
    do
    {
        Console.Write("Password: ");
        password = Console.ReadLine();
    }
    while (string.IsNullOrEmpty(password));
}

// If the email address wasn't set in the configuration file,
// get it from the user now.
if (email is null)
{
    do
    {
        Console.Write("Email: ");
        email = Console.ReadLine();
    } while (string.IsNullOrEmpty(email));
}

// Now sign up the user.
Console.WriteLine($"\\nSigning up {userName} with email address: {email}");
await cognitoWrapper.SignUpAsync(clientId, userName, password, email);

// Add the user to the user pool.
Console.WriteLine($"Adding {userName} to the user pool");
await cognitoWrapper.GetAdminUserAsync(userName, poolId);

UiMethods.DisplayTitle("Get confirmation code");
Console.WriteLine($"Conformation code sent to {userName}.");
Console.Write("Would you like to send a new code? (Y/N) ");
var answer = Console.ReadLine();

if (answer!.ToLower() == "y")
{

```

```
        await cognitoWrapper.ResendConfirmationCodeAsync(clientId, userName);
        Console.WriteLine("Sending a new confirmation code");
    }

    Console.Write("Enter confirmation code (from Email): ");
    var code = Console.ReadLine();

    await cognitoWrapper.ConfirmSignupAsync(clientId, code, userName);

    UiMethods.DisplayTitle("Checking status");
    Console.WriteLine($"Rechecking the status of {userName} in the user pool");
    await cognitoWrapper.GetAdminUserAsync(userName, poolId);

    Console.WriteLine($"Setting up authenticator for {userName} in the user
pool");
    var setupResponse = await cognitoWrapper.InitiateAuthAsync(clientId,
userName, password);

    var setupSession = await
cognitoWrapper.AssociateSoftwareTokenAsync(setupResponse.Session);
    Console.Write("Enter the 6-digit code displayed in Google Authenticator: ");
    var setupCode = Console.ReadLine();

    var setupResult = await
cognitoWrapper.VerifySoftwareTokenAsync(setupSession, setupCode);
    Console.WriteLine($"Setup status: {setupResult}");

    Console.WriteLine($"Now logging in {userName} in the user pool");
    var authSession = await cognitoWrapper.AdminInitiateAuthAsync(clientId,
poolId, userName, password);

    Console.Write("Enter a new 6-digit code displayed in Google Authenticator:
");
    var authCode = Console.ReadLine();

    var authResult = await
cognitoWrapper.AdminRespondToAuthChallengeAsync(userName, clientId, authCode,
authSession, poolId);
    Console.WriteLine($"Authenticated and received access token:
{authResult.AccessToken}");

    Console.WriteLine(new string('-', 80));
    Console.WriteLine("Cognito scenario is complete.");
    Console.WriteLine(new string('-', 80));
```

```
    }  
}  
  
using System.Net;  
  
namespace CognitoActions;  
  
/// <summary>  
/// Methods to perform Amazon Cognito Identity Provider actions.  
/// </summary>  
public class CognitoWrapper  
{  
    private readonly IAmazonCognitoIdentityProvider _cognitoService;  
  
    /// <summary>  
    /// Constructor for the wrapper class containing Amazon Cognito actions.  
    /// </summary>  
    /// <param name="cognitoService">The Amazon Cognito client object.</param>  
    public CognitoWrapper(IAmazonCognitoIdentityProvider cognitoService)  
    {  
        _cognitoService = cognitoService;  
    }  
  
    /// <summary>  
    /// List the Amazon Cognito user pools for an account.  
    /// </summary>  
    /// <returns>A list of UserPoolDescriptionType objects.</returns>  
    public async Task<List<UserPoolDescriptionType>> ListUserPoolsAsync()  
    {  
        var userPools = new List<UserPoolDescriptionType>();  
  
        var userPoolsPaginator = _cognitoService.Paginators.ListUserPools(new  
ListUserPoolsRequest());  
  
        await foreach (var response in userPoolsPaginator.Responses)  
        {  
            userPools.AddRange(response.UserPools);  
        }  
  
        return userPools;  
    }  
}
```

```

/// <summary>
/// Get a list of users for the Amazon Cognito user pool.
/// </summary>
/// <param name="userPoolId">The user pool ID.</param>
/// <returns>A list of users.</returns>
public async Task<List<UserType>> ListUsersAsync(string userPoolId)
{
    var request = new ListUsersRequest
    {
        UserPoolId = userPoolId
    };

    var users = new List<UserType>();

    var usersPaginator = _cognitoService.Paginators.ListUsers(request);
    await foreach (var response in usersPaginator.Responses)
    {
        users.AddRange(response.Users);
    }

    return users;
}

/// <summary>
/// Respond to an admin authentication challenge.
/// </summary>
/// <param name="userName">The name of the user.</param>
/// <param name="clientId">The client ID.</param>
/// <param name="mfaCode">The multi-factor authentication code.</param>
/// <param name="session">The current application session.</param>
/// <param name="clientId">The user pool ID.</param>
/// <returns>The result of the authentication response.</returns>
public async Task<AuthenticationResultType> AdminRespondToAuthChallengeAsync(
    string userName,
    string clientId,
    string mfaCode,
    string session,
    string userPoolId)
{
    Console.WriteLine("SOFTWARE_TOKEN_MFA challenge is generated");

    var challengeResponses = new Dictionary<string, string>();
    challengeResponses.Add("USERNAME", userName);

```

```

        challengeResponses.Add("SOFTWARE_TOKEN_MFA_CODE", mfaCode);

        var respondToAuthChallengeRequest = new AdminRespondToAuthChallengeRequest
        {
            ChallengeName = ChallengeNameType.SOFTWARE_TOKEN_MFA,
            ClientId = clientId,
            ChallengeResponses = challengeResponses,
            Session = session,
            UserPoolId = userPoolId,
        };

        var response = await
_cognitoService.AdminRespondToAuthChallengeAsync(respondToAuthChallengeRequest);
        Console.WriteLine($"Response to Authentication
{response.AuthenticationResult.TokenType}");
        return response.AuthenticationResult;
    }

    /// <summary>
    /// Verify the TOTP and register for MFA.
    /// </summary>
    /// <param name="session">The name of the session.</param>
    /// <param name="code">The MFA code.</param>
    /// <returns>The status of the software token.</returns>
    public async Task<VerifySoftwareTokenResponseType>
VerifySoftwareTokenAsync(string session, string code)
    {
        var tokenRequest = new VerifySoftwareTokenRequest
        {
            UserCode = code,
            Session = session,
        };

        var verifyResponse = await
_cognitoService.VerifySoftwareTokenAsync(tokenRequest);

        return verifyResponse.Status;
    }

    /// <summary>
    /// Get an MFA token to authenticate the user with the authenticator.
    /// </summary>

```

```
/// <param name="session">The session name.</param>
/// <returns>The session name.</returns>
public async Task<string> AssociateSoftwareTokenAsync(string session)
{
    var softwareTokenRequest = new AssociateSoftwareTokenRequest
    {
        Session = session,
    };

    var tokenResponse = await
_cognitoService.AssociateSoftwareTokenAsync(softwareTokenRequest);
    var secretCode = tokenResponse.SecretCode;

    Console.WriteLine($"Use the following secret code to set up the
authenticator: {secretCode}");

    return tokenResponse.Session;
}

/// <summary>
/// Initiate an admin auth request.
/// </summary>
/// <param name="clientId">The client ID to use.</param>
/// <param name="userPoolId">The ID of the user pool.</param>
/// <param name="userName">The username to authenticate.</param>
/// <param name="password">The user's password.</param>
/// <returns>The session to use in challenge-response.</returns>
public async Task<string> AdminInitiateAuthAsync(string clientId, string
userPoolId, string userName, string password)
{
    var authParameters = new Dictionary<string, string>();
    authParameters.Add("USERNAME", userName);
    authParameters.Add("PASSWORD", password);

    var request = new AdminInitiateAuthRequest
    {
        ClientId = clientId,
        UserPoolId = userPoolId,
        AuthParameters = authParameters,
        AuthFlow = AuthFlowType.ADMIN_USER_PASSWORD_AUTH,
    };

    var response = await _cognitoService.AdminInitiateAuthAsync(request);
}
```

```

        return response.Session;
    }

    /// <summary>
    /// Initiate authorization.
    /// </summary>
    /// <param name="clientId">The client Id of the application.</param>
    /// <param name="userName">The name of the user who is authenticating.</param>
    /// <param name="password">The password for the user who is authenticating.</
param>
    /// <returns>The response from the initiate auth request.</returns>
    public async Task<InitiateAuthResponse> InitiateAuthAsync(string clientId,
string userName, string password)
    {
        var authParameters = new Dictionary<string, string>();
        authParameters.Add("USERNAME", userName);
        authParameters.Add("PASSWORD", password);

        var authRequest = new InitiateAuthRequest

        {
            ClientId = clientId,
            AuthParameters = authParameters,
            AuthFlow = AuthFlowType.USER_PASSWORD_AUTH,
        };

        var response = await _cognitoService.InitiateAuthAsync(authRequest);
        Console.WriteLine($"Result Challenge is : {response.ChallengeName}");

        return response;
    }

    /// <summary>
    /// Confirm that the user has signed up.
    /// </summary>
    /// <param name="clientId">The Id of this application.</param>
    /// <param name="code">The confirmation code sent to the user.</param>
    /// <param name="userName">The username.</param>
    /// <returns>True if successful.</returns>
    public async Task<bool> ConfirmSignupAsync(string clientId, string code, string
userName)
    {
        var signUpRequest = new ConfirmSignUpRequest
        {

```



```

        ClientId = clientId,
        ConfirmationCode = code,
        Username = userName,
    };

    var response = await _cognitoService.ConfirmSignUpAsync(signUpRequest);
    if (response.HttpStatusCode == HttpStatusCode.OK)
    {
        Console.WriteLine($"{userName} was confirmed");
        return true;
    }
    return false;
}

/// <summary>
/// Initiates and confirms tracking of the device.
/// </summary>
/// <param name="accessToken">The user's access token.</param>
/// <param name="deviceKey">The key of the device from Amazon Cognito.</param>
/// <param name="deviceName">The device name.</param>
/// <returns></returns>
public async Task<bool> ConfirmDeviceAsync(string accessToken, string deviceKey,
string deviceName)
{
    var request = new ConfirmDeviceRequest
    {
        AccessToken = accessToken,
        DeviceKey = deviceKey,
        DeviceName = deviceName
    };

    var response = await _cognitoService.ConfirmDeviceAsync(request);
    return response.UserConfirmationNecessary;
}

/// <summary>
/// Send a new confirmation code to a user.
/// </summary>
/// <param name="clientId">The Id of the client application.</param>
/// <param name="userName">The username of user who will receive the code.</
param>
/// <returns>The delivery details.</returns>

```

```

    public async Task<CodeDeliveryDetailsType> ResendConfirmationCodeAsync(string
clientId, string userName)
    {
        var codeRequest = new ResendConfirmationCodeRequest
        {
            ClientId = clientId,
            Username = userName,
        };

        var response = await
_cognitoService.ResendConfirmationCodeAsync(codeRequest);

        Console.WriteLine($"Method of delivery is
{response.CodeDeliveryDetails.DeliveryMedium}");

        return response.CodeDeliveryDetails;
    }

    /// <summary>
    /// Get the specified user from an Amazon Cognito user pool with administrator
access.
    /// </summary>
    /// <param name="userName">The name of the user.</param>
    /// <param name="poolId">The Id of the Amazon Cognito user pool.</param>
    /// <returns>Async task.</returns>
    public async Task<UserStatusType> GetAdminUserAsync(string userName, string
poolId)
    {
        AdminGetUserRequest userRequest = new AdminGetUserRequest
        {
            Username = userName,
            UserPoolId = poolId,
        };

        var response = await _cognitoService.AdminGetUserAsync(userRequest);

        Console.WriteLine($"User status {response.UserStatus}");
        return response.UserStatus;
    }

    /// <summary>
    /// Sign up a new user.

```

```
/// </summary>
/// <param name="clientId">The client Id of the application.</param>
/// <param name="userName">The username to use.</param>
/// <param name="password">The user's password.</param>
/// <param name="email">The email address of the user.</param>
/// <returns>A Boolean value indicating whether the user was confirmed.</
returns>
    public async Task<bool> SignUpAsync(string clientId, string userName, string
password, string email)
    {
        var userAttrs = new AttributeType
        {
            Name = "email",
            Value = email,
        };

        var userAttrsList = new List<AttributeType>();

        userAttrsList.Add(userAttrs);

        var signUpRequest = new SignUpRequest
        {
            UserAttributes = userAttrsList,
            Username = userName,
            ClientId = clientId,
            Password = password
        };

        var response = await _cognitoService.SignUpAsync(signUpRequest);
        return response.HttpStatusCode == HttpStatusCode.OK;
    }
}
```

• 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的下列主題。

- [AdminGetUser](#)
- [AdminInitiateAuth](#)
- [AdminRespondToAuthChallenge](#)
- [AssociateSoftwareToken](#)

- [ConfirmDevice](#)
- [ConfirmSignUp](#)
- [InitiateAuth](#)
- [ListUsers](#)
- [ResendConfirmationCode](#)
- [RespondToAuthChallenge](#)
- [SignUp](#)
- [VerifySoftwareToken](#)

使用的 Amazon Comprehend 範例 適用於 .NET 的 SDK

下列程式碼範例示範如何使用 適用於 .NET 的 AWS SDK 搭配 Amazon Comprehend 執行動作和實作常見案例。

Actions 是大型程式的程式碼摘錄，必須在內容中執行。雖然動作會告訴您如何呼叫個別服務函數，但您可以在其相關情境中查看內容中的動作。

案例是向您展示如何呼叫服務中的多個函數或與其他 AWS 服務組合來完成特定任務的程式碼範例。

每個範例均包含完整原始碼的連結，您可在連結中找到如何設定和執行內容中程式碼的相關指示。

主題

- [動作](#)
- [案例](#)

動作

DetectDominantLanguage

以下程式碼範例顯示如何使用 DetectDominantLanguage。

適用於 .NET 的 SDK

 Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
using System;
using System.Threading.Tasks;
using Amazon.Comprehend;
using Amazon.Comprehend.Model;

/// <summary>
/// This example calls the Amazon Comprehend service to determine the
/// dominant language.
/// </summary>
public static class DetectDominantLanguage
{
    /// <summary>
    /// Calls Amazon Comprehend to determine the dominant language used in
    /// the sample text.
    /// </summary>
    public static async Task Main()
    {
        string text = "It is raining today in Seattle.";

        var comprehendClient = new
AmazonComprehendClient(Amazon.RegionEndpoint.USWest2);

        Console.WriteLine("Calling DetectDominantLanguage\n");
        var detectDominantLanguageRequest = new DetectDominantLanguageRequest()
        {
            Text = text,
        };

        var detectDominantLanguageResponse = await
comprehendClient.DetectDominantLanguageAsync(detectDominantLanguageRequest);
        foreach (var dl in detectDominantLanguageResponse.Languages)
        {
            Console.WriteLine($"Language Code: {dl.LanguageCode}, Score:
{dl.Score}");
        }
    }
}
```

```
    }  
  
    Console.WriteLine("Done");  
}  
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [DetectDominantLanguage](#)。

DetectEntities

以下程式碼範例顯示如何使用 DetectEntities。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
using System;  
using System.Threading.Tasks;  
using Amazon.Comprehend;  
using Amazon.Comprehend.Model;  
  
/// <summary>  
/// This example shows how to use the AmazonComprehend service detect any  
/// entities in submitted text.  
/// </summary>  
public static class DetectEntities  
{  
    /// <summary>  
    /// The main method calls the DetectEntitiesAsync method to find any  
    /// entities in the sample code.  
    /// </summary>  
    public static async Task Main()  
    {  
        string text = "It is raining today in Seattle";
```

```
var comprehendClient = new AmazonComprehendClient();

Console.WriteLine("Calling DetectEntities\n");
var detectEntitiesRequest = new DetectEntitiesRequest()
{
    Text = text,
    LanguageCode = "en",
};
var detectEntitiesResponse = await
comprehendClient.DetectEntitiesAsync(detectEntitiesRequest);

foreach (var e in detectEntitiesResponse.Entities)
{
    Console.WriteLine($"Text: {e.Text}, Type: {e.Type}, Score:
{e.Score}, BeginOffset: {e.BeginOffset}, EndOffset: {e.EndOffset}");
}

Console.WriteLine("Done");
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [DetectEntities](#)。

DetectKeyPhrases

以下程式碼範例顯示如何使用 DetectKeyPhrases。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
using System;
using System.Threading.Tasks;
using Amazon.Comprehend;
```

```
using Amazon.Comprehend.Model;

/// <summary>
/// This example shows how to use the Amazon Comprehend service to
/// search text for key phrases.
/// </summary>
public static class DetectKeyPhrase
{
    /// <summary>
    /// This method calls the Amazon Comprehend method DetectKeyPhrasesAsync
    /// to detect any key phrases in the sample text.
    /// </summary>
    public static async Task Main()
    {
        string text = "It is raining today in Seattle";

        var comprehendClient = new
AmazonComprehendClient(Amazon.RegionEndpoint.USWest2);

        // Call DetectKeyPhrases API
        Console.WriteLine("Calling DetectKeyPhrases");
        var detectKeyPhrasesRequest = new DetectKeyPhrasesRequest()
        {
            Text = text,
            LanguageCode = "en",
        };
        var detectKeyPhrasesResponse = await
comprehendClient.DetectKeyPhrasesAsync(detectKeyPhrasesRequest);
        foreach (var kp in detectKeyPhrasesResponse.KeyPhrases)
        {
            Console.WriteLine($"Text: {kp.Text}, Score: {kp.Score}, BeginOffset:
{kp.BeginOffset}, EndOffset: {kp.EndOffset}");
        }

        Console.WriteLine("Done");
    }
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [DetectKeyPhrases](#)。

DetectPiiEntities

以下程式碼範例顯示如何使用 DetectPiiEntities。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
using System;
using System.Threading.Tasks;
using Amazon.Comprehend;
using Amazon.Comprehend.Model;

/// <summary>
/// This example shows how to use the Amazon Comprehend service to find
/// personally identifiable information (PII) within text submitted to the
/// DetectPiiEntitiesAsync method.
/// </summary>
public class DetectingPII
{
    /// <summary>
    /// This method calls the DetectPiiEntitiesAsync method to locate any
    /// personally identifiable information within the supplied text.
    /// </summary>
    public static async Task Main()
    {
        var comprehendClient = new AmazonComprehendClient();
        var text = @"Hello Paul Santos. The latest statement for your
                    credit card account 1111-0000-1111-0000 was
                    mailed to 123 Any Street, Seattle, WA 98109.";

        var request = new DetectPiiEntitiesRequest
        {
            Text = text,
            LanguageCode = "EN",
        };

        var response = await comprehendClient.DetectPiiEntitiesAsync(request);
```

```

        if (response.Entities.Count > 0)
        {
            foreach (var entity in response.Entities)
            {
                var entityValue = text.Substring(entity.BeginOffset,
entity.EndOffset - entity.BeginOffset);
                Console.WriteLine($"{entity.Type}: {entityValue}");
            }
        }
    }
}

```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [DetectPiiEntities](#)。

DetectSentiment

以下程式碼範例顯示如何使用 DetectSentiment。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```

using System;
using System.Threading.Tasks;
using Amazon.Comprehend;
using Amazon.Comprehend.Model;

/// <summary>
/// This example shows how to detect the overall sentiment of the supplied
/// text using the Amazon Comprehend service.
/// </summary>
public static class DetectSentiment
{
    /// <summary>
    /// This method calls the DetetectSentimentAsync method to analyze the
    /// supplied text and determine the overall sentiment.

```

```
/// </summary>
public static async Task Main()
{
    string text = "It is raining today in Seattle";

    var comprehendClient = new
AmazonComprehendClient(Amazon.RegionEndpoint.USWest2);

    // Call DetectKeyPhrases API
    Console.WriteLine("Calling DetectSentiment");
    var detectSentimentRequest = new DetectSentimentRequest()
    {
        Text = text,
        LanguageCode = "en",
    };
    var detectSentimentResponse = await
comprehendClient.DetectSentimentAsync(detectSentimentRequest);
    Console.WriteLine($"Sentiment: {detectSentimentResponse.Sentiment}");
    Console.WriteLine("Done");
}
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [DetectSentiment](#)。

DetectSyntax

以下程式碼範例顯示如何使用 DetectSyntax。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
using System;
using System.Threading.Tasks;
using Amazon.Comprehend;
using Amazon.Comprehend.Model;
```

```

    /// <summary>
    /// This example shows how to use Amazon Comprehend to detect syntax
    /// elements by calling the DetectSyntaxAsync method.
    /// </summary>
    public class DetectingSyntax
    {
        /// <summary>
        /// This method calls DetectSynaxAsync to identify the syntax elements
        /// in the sample text.
        /// </summary>
        public static async Task Main()
        {
            string text = "It is raining today in Seattle";

            var comprehendClient = new AmazonComprehendClient();

            // Call DetectSyntax API
            Console.WriteLine("Calling DetectSyntaxAsync\n");
            var detectSyntaxRequest = new DetectSyntaxRequest()
            {
                Text = text,
                LanguageCode = "en",
            };
            DetectSyntaxResponse detectSyntaxResponse = await
comprehendClient.DetectSyntaxAsync(detectSyntaxRequest);
            foreach (SyntaxToken s in detectSyntaxResponse.SyntaxTokens)
            {
                Console.WriteLine($"Text: {s.Text}, PartOfSpeech:
{s.PartOfSpeech.Tag}, BeginOffset: {s.BeginOffset}, EndOffset: {s.EndOffset}");
            }

            Console.WriteLine("Done");
        }
    }
}

```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [DetectSyntax](#)。

StartTopicsDetectionJob

以下程式碼範例顯示如何使用 StartTopicsDetectionJob。

適用於 .NET 的 SDK

 Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
using System;
using System.Threading.Tasks;
using Amazon.Comprehend;
using Amazon.Comprehend.Model;

/// <summary>
/// This example scans the documents in an Amazon Simple Storage Service
/// (Amazon S3) bucket and analyzes it for topics. The results are stored
/// in another bucket and then the resulting job properties are displayed
/// on the screen. This example was created using the AWS SDK for .NET
/// version 3.7 and .NET Core version 5.0.
/// </summary>
public static class TopicModeling
{
    /// <summary>
    /// This methos calls a topic detection job by calling the Amazon
    /// Comprehend StartTopicsDetectionJobRequest.
    /// </summary>
    public static async Task Main()
    {
        var comprehendClient = new AmazonComprehendClient();

        string inputS3Uri = "s3://input bucket/input path";
        InputFormat inputDocFormat = InputFormat.ONE_DOC_PER_FILE;
        string outputS3Uri = "s3://output bucket/output path";
        string dataAccessRoleArn = "arn:aws:iam::account ID:role/data access
role";

        int numberOfTopics = 10;

        var startTopicsDetectionJobRequest = new
StartTopicsDetectionJobRequest()
        {
            InputDataConfig = new InputDataConfig()
            {
```

```
        S3Uri = inputS3Uri,
        InputFormat = inputDocFormat,
    },
    OutputDataConfig = new OutputDataConfig()
    {
        S3Uri = outputS3Uri,
    },
    DataAccessRoleArn = dataAccessRoleArn,
    NumberOfTopics = numberOfTopics,
};

var startTopicsDetectionJobResponse = await
comprehendClient.StartTopicsDetectionJobAsync(startTopicsDetectionJobRequest);

var jobId = startTopicsDetectionJobResponse.JobId;
Console.WriteLine("JobId: " + jobId);

var describeTopicsDetectionJobRequest = new
DescribeTopicsDetectionJobRequest()
{
    JobId = jobId,
};

var describeTopicsDetectionJobResponse = await
comprehendClient.DescribeTopicsDetectionJobAsync(describeTopicsDetectionJobRequest);

PrintJobProperties(describeTopicsDetectionJobResponse.TopicsDetectionJobProperties);

var listTopicsDetectionJobsResponse = await
comprehendClient.ListTopicsDetectionJobsAsync(new
ListTopicsDetectionJobsRequest());
foreach (var props in
listTopicsDetectionJobsResponse.TopicsDetectionJobPropertiesList)
{
    PrintJobProperties(props);
}

}

/// <summary>
/// This method is a helper method that displays the job properties
/// from the call to StartTopicsDetectionJobRequest.
/// </summary>
/// <param name="props">A list of properties from the call to
/// StartTopicsDetectionJobRequest.</param>
```

```
private static void PrintJobProperties(TopicsDetectionJobProperties props)
{
    Console.WriteLine($"JobId: {props.JobId}, JobName: {props.JobName},
JobStatus: {props.JobStatus}");
    Console.WriteLine($"NumberOfTopics: {props.NumberOfTopics}\nInputS3Uri:
{props.InputDataConfig.S3Uri}");
    Console.WriteLine($"InputFormat: {props.InputDataConfig.InputFormat},
OutputS3Uri: {props.OutputDataConfig.S3Uri}");
}
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [StartTopicsDetectionJob](#)。

案例

建立應用程式以分析客戶意見回饋

下列程式碼範例會示範如何建立可分析客戶評論卡、從其原始語言進行翻譯、判斷對方情緒，以及透過翻譯後的文字產生音訊檔案的應用程式。

適用於 .NET 的 SDK

此範例應用程式會分析和存儲客戶的意見回饋卡。具體來說，它滿足了紐約市一家虛構飯店的需求。飯店以實體評論卡的形式收到賓客以各種語言撰寫的意見回饋。這些意見回饋透過 Web 用戶端上傳至應用程式。評論卡的影像上傳後，系統會執行下列步驟：

- 文字內容是使用 Amazon Textract 從影像中擷取。
- Amazon Comprehend 會決定擷取文字及其用語的情感。
- 擷取的文字內容會使用 Amazon Translate 翻譯成英文。
- Amazon Polly 會使用擷取的文字內容合成音訊檔案。

完整的應用程式可透過 AWS CDK 部署。如需原始程式碼和部署的說明，請參閱 [GitHub](#) 中的專案。

此範例中使用的服務

- Amazon Comprehend
- Lambda

- Amazon Polly
- Amazon Textract
- Amazon Translate

使用的 Amazon DocumentDB 範例 適用於 .NET 的 SDK

下列程式碼範例示範如何使用 適用於 .NET 的 AWS SDK 搭配 Amazon DocumentDB 執行動作和實作常見案例。

每個範例均包含完整原始碼的連結，您可在連結中找到如何設定和執行內容中程式碼的相關指示。

主題

- [無伺服器範例](#)

無伺服器範例

使用 Amazon DocumentDB 觸發條件調用 Lambda 函數

以下程式碼範例示範如何實作 Lambda 函式，該函式會透過接收 DocumentDB 變更串流的記錄來接收所觸發的事件。函數會擷取 DocumentDB 承載並記下記錄內容。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在[無伺服器範例](#)儲存庫中設定和執行。

使用 .NET 搭配 Lambda 使用 Amazon DocumentDB 事件。

```
using Amazon.Lambda.Core;  
using System.Text.Json;  
using System;  
using System.Collections.Generic;  
using System.Text.Json.Serialization;  
//Assembly attribute to enable the Lambda function's JSON input to be converted into  
a .NET class.
```



```
[assembly:
    LambdaSerializer(typeof(Amazon.Lambda.Serialization.SystemTextJson.DefaultLambdaJsonSerializer))]

namespace LambdaDocDb;

public class Function
{
    /// <summary>
    /// Lambda function entry point to process Amazon DocumentDB events.
    /// </summary>
    /// <param name="event">The Amazon DocumentDB event.</param>
    /// <param name="context">The Lambda context object.</param>
    /// <returns>A string to indicate successful processing.</returns>
    public string FunctionHandler(Event evnt, ILambdaContext context)
    {
        foreach (var record in evnt.Events)
        {
            ProcessDocumentDBEvent(record, context);
        }

        return "OK";
    }

    private void ProcessDocumentDBEvent(DocumentDBEventRecord record,
    ILambdaContext context)
    {
        var eventData = record.Event;
        var operationType = eventData.OperationType;
        var databaseName = eventData.Ns.Db;
        var collectionName = eventData.Ns.Coll;
        var fullDocument = JsonSerializer.Serialize(eventData.FullDocument, new
        JsonSerializerOptions { WriteIndented = true });

        context.Logger.LogLine($"Operation type: {operationType}");
        context.Logger.LogLine($"Database: {databaseName}");
        context.Logger.LogLine($"Collection: {collectionName}");
        context.Logger.LogLine($"Full document:\n{fullDocument}");
    }
}
```

```
public class Event
{
    [JsonPropertyName("eventSourceArn")]
    public string EventSourceArn { get; set; }

    [JsonPropertyName("events")]
    public List<DocumentDBEventRecord> Events { get; set; }

    [JsonPropertyName("eventSource")]
    public string EventSource { get; set; }
}

public class DocumentDBEventRecord
{
    [JsonPropertyName("event")]
    public EventData Event { get; set; }
}

public class EventData
{
    [JsonPropertyName("_id")]
    public IdData Id { get; set; }

    [JsonPropertyName("clusterTime")]
    public ClusterTime ClusterTime { get; set; }

    [JsonPropertyName("documentKey")]
    public DocumentKey DocumentKey { get; set; }

    [JsonPropertyName("fullDocument")]
    public Dictionary<string, object> FullDocument { get; set; }

    [JsonPropertyName("ns")]
    public Namespace Ns { get; set; }

    [JsonPropertyName("operationType")]
    public string OperationType { get; set; }
}

public class IdData
{
    [JsonPropertyName("_data")]
    public string Data { get; set; }
}
```

```
public class ClusterTime
{
    [JsonPropertyName("$timestamp")]
    public Timestamp Timestamp { get; set; }
}

public class Timestamp
{
    [JsonPropertyName("t")]
    public long T { get; set; }

    [JsonPropertyName("i")]
    public int I { get; set; }
}

public class DocumentKey
{
    [JsonPropertyName("_id")]
    public Id Id { get; set; }
}

public class Id
{
    [JsonPropertyName("$oid")]
    public string Oid { get; set; }
}

public class Namespace
{
    [JsonPropertyName("db")]
    public string Db { get; set; }

    [JsonPropertyName("coll")]
    public string Coll { get; set; }
}
}
```

使用的 DynamoDB 範例 適用於 .NET 的 SDK

下列程式碼範例示範如何使用 適用於 .NET 的 AWS SDK 搭配 DynamoDB 執行動作和實作常見案例。

Actions 是大型程式的程式碼摘錄，必須在內容中執行。雖然動作會告訴您如何呼叫個別服務函數，但您可以在其相關情境中查看內容中的動作。

案例是向您展示如何呼叫服務中的多個函數或與其他 AWS 服務組合來完成特定任務的程式碼範例。

AWS 社群貢獻是由多個團隊所建立和維護的範例 AWS。若要提供意見回饋，請使用連結儲存庫中提供的機制。

每個範例均包含完整原始碼的連結，您可在連結中找到如何設定和執行內容中程式碼的相關指示。

主題

- [動作](#)
- [案例](#)
- [無伺服器範例](#)
- [AWS 社群貢獻](#)

動作

BatchExecuteStatement

以下程式碼範例顯示如何使用 BatchExecuteStatement。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

使用多批 INSERT 陳述式新增項目。

```
/// <summary>
/// Inserts movies imported from a JSON file into the movie table by
/// using an Amazon DynamoDB PartiQL INSERT statement.
/// </summary>
/// <param name="tableName">The name of the table into which the movie
/// information will be inserted.</param>
/// <param name="movieFileName">The name of the JSON file that contains
/// movie information.</param>
```

```

    /// <returns>A Boolean value that indicates the success or failure of
    /// the insert operation.</returns>
    public static async Task<bool> InsertMovies(string tableName, string
movieFileName)
    {
        // Get the list of movies from the JSON file.
        var movies = ImportMovies(movieFileName);

        var success = false;

        if (movies is not null)
        {
            // Insert the movies in a batch using PartiQL. Because the
            // batch can contain a maximum of 25 items, insert 25 movies
            // at a time.
            string insertBatch = $"INSERT INTO {tableName} VALUE {{'title': ?,
'year': ?}}";
            var statements = new List<BatchStatementRequest>();

            try
            {
                for (var indexOffset = 0; indexOffset < 250; indexOffset += 25)
                {
                    for (var i = indexOffset; i < indexOffset + 25; i++)
                    {
                        statements.Add(new BatchStatementRequest
                        {
                            Statement = insertBatch,
                            Parameters = new List<AttributeValue>
                            {
                                new AttributeValue { S = movies[i].Title },
                                new AttributeValue { N =
movies[i].Year.ToString() },
                            },
                        });
                    }

                    var response = await Client.BatchExecuteStatementAsync(new
BatchExecuteStatementRequest
                    {
                        Statements = statements,
                    });

                    // Wait between batches for movies to be successfully added.

```

```

        System.Threading.Thread.Sleep(3000);

        success = response.HttpStatusCode ==
System.Net.HttpStatusCode.OK;

        // Clear the list of statements for the next batch.
        statements.Clear();
    }
}
catch (AmazonDynamoDBException ex)
{
    Console.WriteLine(ex.Message);
}
}

return success;
}

/// <summary>
/// Loads the contents of a JSON file into a list of movies to be
/// added to the DynamoDB table.
/// </summary>
/// <param name="movieFileName">The full path to the JSON file.</param>
/// <returns>A generic list of movie objects.</returns>
public static List<Movie> ImportMovies(string movieFileName)
{
    if (!File.Exists(movieFileName))
    {
        return null!;
    }

    using var sr = new StreamReader(movieFileName);
    string json = sr.ReadToEnd();
    var allMovies = JsonConvert.DeserializeObject<List<Movie>>(json);

    if (allMovies is not null)
    {
        // Return the first 250 entries.
        return allMovies.GetRange(0, 250);
    }
    else
    {
        return null!;
    }
}

```

```
}
```

使用多批 SELECT 陳述式取得項目。

```

/// <summary>
/// Gets movies from the movie table by
/// using an Amazon DynamoDB PartiQL SELECT statement.
/// </summary>
/// <param name="tableName">The name of the table.</param>
/// <param name="title1">The title of the first movie.</param>
/// <param name="title2">The title of the second movie.</param>
/// <param name="year1">The year of the first movie.</param>
/// <param name="year2">The year of the second movie.</param>
/// <returns>True if successful.</returns>
public static async Task<bool> GetBatch(
    string tableName,
    string title1,
    string title2,
    int year1,
    int year2)
{
    var getBatch = $"SELECT * FROM {tableName} WHERE title = ? AND year
= ?";

    var statements = new List<BatchStatementRequest>
    {
        new BatchStatementRequest
        {
            Statement = getBatch,
            Parameters = new List<AttributeValue>
            {
                new AttributeValue { S = title1 },
                new AttributeValue { N = year1.ToString() },
            },
        },
        new BatchStatementRequest
        {
            Statement = getBatch,
            Parameters = new List<AttributeValue>
            {
                new AttributeValue { S = title2 },
                new AttributeValue { N = year2.ToString() },
            },
        },
    };
}

```

```

        },
    }
};

var response = await Client.BatchExecuteStatementAsync(new
BatchExecuteStatementRequest
{
    Statements = statements,
});

if (response.Responses.Count > 0)
{
    response.Responses.ForEach(r =>
    {
        if (r.Item.Any())
        {
            Console.WriteLine($"{r.Item["title"]}\t{r.Item["year"]}");
        }
    });
    return true;
}
else
{
    Console.WriteLine($"Couldn't find either {title1} or {title2}.");
    return false;
}
}

```

使用多批 UPDATE 陳述式更新項目。

```

/// <summary>
/// Updates information for multiple movies.
/// </summary>
/// <param name="tableName">The name of the table containing the
/// movies to be updated.</param>
/// <param name="producer1">The producer name for the first movie
/// to update.</param>
/// <param name="title1">The title of the first movie.</param>
/// <param name="year1">The year that the first movie was released.</param>
/// <param name="producer2">The producer name for the second
/// movie to update.</param>

```



```

    /// <param name="title2">The title of the second movie.</param>
    /// <param name="year2">The year that the second movie was released.</param>
    /// <returns>A Boolean value that indicates the success of the update.</
returns>
    public static async Task<bool> UpdateBatch(
        string tableName,
        string producer1,
        string title1,
        int year1,
        string producer2,
        string title2,
        int year2)
    {

        string updateBatch = $"UPDATE {tableName} SET Producer=? WHERE title = ?
AND year = ?";
        var statements = new List<BatchStatementRequest>
        {
            new BatchStatementRequest
            {
                Statement = updateBatch,
                Parameters = new List<AttributeValue>
                {
                    new AttributeValue { S = producer1 },
                    new AttributeValue { S = title1 },
                    new AttributeValue { N = year1.ToString() },
                },
            },
            new BatchStatementRequest
            {
                Statement = updateBatch,
                Parameters = new List<AttributeValue>
                {
                    new AttributeValue { S = producer2 },
                    new AttributeValue { S = title2 },
                    new AttributeValue { N = year2.ToString() },
                },
            }
        };

        var response = await Client.BatchExecuteStatementAsync(new
BatchExecuteStatementRequest
    {

```

```

        Statements = statements,
    });

    return response.HttpStatusCode == System.Net.HttpStatusCode.OK;
}

```

使用多批 DELETE 陳述式刪除項目。

```

/// <summary>
/// Deletes multiple movies using a PartiQL BatchExecuteAsync
/// statement.
/// </summary>
/// <param name="tableName">The name of the table containing the
/// moves that will be deleted.</param>
/// <param name="title1">The title of the first movie.</param>
/// <param name="year1">The year the first movie was released.</param>
/// <param name="title2">The title of the second movie.</param>
/// <param name="year2">The year the second movie was released.</param>
/// <returns>A Boolean value indicating the success of the operation.</
returns>
public static async Task<bool> DeleteBatch(
    string tableName,
    string title1,
    int year1,
    string title2,
    int year2)
{
    string updateBatch = $"DELETE FROM {tableName} WHERE title = ? AND year
= ?";

    var statements = new List<BatchStatementRequest>
    {
        new BatchStatementRequest
        {
            Statement = updateBatch,
            Parameters = new List<AttributeValue>
            {
                new AttributeValue { S = title1 },
                new AttributeValue { N = year1.ToString() },
            },
        },
    },
}

```

```
        new BatchStatementRequest
        {
            Statement = updateBatch,
            Parameters = new List<AttributeValue>
            {
                new AttributeValue { S = title2 },
                new AttributeValue { N = year2.ToString() },
            },
        }
    };

    var response = await Client.BatchExecuteStatementAsync(new
BatchExecuteStatementRequest
    {
        Statements = statements,
    });

    return response.HttpStatusCode == System.Net.HttpStatusCode.OK;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [BatchExecuteStatement](#)。

BatchGetItem

以下程式碼範例顯示如何使用 BatchGetItem。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
using System;
using System.Collections.Generic;
using Amazon.DynamoDBv2;
using Amazon.DynamoDBv2.Model;
```

```

namespace LowLevelBatchGet
{
    public class LowLevelBatchGet
    {
        private static readonly string _table1Name = "Forum";
        private static readonly string _table2Name = "Thread";

        public static async void RetrieveMultipleItemsBatchGet(AmazonDynamoDBClient
client)
        {
            var request = new BatchGetItemRequest
            {
                RequestItems = new Dictionary<string, KeysAndAttributes>()
                {
                    { _table1Name,
                        new KeysAndAttributes
                        {
                            Keys = new List<Dictionary<string, AttributeValue> >()
                            {
                                new Dictionary<string, AttributeValue>()
                                {
                                    { "Name", new AttributeValue {
                                        S = "Amazon DynamoDB"
                                    } }
                                },
                                new Dictionary<string, AttributeValue>()
                                {
                                    { "Name", new AttributeValue {
                                        S = "Amazon S3"
                                    } }
                                }
                            }
                        }
                    },
                    {
                        _table2Name,
                        new KeysAndAttributes
                        {
                            Keys = new List<Dictionary<string, AttributeValue> >()
                            {
                                new Dictionary<string, AttributeValue>()
                                {
                                    { "ForumName", new AttributeValue {
                                        S = "Amazon DynamoDB"
                                    } }
                                }
                            }
                        }
                    }
                }
            }
        }
    }
}

```

```

        { "Subject", new AttributeValue {
            S = "DynamoDB Thread 1"
        } },
        new Dictionary<string, AttributeValue>()
        {
            { "ForumName", new AttributeValue {
                S = "Amazon DynamoDB"
            } },
            { "Subject", new AttributeValue {
                S = "DynamoDB Thread 2"
            } }
        },
        new Dictionary<string, AttributeValue>()
        {
            { "ForumName", new AttributeValue {
                S = "Amazon S3"
            } },
            { "Subject", new AttributeValue {
                S = "S3 Thread 1"
            } }
        }
    }
}
}
}
};

BatchGetItemResponse response;
do
{
    Console.WriteLine("Making request");
    response = await client.BatchGetItemAsync(request);

    // Check the response.
    var responses = response.Responses; // Attribute list in the
response.

    foreach (var tableResponse in responses)
    {
        var tableResults = tableResponse.Value;
        Console.WriteLine("Items retrieved from table {0}",
tableResponse.Key);
        foreach (var item1 in tableResults)

```

```

        {
            PrintItem(item1);
        }
    }

    // Any unprocessed keys? could happen if you exceed
    ProvisionedThroughput or some other error.
    Dictionary<string, KeysAndAttributes> unprocessedKeys =
response.UnprocessedKeys;
    foreach (var unprocessedTableKeys in unprocessedKeys)
    {
        // Print table name.
        Console.WriteLine(unprocessedTableKeys.Key);
        // Print unprocessed primary keys.
        foreach (var key in unprocessedTableKeys.Value.Keys)
        {
            PrintItem(key);
        }
    }

    request.RequestItems = unprocessedKeys;
} while (response.UnprocessedKeys.Count > 0);
}

private static void PrintItem(Dictionary<string, AttributeValue>
attributeList)
{
    foreach (KeyValuePair<string, AttributeValue> kvp in attributeList)
    {
        string attributeName = kvp.Key;
        AttributeValue value = kvp.Value;

        Console.WriteLine(
            attributeName + " " +
            (value.S == null ? "" : "S=[" + value.S + "]") +
            (value.N == null ? "" : "N=[" + value.N + "]") +
            (value.SS == null ? "" : "SS=[" + string.Join(",",
value.SS.ToArray()) + "]") +
            (value.NS == null ? "" : "NS=[" + string.Join(",",
value.NS.ToArray()) + "]")
            );
    }
    Console.WriteLine("*****");
}

```

```
static void Main()
{
    var client = new AmazonDynamoDBClient();

    RetrieveMultipleItemsBatchGet(client);
}
}
```

- 如需 API 詳細資訊，請參閱 適用於 .NET 的 AWS SDK API 參考中的 [BatchGetItem](#)。

DescribeTable

以下程式碼範例顯示如何使用 DescribeTable。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
private static async Task GetTableInformation()
{
    Console.WriteLine("\n*** Retrieving table information ***");

    var response = await Client.DescribeTableAsync(new DescribeTableRequest
    {
        TableName = ExampleTableName
    });

    var table = response.Table;
    Console.WriteLine($"Name: {table.TableName}");
    Console.WriteLine($"# of items: {table.ItemCount}");
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [DescribeTable](#)。

ExecuteStatement

以下程式碼範例顯示如何使用 ExecuteStatement。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

使用 INSERT 陳述式新增項目。

```
/// <summary>
/// Inserts a single movie into the movies table.
/// </summary>
/// <param name="tableName">The name of the table.</param>
/// <param name="movieTitle">The title of the movie to insert.</param>
/// <param name="year">The year that the movie was released.</param>
/// <returns>A Boolean value that indicates the success or failure of
/// the INSERT operation.</returns>
public static async Task<bool> InsertSingleMovie(string tableName, string
movieTitle, int year)
{
    string insertBatch = $"INSERT INTO {tableName} VALUE {{'title': ?,
'year': ?}}";

    var response = await Client.ExecuteStatementAsync(new
ExecuteStatementRequest
    {
        Statement = insertBatch,
        Parameters = new List<AttributeValue>
        {
            new AttributeValue { S = movieTitle },
            new AttributeValue { N = year.ToString() },
        },
    });
}
```



```

        return response.HttpStatusCode == System.Net.HttpStatusCode.OK;
    }

```

使用 SELECT 陳述式取得項目。

```

    /// <summary>
    /// Uses a PartiQL SELECT statement to retrieve a single movie from the
    /// movie database.
    /// </summary>
    /// <param name="tableName">The name of the movie table.</param>
    /// <param name="movieTitle">The title of the movie to retrieve.</param>
    /// <returns>A list of movie data. If no movie matches the supplied
    /// title, the list is empty.</returns>
    public static async Task<List<Dictionary<string, AttributeValue>>>
    GetSingleMovie(string tableName, string movieTitle)
    {
        string selectSingle = $"SELECT * FROM {tableName} WHERE title = ?";
        var parameters = new List<AttributeValue>
        {
            new AttributeValue { S = movieTitle },
        };

        var response = await Client.ExecuteStatementAsync(new
    ExecuteStatementRequest
    {
        Statement = selectSingle,
        Parameters = parameters,
    });

        return response.Items;
    }

```

使用 SELECT 陳述式取得項目清單。

```

    /// <summary>
    /// Retrieve multiple movies by year using a SELECT statement.
    /// </summary>

```

```

    /// <param name="tableName">The name of the movie table.</param>
    /// <param name="year">The year the movies were released.</param>
    /// <returns></returns>
    public static async Task<List<Dictionary<string, AttributeValue>>>
GetMovies(string tableName, int year)
    {
        string selectSingle = $"SELECT * FROM {tableName} WHERE year = ?";
        var parameters = new List<AttributeValue>
        {
            new AttributeValue { N = year.ToString() },
        };

        var response = await Client.ExecuteStatementAsync(new
ExecuteStatementRequest
        {
            Statement = selectSingle,
            Parameters = parameters,
        });

        return response.Items;
    }

```

使用 UPDATE 陳述式更新項目。

```

    /// <summary>
    /// Updates a single movie in the table, adding information for the
    /// producer.
    /// </summary>
    /// <param name="tableName">the name of the table.</param>
    /// <param name="producer">The name of the producer.</param>
    /// <param name="movieTitle">The movie title.</param>
    /// <param name="year">The year the movie was released.</param>
    /// <returns>A Boolean value that indicates the success of the
    /// UPDATE operation.</returns>
    public static async Task<bool> UpdateSingleMovie(string tableName, string
producer, string movieTitle, int year)
    {
        string insertSingle = $"UPDATE {tableName} SET Producer=? WHERE title
= ? AND year = ?";

```

```

        var response = await Client.ExecuteStatementAsync(new
ExecuteStatementRequest
    {
        Statement = insertSingle,
        Parameters = new List<AttributeValue>
        {
            new AttributeValue { S = producer },
            new AttributeValue { S = movieTitle },
            new AttributeValue { N = year.ToString() },
        },
    });

    return response.HttpStatusCode == System.Net.HttpStatusCode.OK;
}

```

使用 DELETE 陳述式刪除單個影片。

```

/// <summary>
/// Deletes a single movie from the table.
/// </summary>
/// <param name="tableName">The name of the table.</param>
/// <param name="movieTitle">The title of the movie to delete.</param>
/// <param name="year">The year that the movie was released.</param>
/// <returns>A Boolean value that indicates the success of the
/// DELETE operation.</returns>
public static async Task<bool> DeleteSingleMovie(string tableName, string
movieTitle, int year)
{
    var deleteSingle = $"DELETE FROM {tableName} WHERE title = ? AND year
= ?";

    var response = await Client.ExecuteStatementAsync(new
ExecuteStatementRequest
    {
        Statement = deleteSingle,
        Parameters = new List<AttributeValue>
        {
            new AttributeValue { S = movieTitle },
            new AttributeValue { N = year.ToString() },
        },
    },

```

```
});  
  
    return response.HttpStatusCode == System.Net.HttpStatusCode.OK;  
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [ExecuteStatement](#)。

ListTables

以下程式碼範例顯示如何使用 ListTables。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
private static async Task ListMyTables()  
{  
    Console.WriteLine("\n*** Listing tables ***");  
  
    string lastTableNameEvaluated = null;  
    do  
    {  
        var response = await Client.ListTablesAsync(new ListTablesRequest  
        {  
            Limit = 2,  
            ExclusiveStartTableName = lastTableNameEvaluated  
        });  
  
        foreach (var name in response.TableNames)  
        {  
            Console.WriteLine(name);  
        }  
  
        lastTableNameEvaluated = response.LastEvaluatedTableName;  
    } while (lastTableNameEvaluated != null);  
}
```

- 如需 API 詳細資訊，請參閱 適用於 .NET 的 AWS SDK API 參考中的 [ListTables](#)。

案例

建立無伺服器應用程式來管理相片

下列程式碼範例示範如何建立無伺服器應用程式，讓使用者以標籤管理相片。

適用於 .NET 的 SDK

顯示如何開發照片資產管理應用程式，以便使用 Amazon Rekognition 偵測圖片中的標籤，並將其儲存以供日後擷取。

如需完整的原始碼和如何設定及執行的指示，請參閱 [GitHub](#) 上的完整範例。

如要深入探索此範例的來源，請參閱 [AWS 社群](#) 上的文章。

此範例中使用的服務

- API Gateway
- DynamoDB
- Lambda
- Amazon Rekognition
- Amazon S3
- Amazon SNS

建立 Web 應用程式以追蹤 DynamoDB 資料

下列程式碼示範如何建立一個 Web 應用程式，該應用程式會追蹤 Amazon DynamoDB 資料表中的工作項目，並使用 Amazon Simple Email Service (Amazon SES) 傳送報告。

適用於 .NET 的 SDK

說明如何使用 Amazon DynamoDB .NET API 來建立可追蹤 DynamoDB 工作資料的動態 Web 應用程式。

如需完整的原始碼和如何設定及執行的指示，請參閱 [GitHub](#) 上的完整範例。

此範例中使用的服務

- DynamoDB
- Amazon SES

使用多批 PartiQL 陳述式查詢資料表

以下程式碼範例顯示做法：

- 透過執行多個 SELECT 陳述式取得一批項目。
- 透過執行多個 INSERT 陳述式新增一批項目。
- 透過執行多個 UPDATE 陳述式更新一批項目。
- 透過執行多個 DELETE 陳述式刪除一批項目。

適用於 .NET 的 SDK

 Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
// Before you run this example, download 'movies.json' from
// https://docs.aws.amazon.com/amazondynamodb/latest/developerguide/
// GettingStarted.Js.02.html,
// and put it in the same folder as the example.

// Separator for the console display.
var SepBar = new string('-', 80);
const string tableName = "movie_table";
const string movieFileName = @"..\..\..\..\resources\sample_files
\movies.json";

DisplayInstructions();

// Create the table and wait for it to be active.
Console.WriteLine($"Creating the movie table: {tableName}");

var success = await DynamoDBMethods.CreateMovieTableAsync(tableName);
```

```
if (success)
{
    Console.WriteLine($"Successfully created table: {tableName}.");
}

WaitForEnter();

// Add movie information to the table from moviedata.json. See the
// instructions at the top of this file to download the JSON file.
Console.WriteLine($"Inserting movies into the new table. Please wait...");
success = await PartiQLBatchMethods.InsertMovies(tableName, movieFileName);
if (success)
{
    Console.WriteLine("Movies successfully added to the table.");
}
else
{
    Console.WriteLine("Movies could not be added to the table.");
}

WaitForEnter();

// Update multiple movies by using the BatchExecute statement.
var title1 = "Star Wars";
var year1 = 1977;
var title2 = "Wizard of Oz";
var year2 = 1939;

Console.WriteLine($"Updating two movies with producer information: {title1} and
{title2}.");
success = await PartiQLBatchMethods.GetBatch(tableName, title1, title2, year1,
year2);
if (success)
{
    Console.WriteLine($"Successfully retrieved {title1} and {title2}.");
}
else
{
    Console.WriteLine("Select statement failed.");
}

WaitForEnter();

// Update multiple movies by using the BatchExecute statement.
```

```
var producer1 = "LucasFilm";
var producer2 = "MGM";

Console.WriteLine($"Updating two movies with producer information: {title1} and
{title2}.");
success = await PartiQLBatchMethods.UpdateBatch(tableName, producer1, title1, year1,
producer2, title2, year2);
if (success)
{
    Console.WriteLine($"Successfully updated {title1} and {title2}.");
}
else
{
    Console.WriteLine("Update failed.");
}

WaitForEnter();

// Delete multiple movies by using the BatchExecute statement.
Console.WriteLine($"Now we will delete {title1} and {title2} from the table.");
success = await PartiQLBatchMethods.DeleteBatch(tableName, title1, year1, title2,
year2);

if (success)
{
    Console.WriteLine($"Deleted {title1} and {title2}");
}
else
{
    Console.WriteLine($"could not delete {title1} or {title2}");
}

WaitForEnter();

// DNow that the PartiQL Batch scenario is complete, delete the movie table.
success = await DynamoDBMethods.DeleteTableAsync(tableName);

if (success)
{
    Console.WriteLine($"Successfully deleted {tableName}");
}
else
{
    Console.WriteLine($"Could not delete {tableName}");
}
```



```

}

/// <summary>
/// Displays the description of the application on the console.
/// </summary>
void DisplayInstructions()
{
    Console.Clear();
    Console.WriteLine();
    Console.Write(new string(' ', 24));
    Console.WriteLine("DynamoDB PartiQL Basics Example");
    Console.WriteLine(SepBar);
    Console.WriteLine("This demo application shows the basics of using Amazon
DynamoDB with the AWS SDK for");
    Console.WriteLine(".NET version 3.7 and .NET 6.");
    Console.WriteLine(SepBar);
    Console.WriteLine("Creates a table by using the CreateTable method.");
    Console.WriteLine("Gets multiple movies by using a PartiQL SELECT statement.");
    Console.WriteLine("Updates multiple movies by using the ExecuteBatch method.");
    Console.WriteLine("Deletes multiple movies by using a PartiQL DELETE
statement.");
    Console.WriteLine("Cleans up the resources created for the demo by deleting the
table.");
    Console.WriteLine(SepBar);

    WaitForEnter();
}

/// <summary>
/// Simple method to wait for the <Enter> key to be pressed.
/// </summary>
void WaitForEnter()
{
    Console.WriteLine("\nPress <Enter> to continue.");
    Console.WriteLine(SepBar);
    _ = Console.ReadLine();
}

/// <summary>
/// Gets movies from the movie table by
/// using an Amazon DynamoDB PartiQL SELECT statement.
/// </summary>
/// <param name="tableName">The name of the table.</param>

```

```

    /// <param name="title1">The title of the first movie.</param>
    /// <param name="title2">The title of the second movie.</param>
    /// <param name="year1">The year of the first movie.</param>
    /// <param name="year2">The year of the second movie.</param>
    /// <returns>True if successful.</returns>
    public static async Task<bool> GetBatch(
        string tableName,
        string title1,
        string title2,
        int year1,
        int year2)
    {
        var getBatch = $"SELECT * FROM {tableName} WHERE title = ? AND year
= ?";

        var statements = new List<BatchStatementRequest>
        {
            new BatchStatementRequest
            {
                Statement = getBatch,
                Parameters = new List<AttributeValue>
                {
                    new AttributeValue { S = title1 },
                    new AttributeValue { N = year1.ToString() },
                },
            },
            new BatchStatementRequest
            {
                Statement = getBatch,
                Parameters = new List<AttributeValue>
                {
                    new AttributeValue { S = title2 },
                    new AttributeValue { N = year2.ToString() },
                },
            }
        };

        var response = await Client.BatchExecuteStatementAsync(new
BatchExecuteStatementRequest
        {
            Statements = statements,
        });

        if (response.Responses.Count > 0)

```

```

        {
            response.Responses.ForEach(r =>
            {
                if (r.Item.Any())
                {
                    Console.WriteLine($"{r.Item["title"]}\t{r.Item["year"]}");
                }
            });
            return true;
        }
        else
        {
            Console.WriteLine($"Couldn't find either {title1} or {title2}.");
            return false;
        }
    }

    /// <summary>
    /// Inserts movies imported from a JSON file into the movie table by
    /// using an Amazon DynamoDB PartiQL INSERT statement.
    /// </summary>
    /// <param name="tableName">The name of the table into which the movie
    /// information will be inserted.</param>
    /// <param name="movieFileName">The name of the JSON file that contains
    /// movie information.</param>
    /// <returns>A Boolean value that indicates the success or failure of
    /// the insert operation.</returns>
    public static async Task<bool> InsertMovies(string tableName, string
movieFileName)
    {
        // Get the list of movies from the JSON file.
        var movies = ImportMovies(movieFileName);

        var success = false;

        if (movies is not null)
        {
            // Insert the movies in a batch using PartiQL. Because the
            // batch can contain a maximum of 25 items, insert 25 movies
            // at a time.
            string insertBatch = $"INSERT INTO {tableName} VALUE {{'title': ?,
'year': ?}}";
            var statements = new List<BatchStatementRequest>();

```

```

        try
        {
            for (var indexOffset = 0; indexOffset < 250; indexOffset += 25)
            {
                for (var i = indexOffset; i < indexOffset + 25; i++)
                {
                    statements.Add(new BatchStatementRequest
                    {
                        Statement = insertBatch,
                        Parameters = new List<AttributeValue>
                        {
                            new AttributeValue { S = movies[i].Title },
                            new AttributeValue { N =
movies[i].Year.ToString() },
                        },
                    });
                }

                var response = await Client.BatchExecuteStatementAsync(new
BatchExecuteStatementRequest
                {
                    Statements = statements,
                });

                // Wait between batches for movies to be successfully added.
                System.Threading.Thread.Sleep(3000);

                success = response.HttpStatusCode ==
System.Net.HttpStatusCode.OK;

                // Clear the list of statements for the next batch.
                statements.Clear();
            }
        }
        catch (AmazonDynamoDBException ex)
        {
            Console.WriteLine(ex.Message);
        }
    }

    return success;
}

```

```

    /// <summary>
    /// Loads the contents of a JSON file into a list of movies to be
    /// added to the DynamoDB table.
    /// </summary>
    /// <param name="movieFileName">The full path to the JSON file.</param>
    /// <returns>A generic list of movie objects.</returns>
    public static List<Movie> ImportMovies(string movieFileName)
    {
        if (!File.Exists(movieFileName))
        {
            return null!;
        }

        using var sr = new StreamReader(movieFileName);
        string json = sr.ReadToEnd();
        var allMovies = JsonConvert.DeserializeObject<List<Movie>>(json);

        if (allMovies is not null)
        {
            // Return the first 250 entries.
            return allMovies.GetRange(0, 250);
        }
        else
        {
            return null!;
        }
    }

    /// <summary>
    /// Updates information for multiple movies.
    /// </summary>
    /// <param name="tableName">The name of the table containing the
    /// movies to be updated.</param>
    /// <param name="producer1">The producer name for the first movie
    /// to update.</param>
    /// <param name="title1">The title of the first movie.</param>
    /// <param name="year1">The year that the first movie was released.</param>
    /// <param name="producer2">The producer name for the second
    /// movie to update.</param>
    /// <param name="title2">The title of the second movie.</param>
    /// <param name="year2">The year that the second movie was released.</param>
    /// <returns>A Boolean value that indicates the success of the update.</
returns>
    public static async Task<bool> UpdateBatch(

```

```
        string tableName,
        string producer1,
        string title1,
        int year1,
        string producer2,
        string title2,
        int year2)
    {
        string updateBatch = $"UPDATE {tableName} SET Producer=? WHERE title = ?
AND year = ?";
        var statements = new List<BatchStatementRequest>
        {
            new BatchStatementRequest
            {
                Statement = updateBatch,
                Parameters = new List<AttributeValue>
                {
                    new AttributeValue { S = producer1 },
                    new AttributeValue { S = title1 },
                    new AttributeValue { N = year1.ToString() },
                },
            },
            new BatchStatementRequest
            {
                Statement = updateBatch,
                Parameters = new List<AttributeValue>
                {
                    new AttributeValue { S = producer2 },
                    new AttributeValue { S = title2 },
                    new AttributeValue { N = year2.ToString() },
                },
            }
        };

        var response = await Client.BatchExecuteStatementAsync(new
BatchExecuteStatementRequest
        {
            Statements = statements,
        });

        return response.HttpStatusCode == System.Net.HttpStatusCode.OK;
    }
```

```

    /// <summary>
    /// Deletes multiple movies using a PartiQL BatchExecuteAsync
    /// statement.
    /// </summary>
    /// <param name="tableName">The name of the table containing the
    /// moves that will be deleted.</param>
    /// <param name="title1">The title of the first movie.</param>
    /// <param name="year1">The year the first movie was released.</param>
    /// <param name="title2">The title of the second movie.</param>
    /// <param name="year2">The year the second movie was released.</param>
    /// <returns>A Boolean value indicating the success of the operation.</
returns>
    public static async Task<bool> DeleteBatch(
        string tableName,
        string title1,
        int year1,
        string title2,
        int year2)
    {

        string updateBatch = $"DELETE FROM {tableName} WHERE title = ? AND year
= ?";

        var statements = new List<BatchStatementRequest>
        {
            new BatchStatementRequest
            {
                Statement = updateBatch,
                Parameters = new List<AttributeValue>
                {
                    new AttributeValue { S = title1 },
                    new AttributeValue { N = year1.ToString() },
                },
            },

            new BatchStatementRequest
            {
                Statement = updateBatch,
                Parameters = new List<AttributeValue>
                {
                    new AttributeValue { S = title2 },
                    new AttributeValue { N = year2.ToString() },
                },
            }
        }
    }

```

```
};

var response = await Client.BatchExecuteStatementAsync(new
BatchExecuteStatementRequest
{
    Statements = statements,
});

return response.HttpStatusCode == System.Net.HttpStatusCode.OK;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [BatchExecuteStatement](#)。

使用 PartiQL 查詢資料表

以下程式碼範例顯示做法：

- 透過執行 SELECT 陳述式取得項目。
- 透過執行 INSERT 陳述式新增項目。
- 透過執行 UPDATE 陳述式更新項目。
- 透過執行 DELETE 陳述式刪除項目。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
namespace PartiQL_Basics_Scenario
{
    public class PartiQLMethods
    {
        private static readonly AmazonDynamoDBClient Client = new
AmazonDynamoDBClient();
```



```

    /// <summary>
    /// Inserts movies imported from a JSON file into the movie table by
    /// using an Amazon DynamoDB PartiQL INSERT statement.
    /// </summary>
    /// <param name="tableName">The name of the table where the movie
    /// information will be inserted.</param>
    /// <param name="movieFileName">The name of the JSON file that contains
    /// movie information.</param>
    /// <returns>A Boolean value that indicates the success or failure of
    /// the insert operation.</returns>
    public static async Task<bool> InsertMovies(string tableName, string
movieFileName)
    {
        // Get the list of movies from the JSON file.
        var movies = ImportMovies(movieFileName);

        var success = false;

        if (movies is not null)
        {
            // Insert the movies in a batch using PartiQL. Because the
            // batch can contain a maximum of 25 items, insert 25 movies
            // at a time.
            string insertBatch = $"INSERT INTO {tableName} VALUE {{'title': ?,
'year': ?}}";
            var statements = new List<BatchStatementRequest>();

            try
            {
                for (var indexOffset = 0; indexOffset < 250; indexOffset += 25)
                {
                    for (var i = indexOffset; i < indexOffset + 25; i++)
                    {
                        statements.Add(new BatchStatementRequest
                        {
                            Statement = insertBatch,
                            Parameters = new List<AttributeValue>
                            {
                                new AttributeValue { S = movies[i].Title },
                                new AttributeValue { N =
movies[i].Year.ToString() },
                            },
                        });
                    }
                }
            }
        }
    }

```

```

        }

        var response = await Client.BatchExecuteStatementAsync(new
BatchExecuteStatementRequest
        {
            Statements = statements,
        });

        // Wait between batches for movies to be successfully added.
        System.Threading.Thread.Sleep(3000);

        success = response.HttpStatusCode ==
System.Net.HttpStatusCode.OK;

        // Clear the list of statements for the next batch.
        statements.Clear();
    }
}
catch (AmazonDynamoDBException ex)
{
    Console.WriteLine(ex.Message);
}
}

return success;
}

/// <summary>
/// Loads the contents of a JSON file into a list of movies to be
/// added to the DynamoDB table.
/// </summary>
/// <param name="movieFileName">The full path to the JSON file.</param>
/// <returns>A generic list of movie objects.</returns>
public static List<Movie> ImportMovies(string movieFileName)
{
    if (!File.Exists(movieFileName))
    {
        return null!;
    }

    using var sr = new StreamReader(movieFileName);
    string json = sr.ReadToEnd();
    var allMovies = JsonConvert.DeserializeObject<List<Movie>>(json);

```

```

        if (allMovies is not null)
        {
            // Return the first 250 entries.
            return allMovies.GetRange(0, 250);
        }
        else
        {
            return null!;
        }
    }
}

/// <summary>
/// Uses a PartiQL SELECT statement to retrieve a single movie from the
/// movie database.
/// </summary>
/// <param name="tableName">The name of the movie table.</param>
/// <param name="movieTitle">The title of the movie to retrieve.</param>
/// <returns>A list of movie data. If no movie matches the supplied
/// title, the list is empty.</returns>
public static async Task<List<Dictionary<string, AttributeValue>>>
GetSingleMovie(string tableName, string movieTitle)
{
    string selectSingle = $"SELECT * FROM {tableName} WHERE title = ?";
    var parameters = new List<AttributeValue>
    {
        new AttributeValue { S = movieTitle },
    };

    var response = await Client.ExecuteStatementAsync(new
ExecuteStatementRequest
    {
        Statement = selectSingle,
        Parameters = parameters,
    });

    return response.Items;
}

/// <summary>
/// Retrieve multiple movies by year using a SELECT statement.

```

```

    /// </summary>
    /// <param name="tableName">The name of the movie table.</param>
    /// <param name="year">The year the movies were released.</param>
    /// <returns></returns>
    public static async Task<List<Dictionary<string, AttributeValue>>>
GetMovies(string tableName, int year)
    {
        string selectSingle = $"SELECT * FROM {tableName} WHERE year = ?";
        var parameters = new List<AttributeValue>
        {
            new AttributeValue { N = year.ToString() },
        };

        var response = await Client.ExecuteStatementAsync(new
ExecuteStatementRequest
        {
            Statement = selectSingle,
            Parameters = parameters,
        });

        return response.Items;
    }

    /// <summary>
    /// Inserts a single movie into the movies table.
    /// </summary>
    /// <param name="tableName">The name of the table.</param>
    /// <param name="movieTitle">The title of the movie to insert.</param>
    /// <param name="year">The year that the movie was released.</param>
    /// <returns>A Boolean value that indicates the success or failure of
    /// the INSERT operation.</returns>
    public static async Task<bool> InsertSingleMovie(string tableName, string
movieTitle, int year)
    {
        string insertBatch = $"INSERT INTO {tableName} VALUE {{'title': ?,
'year': ?}}";

        var response = await Client.ExecuteStatementAsync(new
ExecuteStatementRequest
        {
            Statement = insertBatch,
            Parameters = new List<AttributeValue>
            {

```

```

        new AttributeValue { S = movieTitle },
        new AttributeValue { N = year.ToString() },
    },
});

return response.HttpStatusCode == System.Net.HttpStatusCode.OK;
}

/// <summary>
/// Updates a single movie in the table, adding information for the
/// producer.
/// </summary>
/// <param name="tableName">the name of the table.</param>
/// <param name="producer">The name of the producer.</param>
/// <param name="movieTitle">The movie title.</param>
/// <param name="year">The year the movie was released.</param>
/// <returns>A Boolean value that indicates the success of the
/// UPDATE operation.</returns>
public static async Task<bool> UpdateSingleMovie(string tableName, string
producer, string movieTitle, int year)
{
    string insertSingle = $"UPDATE {tableName} SET Producer=? WHERE title
= ? AND year = ?";

    var response = await Client.ExecuteStatementAsync(new
ExecuteStatementRequest
    {
        Statement = insertSingle,
        Parameters = new List<AttributeValue>
        {
            new AttributeValue { S = producer },
            new AttributeValue { S = movieTitle },
            new AttributeValue { N = year.ToString() },
        },
    });

    return response.HttpStatusCode == System.Net.HttpStatusCode.OK;
}

/// <summary>
```

```

    /// Deletes a single movie from the table.
    /// </summary>
    /// <param name="tableName">The name of the table.</param>
    /// <param name="movieTitle">The title of the movie to delete.</param>
    /// <param name="year">The year that the movie was released.</param>
    /// <returns>A Boolean value that indicates the success of the
    /// DELETE operation.</returns>
    public static async Task<bool> DeleteSingleMovie(string tableName, string
movieTitle, int year)
    {
        var deleteSingle = $"DELETE FROM {tableName} WHERE title = ? AND year
= ?";

        var response = await Client.ExecuteStatementAsync(new
ExecuteStatementRequest
        {
            Statement = deleteSingle,
            Parameters = new List<AttributeValue>
            {
                new AttributeValue { S = movieTitle },
                new AttributeValue { N = year.ToString() },
            },
        });

        return response.HttpStatusCode == System.Net.HttpStatusCode.OK;
    }

    /// <summary>
    /// Displays the list of movies returned from a database query.
    /// </summary>
    /// <param name="items">The list of movie information to display.</param>
    private static void DisplayMovies(List<Dictionary<string, AttributeValue>>
items)
    {
        if (items.Count > 0)
        {
            Console.WriteLine($"Found {items.Count} movies.");
            items.ForEach(item =>
Console.WriteLine($"{item["year"].N}\t{item["title"].S}"));
        }
        else
        {

```

```

        Console.WriteLine($"Didn't find a movie that matched the supplied
criteria.");
    }
}

}

}

/// <summary>
/// Uses a PartiQL SELECT statement to retrieve a single movie from the
/// movie database.
/// </summary>
/// <param name="tableName">The name of the movie table.</param>
/// <param name="movieTitle">The title of the movie to retrieve.</param>
/// <returns>A list of movie data. If no movie matches the supplied
/// title, the list is empty.</returns>
public static async Task<List<Dictionary<string, AttributeValue>>>
GetSingleMovie(string tableName, string movieTitle)
{
    string selectSingle = $"SELECT * FROM {tableName} WHERE title = ?";
    var parameters = new List<AttributeValue>
    {
        new AttributeValue { S = movieTitle },
    };

    var response = await Client.ExecuteStatementAsync(new
ExecuteStatementRequest
    {
        Statement = selectSingle,
        Parameters = parameters,
    });

    return response.Items;
}

/// <summary>
/// Inserts a single movie into the movies table.
/// </summary>
/// <param name="tableName">The name of the table.</param>

```

```

    /// <param name="movieTitle">The title of the movie to insert.</param>
    /// <param name="year">The year that the movie was released.</param>
    /// <returns>A Boolean value that indicates the success or failure of
    /// the INSERT operation.</returns>
    public static async Task<bool> InsertSingleMovie(string tableName, string
movieTitle, int year)
    {
        string insertBatch = $"INSERT INTO {tableName} VALUE {'title': ?,
'year': ?}";

        var response = await Client.ExecuteStatementAsync(new
ExecuteStatementRequest
        {
            Statement = insertBatch,
            Parameters = new List<AttributeValue>
            {
                new AttributeValue { S = movieTitle },
                new AttributeValue { N = year.ToString() },
            },
        });

        return response.HttpStatusCode == System.Net.HttpStatusCode.OK;
    }

    /// <summary>
    /// Updates a single movie in the table, adding information for the
    /// producer.
    /// </summary>
    /// <param name="tableName">the name of the table.</param>
    /// <param name="producer">The name of the producer.</param>
    /// <param name="movieTitle">The movie title.</param>
    /// <param name="year">The year the movie was released.</param>
    /// <returns>A Boolean value that indicates the success of the
    /// UPDATE operation.</returns>
    public static async Task<bool> UpdateSingleMovie(string tableName, string
producer, string movieTitle, int year)
    {
        string insertSingle = $"UPDATE {tableName} SET Producer=? WHERE title
= ? AND year = ?";

        var response = await Client.ExecuteStatementAsync(new
ExecuteStatementRequest

```



```

        {
            Statement = insertSingle,
            Parameters = new List<AttributeValue>
            {
                new AttributeValue { S = producer },
                new AttributeValue { S = movieTitle },
                new AttributeValue { N = year.ToString() },
            },
        });

        return response.HttpStatusCode == System.Net.HttpStatusCode.OK;
    }

    /// <summary>
    /// Deletes a single movie from the table.
    /// </summary>
    /// <param name="tableName">The name of the table.</param>
    /// <param name="movieTitle">The title of the movie to delete.</param>
    /// <param name="year">The year that the movie was released.</param>
    /// <returns>A Boolean value that indicates the success of the
    /// DELETE operation.</returns>
    public static async Task<bool> DeleteSingleMovie(string tableName, string
movieTitle, int year)
    {
        var deleteSingle = $"DELETE FROM {tableName} WHERE title = ? AND year
= ?";

        var response = await Client.ExecuteStatementAsync(new
ExecuteStatementRequest
        {
            Statement = deleteSingle,
            Parameters = new List<AttributeValue>
            {
                new AttributeValue { S = movieTitle },
                new AttributeValue { N = year.ToString() },
            },
        });

        return response.HttpStatusCode == System.Net.HttpStatusCode.OK;
    }

```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [ExecuteStatement](#)。

使用文件模型

下列程式碼範例示範如何使用 DynamoDB 和 AWS SDK 的文件模型來執行建立、讀取、更新和刪除 (CRUD) 和批次操作。

如需詳細資訊，請參閱[文件模型](#)。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

使用文件模型執行 CRUD 操作。

```
/// <summary>
/// Performs CRUD operations on an Amazon DynamoDB table.
/// </summary>
public class MidlevelItemCRUD
{
    public static async Task Main()
    {
        var tableName = "ProductCatalog";
        var sampleBookId = 555;

        var client = new AmazonDynamoDBClient();
        var productCatalog = LoadTable(client, tableName);

        await CreateBookItem(productCatalog, sampleBookId);
        RetrieveBook(productCatalog, sampleBookId);

        // Couple of sample updates.
        UpdateMultipleAttributes(productCatalog, sampleBookId);
        UpdateBookPriceConditionally(productCatalog, sampleBookId);
    }
}
```

```

        // Delete.
        await DeleteBook(productCatalog, sampleBookId);
    }

    /// <summary>
    /// Loads the contents of a DynamoDB table.
    /// </summary>
    /// <param name="client">An initialized DynamoDB client object.</param>
    /// <param name="tableName">The name of the table to load.</param>
    /// <returns>A DynamoDB table object.</returns>
    public static Table LoadTable(IAmazonDynamoDB client, string tableName)
    {
        Table productCatalog = Table.LoadTable(client, tableName);
        return productCatalog;
    }

    /// <summary>
    /// Creates an example book item and adds it to the DynamoDB table
    /// ProductCatalog.
    /// </summary>
    /// <param name="productCatalog">A DynamoDB table object.</param>
    /// <param name="sampleBookId">An integer value representing the book's
ID.</param>
    public static async Task CreateBookItem(Table productCatalog, int
sampleBookId)
    {
        Console.WriteLine("\n*** Executing CreateBookItem() ***");
        var book = new Document
        {
            ["Id"] = sampleBookId,
            ["Title"] = "Book " + sampleBookId,
            ["Price"] = 19.99,
            ["ISBN"] = "111-1111111111",
            ["Authors"] = new List<string> { "Author 1", "Author 2", "Author
3" },
            ["PageCount"] = 500,
            ["Dimensions"] = "8.5x11x.5",
            ["InPublication"] = new DynamoDBBool(true),
            ["InStock"] = new DynamoDBBool(false),
            ["QuantityOnHand"] = 0,
        };

        // Adds the book to the ProductCatalog table.
        await productCatalog.PutItemAsync(book);
    }

```

```

    }

    /// <summary>
    /// Retrieves an item, a book, from the DynamoDB ProductCatalog table.
    /// </summary>
    /// <param name="productCatalog">A DynamoDB table object.</param>
    /// <param name="sampleBookId">An integer value representing the book's
ID.</param>
    public static async void RetrieveBook(
        Table productCatalog,
        int sampleBookId)
    {
        Console.WriteLine("\n*** Executing RetrieveBook() ***");

        // Optional configuration.
        var config = new GetItemOperationConfig
        {
            AttributesToGet = new List<string> { "Id", "ISBN", "Title",
"Authors", "Price" },
            ConsistentRead = true,
        };

        Document document = await productCatalog.GetItemAsync(sampleBookId,
config);
        Console.WriteLine("RetrieveBook: Printing book retrieved...");
        PrintDocument(document);
    }

    /// <summary>
    /// Updates multiple attributes for a book and writes the changes to the
    /// DynamoDB table ProductCatalog.
    /// </summary>
    /// <param name="productCatalog">A DynamoDB table object.</param>
    /// <param name="sampleBookId">An integer value representing the book's
ID.</param>
    public static async void UpdateMultipleAttributes(
        Table productCatalog,
        int sampleBookId)
    {
        Console.WriteLine("\nUpdating multiple attributes....");
        int partitionKey = sampleBookId;

        var book = new Document
        {

```

```

        ["Id"] = partitionKey,

        // List of attribute updates.
        // The following replaces the existing authors list.
        ["Authors"] = new List<string> { "Author x", "Author y" },
        ["newAttribute"] = "New Value",
        ["ISBN"] = null, // Remove it.
    };

    // Optional parameters.
    var config = new UpdateItemOperationConfig
    {
        // Gets updated item in response.
        ReturnValues = ReturnValues.AllNewAttributes,
    };

    Document updatedBook = await productCatalog.UpdateItemAsync(book,
config);
    Console.WriteLine("UpdateMultipleAttributes: Printing item after
updates ...");
    PrintDocument(updatedBook);
}

/// <summary>
/// Updates a book item if it meets the specified criteria.
/// </summary>
/// <param name="productCatalog">A DynamoDB table object.</param>
/// <param name="sampleBookId">An integer value representing the book's
ID.</param>
public static async void UpdateBookPriceConditionally(
    Table productCatalog,
    int sampleBookId)
{
    Console.WriteLine("\n*** Executing UpdateBookPriceConditionally() ***");

    int partitionKey = sampleBookId;

    var book = new Document
    {
        ["Id"] = partitionKey,
        ["Price"] = 29.99,
    };

    // For conditional price update, creating a condition expression.

```

```

        var expr = new Expression
        {
            ExpressionStatement = "Price = :val",
        };
        expr.ExpressionAttributeValues[":val"] = 19.00;

        // Optional parameters.
        var config = new UpdateItemOperationConfig
        {
            ConditionalExpression = expr,
            ReturnValues = ReturnValues.AllNewAttributes,
        };

        Document updatedBook = await productCatalog.UpdateItemAsync(book,
config);

        Console.WriteLine("UpdateBookPriceConditionally: Printing item whose
price was conditionally updated");
        PrintDocument(updatedBook);
    }

    /// <summary>
    /// Deletes the book with the supplied Id value from the DynamoDB table
    /// ProductCatalog.
    /// </summary>
    /// <param name="productCatalog">A DynamoDB table object.</param>
    /// <param name="sampleBookId">An integer value representing the book's
ID.</param>
    public static async Task DeleteBook(
        Table productCatalog,
        int sampleBookId)
    {
        Console.WriteLine("\n*** Executing DeleteBook() ***");

        // Optional configuration.
        var config = new DeleteItemOperationConfig
        {
            // Returns the deleted item.
            ReturnValues = ReturnValues.AllOldAttributes,
        };
        Document document = await productCatalog.DeleteItemAsync(sampleBookId,
config);

        Console.WriteLine("DeleteBook: Printing deleted just deleted...");

        PrintDocument(document);
    }

```

```

    }

    /// <summary>
    /// Prints the information for the supplied DynamoDB document.
    /// </summary>
    /// <param name="updatedDocument">A DynamoDB document object.</param>
    public static void PrintDocument(Document updatedDocument)
    {
        if (updatedDocument is null)
        {
            return;
        }

        foreach (var attribute in updatedDocument.GetAttributeNames())
        {
            string stringValue = null;
            var value = updatedDocument[attribute];

            if (value is null)
            {
                continue;
            }

            if (value is Primitive)
            {
                stringValue = value.AsPrimitive().Value.ToString();
            }
            else if (value is PrimitiveList)
            {
                stringValue = string.Join(",", (from primitive
                                                  in value.AsPrimitiveList().Entries
                                                  select
primitive.Value).ToArray());
            }

            Console.WriteLine($"{attribute} - {stringValue}", attribute,
stringValue);
        }
    }
}

```

使用文件模型執行批次寫入操作。

```

/// <summary>
/// Shows how to use mid-level Amazon DynamoDB API calls to perform batch
/// operations.
/// </summary>
public class MidLevelBatchWriteItem
{
    public static async Task Main()
    {
        IAmazonDynamoDB client = new AmazonDynamoDBClient();

        await SingleTableBatchWrite(client);
        await MultiTableBatchWrite(client);
    }

    /// <summary>
    /// Perform a batch operation on a single DynamoDB table.
    /// </summary>
    /// <param name="client">An initialized DynamoDB object.</param>
    public static async Task SingleTableBatchWrite(IAmazonDynamoDB client)
    {
        Table productCatalog = Table.LoadTable(client, "ProductCatalog");
        var batchWrite = productCatalog.CreateBatchWrite();

        var book1 = new Document
        {
            ["Id"] = 902,
            ["Title"] = "My book1 in batch write using .NET helper classes",
            ["ISBN"] = "902-11-11-1111",
            ["Price"] = 10,
            ["ProductCategory"] = "Book",
            ["Authors"] = new List<string> { "Author 1", "Author 2", "Author
3" },

            ["Dimensions"] = "8.5x11x.5",
            ["InStock"] = new DynamoDBBool(true),
            ["QuantityOnHand"] = new DynamoDBNull(), // Quantity is unknown at
this time.
        };

        batchWrite.AddDocumentToPut(book1);

        // Specify delete item using overload that takes PK.

```



```
        batchWrite.AddKeyToDelete(12345);
        Console.WriteLine("Performing batch write in SingleTableBatchWrite()");
        await batchWrite.ExecuteAsync();
    }

    /// <summary>
    /// Perform a batch operation involving multiple DynamoDB tables.
    /// </summary>
    /// <param name="client">An initialized DynamoDB client object.</param>
    public static async Task MultiTableBatchWrite(IAmazonDynamoDB client)
    {
        // Specify item to add in the Forum table.
        Table forum = Table.LoadTable(client, "Forum");
        var forumBatchWrite = forum.CreateBatchWrite();

        var forum1 = new Document
        {
            ["Name"] = "Test BatchWrite Forum",
            ["Threads"] = 0,
        };
        forumBatchWrite.AddDocumentToPut(forum1);

        // Specify item to add in the Thread table.
        Table thread = Table.LoadTable(client, "Thread");
        var threadBatchWrite = thread.CreateBatchWrite();

        var thread1 = new Document
        {
            ["ForumName"] = "S3 forum",
            ["Subject"] = "My sample question",
            ["Message"] = "Message text",
            ["KeywordTags"] = new List<string> { "S3", "Bucket" },
        };
        threadBatchWrite.AddDocumentToPut(thread1);

        // Specify item to delete from the Thread table.
        threadBatchWrite.AddKeyToDelete("someForumName", "someSubject");

        // Create multi-table batch.
        var superBatch = new MultiTableDocumentBatchWrite();
        superBatch.AddBatch(forumBatchWrite);
        superBatch.AddBatch(threadBatchWrite);
        Console.WriteLine("Performing batch write in MultiTableBatchWrite()");
    }
}
```

```
        // Execute the batch.
        await superBatch.ExecuteAsync();
    }
}
```

使用文件模型掃描資料表。

```
/// <summary>
/// Shows how to use mid-level Amazon DynamoDB API calls to scan a DynamoDB
/// table for values.
/// </summary>
public class MidLevelScanOnly
{
    public static async Task Main()
    {
        IAmazonDynamoDB client = new AmazonDynamoDBClient();

        Table productCatalogTable = Table.LoadTable(client, "ProductCatalog");

        await FindProductsWithNegativePrice(productCatalogTable);
        await FindProductsWithNegativePriceWithConfig(productCatalogTable);
    }

    /// <summary>
    /// Retrieves any products that have a negative price in a DynamoDB table.
    /// </summary>
    /// <param name="productCatalogTable">A DynamoDB table object.</param>
    public static async Task FindProductsWithNegativePrice(
        Table productCatalogTable)
    {
        // Assume there is a price error. So we scan to find items priced < 0.
        var scanFilter = new ScanFilter();
        scanFilter.AddCondition("Price", ScanOperator.LessThan, 0);

        Search search = productCatalogTable.Scan(scanFilter);

        do
        {
            var documentList = await search.GetNextSetAsync();
        }
    }
}
```

```

        Console.WriteLine("\nFindProductsWithNegativePrice:
printing .....");

        foreach (var document in documentList)
        {
            PrintDocument(document);
        }
    }
    while (!search.IsDone);
}

/// <summary>
/// Finds any items in the ProductCatalog table using a DynamoDB
/// configuration object.
/// </summary>
/// <param name="productCatalogTable">A DynamoDB table object.</param>
public static async Task FindProductsWithNegativePriceWithConfig(
    Table productCatalogTable)
{
    // Assume there is a price error. So we scan to find items priced < 0.
    var scanFilter = new ScanFilter();
    scanFilter.AddCondition("Price", ScanOperator.LessThan, 0);

    var config = new ScanOperationConfig()
    {
        Filter = scanFilter,
        Select = SelectValues.SpecificAttributes,
        AttributesToGet = new List<string> { "Title", "Id" },
    };

    Search search = productCatalogTable.Scan(config);

    do
    {
        var documentList = await search.GetNextSetAsync();
        Console.WriteLine("\nFindProductsWithNegativePriceWithConfig:
printing .....");

        foreach (var document in documentList)
        {
            PrintDocument(document);
        }
    }
    while (!search.IsDone);
}

```

```

    }

    /// <summary>
    /// Displays the details of the passed DynamoDB document object on the
    /// console.
    /// </summary>
    /// <param name="document">A DynamoDB document object.</param>
    public static void PrintDocument(Document document)
    {
        Console.WriteLine();
        foreach (var attribute in document.GetAttributeNames())
        {
            string stringValue = null;
            var value = document[attribute];
            if (value is Primitive)
            {
                stringValue = value.AsPrimitive().Value.ToString();
            }
            else if (value is PrimitiveList)
            {
                stringValue = string.Join(",", (from primitive
                                                in value.AsPrimitiveList().Entries
                                                select
primitive.Value).ToArray());
            }

            Console.WriteLine($"{attribute} - {stringValue}");
        }
    }
}

```

使用文件模型搜尋和掃描資料表。

```

    /// <summary>
    /// Shows how to perform mid-level query procedures on an Amazon DynamoDB
    /// table.
    /// </summary>
    public class MidLevelQueryAndScan
    {
        public static async Task Main()

```

```

    {
        IAmazonDynamoDB client = new AmazonDynamoDBClient();

        // Query examples.
        Table replyTable = Table.LoadTable(client, "Reply");
        string forumName = "Amazon DynamoDB";
        string threadSubject = "DynamoDB Thread 2";

        await FindRepliesInLast15Days(replyTable);
        await FindRepliesInLast15DaysWithConfig(replyTable, forumName,
threadSubject);
        await FindRepliesPostedWithinTimePeriod(replyTable, forumName,
threadSubject);

        // Get Example.
        Table productCatalogTable = Table.LoadTable(client, "ProductCatalog");
        int productId = 101;

        await GetProduct(productCatalogTable, productId);
    }

    /// <summary>
    /// Retrieves information about a product from the DynamoDB table
    /// ProductCatalog based on the product ID and displays the information
    /// on the console.
    /// </summary>
    /// <param name="tableName">The name of the table from which to retrieve
    /// product information.</param>
    /// <param name="productId">The ID of the product to retrieve.</param>
    public static async Task GetProduct(Table tableName, int productId)
    {
        Console.WriteLine("*** Executing GetProduct() ***");
        Document productDocument = await tableName.GetItemAsync(productId);
        if (productDocument != null)
        {
            PrintDocument(productDocument);
        }
        else
        {
            Console.WriteLine("Error: product " + productId + " does not
exist");
        }
    }
}

```

```

    /// <summary>
    /// Retrieves replies from the passed DynamoDB table object.
    /// </summary>
    /// <param name="table">The table we want to query.</param>
    public static async Task FindRepliesInLast15Days(
        Table table)
    {
        DateTime twoWeeksAgoDate = DateTime.UtcNow - TimeSpan.FromDays(15);
        var filter = new QueryFilter("Id", QueryOperator.Equal, "Id");
        filter.AddCondition("ReplyDateTime", QueryOperator.GreaterThan,
twoWeeksAgoDate);

        // Use Query overloads that take the minimum required query parameters.
        Search search = table.Query(filter);

        do
        {
            var documentSet = await search.GetNextSetAsync();
            Console.WriteLine("\nFindRepliesInLast15Days:
printing .....");

            foreach (var document in documentSet)
            {
                PrintDocument(document);
            }
        } while (!search.IsDone);
    }

    /// <summary>
    /// Retrieve replies made during a specific time period.
    /// </summary>
    /// <param name="table">The table we want to query.</param>
    /// <param name="forumName">The name of the forum that we're interested
in.</param>
    /// <param name="threadSubject">The subject of the thread, which we are
    /// searching for replies.</param>
    public static async Task FindRepliesPostedWithinTimePeriod(
        Table table,
        string forumName,
        string threadSubject)
    {
        DateTime startDate = DateTime.UtcNow.Subtract(new TimeSpan(21, 0, 0,
0));

```

```

        DateTime endDate = DateTime.UtcNow.Subtract(new TimeSpan(1, 0, 0, 0));

        var filter = new QueryFilter("Id", QueryOperator.Equal, forumName + "#"
+ threadSubject);
        filter.AddCondition("ReplyDateTime", QueryOperator.Between, startDate,
endDate);

        var config = new QueryOperationConfig()
        {
            Limit = 2, // 2 items/page.
            Select = SelectValues.SpecificAttributes,
            AttributesToGet = new List<string>
            {
                "Message",
                "ReplyDateTime",
                "PostedBy",
            },
            ConsistentRead = true,
            Filter = filter,
        };

        Search search = table.Query(config);

        do
        {
            var documentList = await search.GetNextSetAsync();
            Console.WriteLine("\nFindRepliesPostedWithinTimePeriod: printing
replies posted within dates: {0} and {1} .....", startDate, endDate);

            foreach (var document in documentList)
            {
                PrintDocument(document);
            }
        }
        while (!search.IsDone);
    }

    /// <summary>
    /// Perform a query for replies made in the last 15 days using a DynamoDB
    /// QueryOperationConfig object.
    /// </summary>
    /// <param name="table">The table we want to query.</param>
    /// <param name="forumName">The name of the forum that we're interested
in.</param>

```

```

    /// <param name="threadName">The bane of the thread that we are searching
    /// for replies.</param>
    public static async Task FindRepliesInLast15DaysWithConfig(
        Table table,
        string forumName,
        string threadName)
    {
        DateTime twoWeeksAgoDate = DateTime.UtcNow - TimeSpan.FromDays(15);
        var filter = new QueryFilter("Id", QueryOperator.Equal, forumName + "#"
+ threadName);
        filter.AddCondition("ReplyDateTime", QueryOperator.GreaterThan,
twoWeeksAgoDate);

        var config = new QueryOperationConfig()
        {
            Filter = filter,

            // Optional parameters.
            Select = SelectValues.SpecificAttributes,
            AttributesToGet = new List<string>
            {
                "Message",
                "ReplyDateTime",
                "PostedBy",
            },
            ConsistentRead = true,
        };

        Search search = table.Query(config);

        do
        {
            var documentSet = await search.GetNextSetAsync();
            Console.WriteLine("\nFindRepliesInLast15DaysWithConfig:
printing .....");

            foreach (var document in documentSet)
            {
                PrintDocument(document);
            }
        }
        while (!search.IsDone);
    }

```



```
/// <summary>
/// Displays the contents of the passed DynamoDB document on the console.
/// </summary>
/// <param name="document">A DynamoDB document to display.</param>
public static void PrintDocument(Document document)
{
    Console.WriteLine();
    foreach (var attribute in document.GetAttributeNames())
    {
        string stringValue = null;
        var value = document[attribute];

        if (value is Primitive)
        {
            stringValue = value.AsPrimitive().Value.ToString();
        }
        else if (value is PrimitiveList)
        {
            stringValue = string.Join(",", (from primitive
                                             in value.AsPrimitiveList().Entries
                                             select
primitive.Value).ToArray());
        }

        Console.WriteLine($"{attribute} - {stringValue}");
    }
}
```

使用高階物件持久性模型

下列程式碼範例示範如何使用 DynamoDB 和 AWS SDK 的物件持久性模型來執行建立、讀取、更新和刪除 (CRUD) 和批次操作。

如需詳細資訊，請參閱[物件持久性模型](#)。

適用於 .NET 的 SDK

 Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

使用高階物件持久性模型執行 CRUD 操作。

```
/// <summary>
/// Shows how to perform high-level CRUD operations on an Amazon DynamoDB
/// table.
/// </summary>
public class HighLevelItemCrud
{
    public static async Task Main()
    {
        var client = new AmazonDynamoDBClient();
        DynamoDBContext context = new DynamoDBContext(client);
        await PerformCRUDOperations(context);
    }

    public static async Task PerformCRUDOperations(IDynamoDBContext context)
    {
        int bookId = 1001; // Some unique value.
        Book myBook = new Book
        {
            Id = bookId,
            Title = "object persistence-AWS SDK for.NET SDK-Book 1001",
            Isbn = "111-1111111001",
            BookAuthors = new List<string> { "Author 1", "Author 2" },
        };

        // Save the book to the ProductCatalog table.
        await context.SaveAsync(myBook);

        // Retrieve the book from the ProductCatalog table.
        Book bookRetrieved = await context.LoadAsync<Book>(bookId);

        // Update some properties.
        bookRetrieved.Isbn = "222-2222221001";
    }
}
```

```

        // Update existing authors list with the following values.
        bookRetrieved.BookAuthors = new List<string> { " Author 1", "Author
x" };

        await context.SaveChangesAsync(bookRetrieved);

        // Retrieve the updated book. This time, add the optional
        // ConsistentRead parameter using DynamoDBContextConfig object.
        await context.LoadAsync<Book>(bookId, new DynamoDBContextConfig
        {
            ConsistentRead = true,
        });

        // Delete the book.
        await context.DeleteAsync<Book>(bookId);

        // Try to retrieve deleted book. It should return null.
        Book deletedBook = await context.LoadAsync<Book>(bookId, new
DynamoDBContextConfig
        {
            ConsistentRead = true,
        });

        if (deletedBook == null)
        {
            Console.WriteLine("Book is deleted");
        }
    }
}

```

使用高階物件持久性模型執行批次寫入操作。

```

/// <summary>
/// Performs high-level batch write operations to an Amazon DynamoDB table.
/// This example was written using the AWS SDK for .NET version 3.7 and .NET
/// Core 5.0.
/// </summary>
public class HighLevelBatchWriteItem
{
    public static async Task SingleTableBatchWrite(IDynamoDBContext context)

```

```
{
    Book book1 = new Book
    {
        Id = 902,
        InPublication = true,
        Isbn = "902-11-11-1111",
        PageCount = "100",
        Price = 10,
        ProductCategory = "Book",
        Title = "My book3 in batch write",
    };

    Book book2 = new Book
    {
        Id = 903,
        InPublication = true,
        Isbn = "903-11-11-1111",
        PageCount = "200",
        Price = 10,
        ProductCategory = "Book",
        Title = "My book4 in batch write",
    };

    var bookBatch = context.CreateBatchWrite<Book>();
    bookBatch.AddPutItems(new List<Book> { book1, book2 });

    Console.WriteLine("Adding two books to ProductCatalog table.");
    await bookBatch.ExecuteAsync();
}

public static async Task MultiTableBatchWrite(IDynamoDBContext context)
{
    // New Forum item.
    Forum newForum = new Forum
    {
        Name = "Test BatchWrite Forum",
        Threads = 0,
    };
    var forumBatch = context.CreateBatchWrite<Forum>();
    forumBatch.AddPutItem(newForum);

    // New Thread item.
    Thread newThread = new Thread
    {
```

```

        ForumName = "S3 forum",
        Subject = "My sample question",
        KeywordTags = new List<string> { "S3", "Bucket" },
        Message = "Message text",
    };

    DynamoDBOperationConfig config = new DynamoDBOperationConfig();
    config.SkipVersionCheck = true;
    var threadBatch = context.CreateBatchWrite<Thread>(config);
    threadBatch.AddPutItem(newThread);
    threadBatch.AddDeleteKey("some partition key value", "some sort key
value");

    var superBatch = new MultiTableBatchWrite(forumBatch, threadBatch);

    Console.WriteLine("Performing batch write in MultiTableBatchWrite().");
    await superBatch.ExecuteAsync();
}

public static async Task Main()
{
    AmazonDynamoDBClient client = new AmazonDynamoDBClient();
    DynamoDBContext context = new DynamoDBContext(client);

    await SingleTableBatchWrite(context);
    await MultiTableBatchWrite(context);
}
}

```

使用高階物件持久性模型將任意資料映射至資料表。

```

/// <summary>
/// Shows how to map arbitrary data to an Amazon DynamoDB table.
/// </summary>
public class HighLevelMappingArbitraryData
{
    /// <summary>
    /// Creates a book, adds it to the DynamoDB ProductCatalog table, retrieves
    /// the new book from the table, updates the dimensions and writes the
    /// changed item back to the table.

```

```
/// </summary>
/// <param name="context">The DynamoDB context object used to write and
/// read data from the table.</param>
public static async Task AddRetrieveUpdateBook(IDynamoDBContext context)
{
    // Create a book.
    DimensionType myBookDimensions = new DimensionType()
    {
        Length = 8M,
        Height = 11M,
        Thickness = 0.5M,
    };

    Book myBook = new Book
    {
        Id = 501,
        Title = "AWS SDK for .NET Object Persistence Model Handling
Arbitrary Data",
        Isbn = "999-9999999999",
        BookAuthors = new List<string> { "Author 1", "Author 2" },
        Dimensions = myBookDimensions,
    };

    // Add the book to the DynamoDB table ProductCatalog.
    await context.SaveAsync(myBook);

    // Retrieve the book.
    Book bookRetrieved = await context.LoadAsync<Book>(501);

    // Update the book dimensions property.
    bookRetrieved.Dimensions.Height += 1;
    bookRetrieved.Dimensions.Length += 1;
    bookRetrieved.Dimensions.Thickness += 0.2M;

    // Write the changed item to the table.
    await context.SaveAsync(bookRetrieved);
}

public static async Task Main()
{
    var client = new AmazonDynamoDBClient();
    DynamoDBContext context = new DynamoDBContext(client);
    await AddRetrieveUpdateBook(context);
}
```

```
}
```

使用高階物件持久性模型搜尋和掃描資料表。

```
/// <summary>
/// Shows how to perform high-level query and scan operations to Amazon
/// DynamoDB tables.
/// </summary>
public class HighLevelQueryAndScan
{
    public static async Task Main()
    {
        var client = new AmazonDynamoDBClient();

        DynamoDBContext context = new DynamoDBContext(client);

        // Get an item.
        await GetBook(context, 101);

        // Sample forum and thread to test queries.
        string forumName = "Amazon DynamoDB";
        string threadSubject = "DynamoDB Thread 1";

        // Sample queries.
        await FindRepliesInLast15Days(context, forumName, threadSubject);
        await FindRepliesPostedWithinTimePeriod(context, forumName,
threadSubject);

        // Scan table.
        await FindProductsPricedLessThanZero(context);
    }

    public static async Task GetBook(IDynamoDBContext context, int productId)
    {
        Book bookItem = await context.LoadAsync<Book>(productId);

        Console.WriteLine("\nGetBook: Printing result.....");
        Console.WriteLine($"Title: {bookItem.Title} \n ISBN:{bookItem.Isbn} \n
No. of pages: {bookItem.PageCount}");
    }
}
```

```

    /// <summary>
    /// Queries a DynamoDB table to find replies posted within the last 15 days.
    /// </summary>
    /// <param name="context">The DynamoDB context used to perform the query.</
param>
    /// <param name="forumName">The name of the forum that we're interested
in.</param>
    /// <param name="threadSubject">The thread object containing the query
parameters.</param>
    public static async Task FindRepliesInLast15Days(
        IDynamoDBContext context,
        string forumName,
        string threadSubject)
    {
        string replyId = $"{forumName} #{threadSubject}";
        DateTime twoWeeksAgoDate = DateTime.UtcNow - TimeSpan.FromDays(15);

        List<object> times = new List<object>();
        times.Add(twoWeeksAgoDate);

        List<ScanCondition> scs = new List<ScanCondition>();
        var sc = new ScanCondition("PostedBy", ScanOperator.GreaterThan,
times.ToArray());
        scs.Add(sc);

        var cfg = new DynamoDBOperationConfig
        {
            QueryFilter = scs,
        };

        AsyncSearch<Reply> response = context.QueryAsync<Reply>(replyId, cfg);
        IEnumerable<Reply> latestReplies = await response.GetRemainingAsync();

        Console.WriteLine("\nReplies in last 15 days:");

        foreach (Reply r in latestReplies)
        {
            Console.WriteLine($"{r.Id}\t{r.PostedBy}\t{r.Message}\t{r.ReplyDateTime}");
        }
    }

    /// <summary>

```



```

    /// Queries for replies posted within a specific time period.
    /// </summary>
    /// <param name="context">The DynamoDB context used to perform the query.</
param>
    /// <param name="forumName">The name of the forum that we're interested
in.</param>
    /// <param name="threadSubject">Information about the subject that we're
    /// interested in.</param>
    public static async Task FindRepliesPostedWithinTimePeriod(
        IDynamoDBContext context,
        string forumName,
        string threadSubject)
    {
        string forumId = forumName + "#" + threadSubject;
        Console.WriteLine("\nReplies posted within time period:");

        DateTime startDate = DateTime.UtcNow - TimeSpan.FromDays(30);
        DateTime endDate = DateTime.UtcNow - TimeSpan.FromDays(1);

        List<object> times = new List<object>();
        times.Add(startDate);
        times.Add(endDate);

        List<ScanCondition> scs = new List<ScanCondition>();
        var sc = new ScanCondition("LastPostedBy", ScanOperator.Between,
times.ToArray());
        scs.Add(sc);

        var cfg = new DynamoDBOperationConfig
        {
            QueryFilter = scs,
        };

        AsyncSearch<Reply> response = context.QueryAsync<Reply>(forumId, cfg);
        IEnumerable<Reply> repliesInAPeriod = await
response.GetRemainingAsync();

        foreach (Reply r in repliesInAPeriod)
        {
            Console.WriteLine("{r.Id}\t{r.PostedBy}\t{r.Message}\t{r.ReplyDateTime}");
        }
    }
}

```

```

    /// <summary>
    /// Queries the DynamoDB ProductCatalog table for products costing less
    /// than zero.
    /// </summary>
    /// <param name="context">The DynamoDB context object used to perform the
    /// query.</param>
    public static async Task FindProductsPricedLessThanZero(IDynamoDBContext
context)
    {
        int price = 0;

        List<ScanCondition> scs = new List<ScanCondition>();
        var sc1 = new ScanCondition("Price", ScanOperator.LessThan, price);
        var sc2 = new ScanCondition("ProductCategory", ScanOperator.Equal,
"Book");

        scs.Add(sc1);
        scs.Add(sc2);

        AsyncSearch<Book> response = context.ScanAsync<Book>(scs);

        IEnumerable<Book> itemsWithWrongPrice = await
response.GetRemainingAsync();

        Console.WriteLine("\nFindProductsPricedLessThanZero: Printing
result.....");

        foreach (Book r in itemsWithWrongPrice)
        {
            Console.WriteLine($"{r.Id}\t{r.Title}\t{r.Price}\t{r.Isbn}");
        }
    }
}

```

無伺服器範例

使用 DynamoDB 觸發條件調用 Lambda 函式

以下程式碼範例示範如何實作 Lambda 函式，該函式會透過接收 DynamoDB 串流的記錄來接收所觸發的事件。函數會擷取 DynamoDB 承載並記下記錄內容。

適用於 .NET 的 SDK

 Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在[無伺服器範例](#)儲存庫中設定和執行。

使用 .NET 搭配 Lambda 來使用 DynamoDB 事件。

```
// Copyright Amazon.com, Inc. or its affiliates. All Rights Reserved.
// SPDX-License-Identifier: Apache-2.0
using System.Text.Json;
using System.Text;
using Amazon.Lambda.Core;
using Amazon.Lambda.DynamoDBEvents;

// Assembly attribute to enable the Lambda function's JSON input to be converted
// into a .NET class.
[assembly:
    LambdaSerializer(typeof(Amazon.Lambda.Serialization.SystemTextJson.DefaultLambdaJsonSerializer))]

namespace AWSLambda_DDB;

public class Function
{
    public void FunctionHandler(DynamoDBEvent dynamoEvent, ILambdaContext context)
    {
        context.Logger.LogInformation($"Beginning to process
        {dynamoEvent.Records.Count} records...");

        foreach (var record in dynamoEvent.Records)
        {
            context.Logger.LogInformation($"Event ID: {record.EventID}");
            context.Logger.LogInformation($"Event Name: {record.EventName}");

            context.Logger.LogInformation(JsonSerializer.Serialize(record));
        }

        context.Logger.LogInformation("Stream processing complete.");
    }
}
```

使用 DynamoDB 觸發條件報告 Lambda 函式的批次項目失敗

下列程式碼範例示範如何針對接收來自 DynamoDB 串流之事件的 Lambda 函式，實作部分批次回應。此函數會在回應中報告批次項目失敗，指示 Lambda 稍後重試這些訊息。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在[無伺服器範例](#)儲存庫中設定和執行。

使用 .NET 搭配 Lambda 報告 DynamoDB 批次項目失敗。

```
// Copyright Amazon.com, Inc. or its affiliates. All Rights Reserved.
// SPDX-License-Identifier: Apache-2.0
using System.Text.Json;
using System.Text;
using Amazon.Lambda.Core;
using Amazon.Lambda.DynamoDBEvents;

// Assembly attribute to enable the Lambda function's JSON input to be converted
// into a .NET class.
[assembly:
    LambdaSerializer(typeof(Amazon.Lambda.Serialization.SystemTextJson.DefaultLambdaJsonSerializer))]

namespace AWSLambda_DDB;

public class Function
{
    public StreamsEventResponse FunctionHandler(DynamoDBEvent dynamoEvent,
        ILambdaContext context)
    {
        context.Logger.LogInformation($"Beginning to process
        {dynamoEvent.Records.Count} records...");
        List<StreamsEventResponse.BatchItemFailure> batchItemFailures = new
        List<StreamsEventResponse.BatchItemFailure>();
        StreamsEventResponse streamsEventResponse = new StreamsEventResponse();
```

```
foreach (var record in dynamoEvent.Records)
{
    try
    {
        var sequenceNumber = record.Dynamodb.SequenceNumber;
        context.Logger.LogInformation(sequenceNumber);
    }
    catch (Exception ex)
    {
        context.Logger.LogError(ex.Message);
        batchItemFailures.Add(new StreamsEventResponse.BatchItemFailure()
        { ItemIdentifier = record.Dynamodb.SequenceNumber });
    }

    if (batchItemFailures.Count > 0)
    {
        streamsEventResponse.BatchItemFailures = batchItemFailures;
    }

    context.Logger.LogInformation("Stream processing complete.");
    return streamsEventResponse;
}
}
```

AWS 社群貢獻

建置和測試無伺服器應用程式

下列程式碼範例示範如何搭配 Lambda 和 DynamoDB 使用 API Gateway，建置和測試無伺服器應用程式

適用於 .NET 的 SDK

示範如何使用 .NET SDK 建置和測試無伺服器應用程式，而該應用程式是由具有 Lambda 和 DynamoDB 的 API Gateway 組成。

如需完整的原始碼和如何設定及執行的指示，請參閱 [GitHub](#) 上的完整範例。

此範例中使用的服務

- API Gateway

- DynamoDB
- Lambda

使用的 Amazon EC2 範例 適用於 .NET 的 SDK

下列程式碼範例示範如何使用 適用於 .NET 的 AWS SDK 搭配 Amazon EC2 執行動作和實作常見案例。

基本概念是程式碼範例，這些範例說明如何在服務內執行基本操作。

Actions 是大型程式的程式碼摘錄，必須在內容中執行。雖然動作會告訴您如何呼叫個別服務函數，但您可以在其相關情境中查看內容中的動作。

案例是向您展示如何呼叫服務中的多個函數或與其他 AWS 服務組合來完成特定任務的程式碼範例。

每個範例均包含完整原始碼的連結，您可在連結中找到如何設定和執行內容中程式碼的相關指示。

主題

- [基本概念](#)
- [動作](#)
- [案例](#)

基本概念

了解基本概念

以下程式碼範例顯示做法：

- 建立金鑰對和安全群組。
- 選取 Amazon Machine Image (AMI) 和相容的執行個體類型，然後建立執行個體。
- 停止並重新啟動執行個體。
- 將彈性 IP 地址與您的執行個體建立關聯。
- 使用 SSH 連線至執行個體，然後清理資源。

適用於 .NET 的 SDK

 Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

在命令提示中執行案例。

```
/// <summary>
/// Show Amazon Elastic Compute Cloud (Amazon EC2) Basics actions.
/// </summary>
public class EC2Basics
{
    public static ILogger<EC2Basics> _logger = null!;
    public static EC2Wrapper _ec2Wrapper = null!;
    public static SsmWrapper _ssmWrapper = null!;
    public static UiMethods _uiMethods = null!;

    public static string associationId = null!;
    public static string allocationId = null!;
    public static string instanceId = null!;
    public static string keyPairName = null!;
    public static string groupName = null!;
    public static string tempFileName = null!;
    public static string secGroupId = null!;
    public static bool isInteractive = true;

    /// <summary>
    /// Perform the actions defined for the Amazon EC2 Basics scenario.
    /// </summary>
    /// <param name="args">Command line arguments.</param>
    /// <returns>A Task object.</returns>
    public static async Task Main(string[] args)
    {
        // Set up dependency injection for Amazon EC2 and Amazon Simple Systems
        // Management (Amazon SSM) Service.
        using var host =
            Microsoft.Extensions.Hosting.Host.CreateDefaultBuilder(args)
                .ConfigureServices((_, services) =>
                    services.AddAWSService<IAmazonEC2>()
                        .AddAWSService<IAmazonSimpleSystemsManagement>())
```

```

        .AddTransient<EC2Wrapper>()
        .AddTransient<SsmWrapper>()
    )
    .Build();

    SetupServices(host);

    var uniqueName = Guid.NewGuid().ToString();
    keyPairName = "mvp-example-key-pair" + uniqueName;
    groupName = "ec2-scenario-group" + uniqueName;
    var groupDescription = "A security group created for the EC2 Basics
scenario.";

    try
    {
        // Start the scenario.
        _uiMethods.DisplayOverview();
        _uiMethods.PressEnter(isInteractive);

        // Create the key pair.
        _uiMethods.DisplayTitle("Create RSA key pair");
        Console.Write("Let's create an RSA key pair that you can be use to ");
        Console.WriteLine("securely connect to your EC2 instance.");
        var keyPair = await _ec2Wrapper.CreateKeyPair(keyPairName);

        // Save key pair information to a temporary file.
        tempFileName = _ec2Wrapper.SaveKeyPair(keyPair);

        Console.WriteLine(
            $"Created the key pair: {keyPair.KeyName} and saved it to:
{tempFileName}");
        string? answer = "";
        if (isInteractive)
        {
            do
            {
                Console.Write("Would you like to list your existing key pairs?
");
                answer = Console.ReadLine();
            } while (answer!.ToLower() != "y" && answer.ToLower() != "n");
        }

        if (!isInteractive || answer == "y")
        {

```



```

        // List existing key pairs.
        _uiMethods.DisplayTitle("Existing key pairs");

        // Passing an empty string to the DescribeKeyPairs method will
return
        // a list of all existing key pairs.
        var keyPairs = await _ec2Wrapper.DescribeKeyPairs("");
        keyPairs.ForEach(kp =>
        {
            Console.WriteLine(
                $"{kp.KeyName} created at: {kp.CreateTime} Fingerprint:
{kp.KeyFingerprint}");
        });

        _uiMethods.PressEnter(isInteractive);

        // Create the security group.
        Console.WriteLine(
            "Let's create a security group to manage access to your instance.");
        secGroupId = await _ec2Wrapper.CreateSecurityGroup(groupName,
groupDescription);
        Console.WriteLine(
            "Let's add rules to allow all HTTP and HTTPS inbound traffic and to
allow SSH only from your current IP address.");

        _uiMethods.DisplayTitle("Security group information");
        var secGroups = await _ec2Wrapper.DescribeSecurityGroups(secGroupId);

        Console.WriteLine($"Created security group {groupName} in your default
VPC.");
        secGroups.ForEach(group =>
        {
            _ec2Wrapper.DisplaySecurityGroupInfoAsync(group);
        });
        _uiMethods.PressEnter(isInteractive);

        Console.WriteLine(
            "Now we'll authorize the security group we just created so that it
can");

        Console.WriteLine("access the EC2 instances you create.");
        await _ec2Wrapper.AuthorizeSecurityGroupIngress(groupName);

        secGroups = await _ec2Wrapper.DescribeSecurityGroups(secGroupId);

```

```
Console.WriteLine($"Now let's look at the permissions again.");
secGroups.ForEach(group =>
{
    _ec2Wrapper.DisplaySecurityGroupInfoAsync(group);
});
_uiMethods.PressEnter(isInteractive);

// Get list of available Amazon Linux 2 Amazon Machine Images (AMIs).
var parameters =
    await _ssmWrapper.GetParametersByPath(
        "/aws/service/ami-amazon-linux-latest");

List<string> imageIds = parameters.Select(param =>
param.Value).ToList();

var images = await _ec2Wrapper.DescribeImages(imageIds);

var i = 1;
images.ForEach(image =>
{
    Console.WriteLine($"{i++}\t{image.Description}");
});

int choice = 1;
bool validNumber = false;
if (isInteractive)
{
    do
    {
        Console.Write("Please select an image: ");
        var selImage = Console.ReadLine();
        validNumber = int.TryParse(selImage, out choice);
    } while (!validNumber);
}

var selectedImage = images[choice - 1];

// Display available instance types.
_uiMethods.DisplayTitle("Instance Types");
var instanceTypes =
    await _ec2Wrapper.DescribeInstanceTypes(selectedImage.Architecture);

i = 1;
instanceTypes.ForEach(instanceType =>
```

```
{
    Console.WriteLine($"{i++}\t{instanceType.InstanceType}");
});
if (isInteractive)
{
    do
    {
        Console.Write("Please select an instance type: ");
        var selImage = Console.ReadLine();
        validNumber = int.TryParse(selImage, out choice);
    } while (!validNumber);
}

var selectedInstanceType = instanceTypes[choice - 1].InstanceType;

// Create an EC2 instance.
_uiMethods.DisplayTitle("Creating an EC2 Instance");
instanceId = await _ec2Wrapper.RunInstances(selectedImage.ImageId,
    selectedInstanceType, keyPairName, secGroupId);

_uiMethods.PressEnter(isInteractive);

var instance = await _ec2Wrapper.DescribeInstance(instanceId);
_uiMethods.DisplayTitle("New Instance Information");
_ec2Wrapper.DisplayInstanceInformation(instance);

Console.WriteLine(
    "\nYou can use SSH to connect to your instance. For example:");
Console.WriteLine(
    $"{i}\tssh -i {tempFileName} ec2-user@{instance.PublicIpAddress}");

_uiMethods.PressEnter(isInteractive);

Console.WriteLine(
    "Now we'll stop the instance and then start it again to see what's
changed.");

await _ec2Wrapper.StopInstances(instanceId);

Console.WriteLine("Now let's start it up again.");
await _ec2Wrapper.StartInstances(instanceId);

Console.WriteLine("\nLet's see what changed.");
```

```
instance = await _ec2Wrapper.DescribeInstance(instanceId);
_uiMethods.DisplayTitle("New Instance Information");
_ec2Wrapper.DisplayInstanceInformation(instance);

Console.WriteLine("\nNotice the change in the SSH information:");
Console.WriteLine(
    $"\\tssh -i {tempFileName} ec2-user@{instance.PublicIpAddress}");

_uiMethods.PressEnter(isInteractive);

Console.WriteLine(
    "Now we will stop the instance again. Then we will create and
associate an");
Console.WriteLine("Elastic IP address to use with our instance.");

await _ec2Wrapper.StopInstances(instanceId);
_uiMethods.PressEnter(isInteractive);

_uiMethods.DisplayTitle("Allocate Elastic IP address");
Console.WriteLine(
    "You can allocate an Elastic IP address and associate it with your
instance\\nto keep a consistent IP address even when your instance restarts.");
var allocationResponse = await _ec2Wrapper.AllocateAddress();
allocationId = allocationResponse.AllocationId;
Console.WriteLine(
    "Now we will associate the Elastic IP address with our instance.");
associationId = await _ec2Wrapper.AssociateAddress(allocationId,
instanceId);

// Start the instance again.
Console.WriteLine("Now let's start the instance again.");
await _ec2Wrapper.StartInstances(instanceId);

Console.WriteLine("\nLet's see what changed.");

instance = await _ec2Wrapper.DescribeInstance(instanceId);
_uiMethods.DisplayTitle("Instance information");
_ec2Wrapper.DisplayInstanceInformation(instance);

Console.WriteLine("\nHere is the SSH information:");
Console.WriteLine(
    $"\\tssh -i {tempFileName} ec2-user@{instance.PublicIpAddress}");

Console.WriteLine("Let's stop and start the instance again.");
```

```

        _uiMethods.PressEnter(isInteractive);

        await _ec2Wrapper.StopInstances(instanceId);

        Console.WriteLine("\nThe instance has stopped.");

        Console.WriteLine("Now let's start it up again.");
        await _ec2Wrapper.StartInstances(instanceId);

        instance = await _ec2Wrapper.DescribeInstance(instanceId);
        _uiMethods.DisplayTitle("New Instance Information");
        _ec2Wrapper.DisplayInstanceInformation(instance);
        Console.WriteLine("Note that the IP address did not change this time.");
        _uiMethods.PressEnter(isInteractive);

        await Cleanup();
    }
    catch (Exception ex)
    {
        _logger.LogError(ex, "There was a problem with the scenario, starting
cleanup.");
        await Cleanup();
    }

    _uiMethods.DisplayTitle("EC2 Basics Scenario completed.");
    _uiMethods.PressEnter(isInteractive);
}

/// <summary>
/// Set up the services and logging.
/// </summary>
/// <param name="host"></param>
public static void SetUpServices(IHost host)
{
    var loggerFactory = LoggerFactory.Create(builder =>
    {
        builder.AddConsole();
    });
    _logger = new Logger<EC2Basics>(loggerFactory);

    // Now the client is available for injection.
    _ec2Wrapper = host.Services.GetRequiredService<EC2Wrapper>();
    _ssmWrapper = host.Services.GetRequiredService<SsmWrapper>();
    _uiMethods = new UiMethods();

```

```

    }

    /// <summary>
    /// Clean up any resources from the scenario.
    /// </summary>
    /// <returns></returns>
    public static async Task Cleanup()
    {
        _uiMethods.DisplayTitle("Clean up resources");
        Console.WriteLine("Now let's clean up the resources we created.");

        Console.WriteLine("Disassociate the Elastic IP address and release it.");
        // Disassociate the Elastic IP address.
        await _ec2Wrapper.DisassociateIp(associationId);

        // Delete the Elastic IP address.
        await _ec2Wrapper.ReleaseAddress(allocationId);

        // Terminate the instance.
        Console.WriteLine("Terminating the instance we created.");
        await _ec2Wrapper.TerminateInstances(instanceId);

        // Delete the security group.
        Console.WriteLine($"Deleting the Security Group: {groupName}.");
        await _ec2Wrapper.DeleteSecurityGroup(secGroupId);

        // Delete the RSA key pair.
        Console.WriteLine($"Deleting the key pair: {keyPairName}");
        await _ec2Wrapper.DeleteKeyPair(keyPairName);
        Console.WriteLine("Deleting the temporary file with the key information.");
        _ec2Wrapper.DeleteTempFile(tempFileName);
        _uiMethods.PressEnter(isInteractive);
    }
}

```

定義包裝 EC2 動作的類別。

```

/// <summary>
/// Methods of this class perform Amazon Elastic Compute Cloud (Amazon EC2).
/// </summary>
public class EC2Wrapper
{

```

```

private readonly IAmazonEC2 _amazonEC2;
private readonly ILogger<EC2Wrapper> _logger;

/// <summary>
/// Constructor for the EC2Wrapper class.
/// </summary>
/// <param name="amazonScheduler">The injected EC2 client.</param>
/// <param name="logger">The injected logger.</param>
public EC2Wrapper(IAmazonEC2 amazonService, ILogger<EC2Wrapper> logger)
{
    _amazonEC2 = amazonService;
    _logger = logger;
}

/// <summary>
/// Allocates an Elastic IP address that can be associated with an Amazon EC2
// instance. By using an Elastic IP address, you can keep the public IP address
// constant even when you restart the associated instance.
/// </summary>
/// <returns>The response object for the allocated address.</returns>
public async Task<AllocateAddressResponse> AllocateAddress()
{
    var request = new AllocateAddressRequest();

    try
    {
        var response = await _amazonEC2.AllocateAddressAsync(request);
        Console.WriteLine($"Allocated IP: {response.PublicIp} with allocation ID
{response.AllocationId}.");
        return response;
    }
    catch (AmazonEC2Exception ec2Exception)
    {
        if (ec2Exception.ErrorCode == "AddressLimitExceeded")
        {
            // For more information on Elastic IP address quotas, see:
            // https://docs.aws.amazon.com/AWSEC2/latest/UserGuide/elastic-ip-
addresses-eip.html#using-instance-addressing-limit
            _logger.LogError($"Unable to allocate Elastic IP, address limit
exceeded. {ec2Exception.Message}");
        }

        throw;
    }
}

```

```

        catch (Exception ex)
        {
            _logger.LogError($"An error occurred while allocating Elastic IP.:
{ex.Message}");
            throw;
        }
    }

    /// <summary>
    /// Associates an Elastic IP address with an instance. When this association is
    /// created, the Elastic IP's public IP address is immediately used as the
    public
    /// IP address of the associated instance.
    /// </summary>
    /// <param name="allocationId">The allocation Id of an Elastic IP address.</
param>
    /// <param name="instanceId">The instance Id of the EC2 instance to
    /// associate the address with.</param>
    /// <returns>The association Id that represents
    /// the association of the Elastic IP address with an instance.</returns>
    public async Task<string> AssociateAddress(string allocationId, string
instanceId)
    {
        try
        {
            var request = new AssociateAddressRequest
            {
                AllocationId = allocationId,
                InstanceId = instanceId
            };

            var response = await _amazonEC2.AssociateAddressAsync(request);
            return response.AssociationId;
        }
        catch (AmazonEC2Exception ec2Exception)
        {
            if (ec2Exception.ErrorCode == "InvalidInstanceId")
            {
                _logger.LogError(
                    $"InstanceId is invalid, unable to associate address.
{ec2Exception.Message}");
            }

            throw;
        }
    }

```



```

    }
    catch (Exception ex)
    {
        _logger.LogError(
            $"An error occurred while associating the Elastic IP.:
{ex.Message}");
        throw;
    }
}

/// <summary>
/// Authorize the local computer ingress to EC2 instances associated
/// with the virtual private cloud (VPC) security group.
/// </summary>
/// <param name="groupName">The name of the security group.</param>
/// <returns>A Boolean value indicating the success of the action.</returns>
public async Task<bool> AuthorizeSecurityGroupIngress(string groupName)
{
    try
    {
        // Get the IP address for the local computer.
        var ipAddress = await GetIpAddress();
        Console.WriteLine($"Your IP address is: {ipAddress}");
        var ipRanges =
            new List<IpRange> { new IpRange { CidrIp = $"{ipAddress}/32" } };
        var permission = new IpPermission
        {
            Ipv4Ranges = ipRanges,
            IpProtocol = "tcp",
            FromPort = 22,
            ToPort = 22
        };
        var permissions = new List<IpPermission> { permission };
        var response = await _amazonEC2.AuthorizeSecurityGroupIngressAsync(
            new AuthorizeSecurityGroupIngressRequest(groupName, permissions));
        return response.HttpStatusCode == HttpStatusCode.OK;
    }
    catch (AmazonEC2Exception ec2Exception)
    {
        if (ec2Exception.ErrorCode == "InvalidPermission.Duplicate")
        {
            _logger.LogError(
                $"The ingress rule already exists. {ec2Exception.Message}");
        }
    }
}

```

```

        throw;
    }
    catch (Exception ex)
    {
        _logger.LogError(
            $"An error occurred while authorizing ingress.: {ex.Message}");
        throw;
    }
}

/// <summary>
/// Authorize the local computer for ingress to
/// the Amazon EC2 SecurityGroup.
/// </summary>
/// <returns>The IPv4 address of the computer running the scenario.</returns>
private static async Task<string> GetIpAddress()
{
    var httpClient = new HttpClient();
    var ipString = await httpClient.GetStringAsync("https://
checkip.amazonaws.com");

    // The IP address is returned with a new line
    // character on the end. Trim off the whitespace and
    // return the value to the caller.
    return ipString.Trim();
}

/// <summary>
/// Create an Amazon EC2 key pair with a specified name.
/// </summary>
/// <param name="keyPairName">The name for the new key pair.</param>
/// <returns>The Amazon EC2 key pair created.</returns>
public async Task<KeyPair?> CreateKeyPair(string keyPairName)
{
    try
    {
        var request = new CreateKeyPairRequest { KeyName = keyPairName, };

        var response = await _amazonEC2.CreateKeyPairAsync(request);

        var kp = response.KeyPair;
        // Return the key pair so it can be saved if needed.
    }
}

```

```

        // Wait until the key pair exists.
        int retries = 5;
        while (retries-- > 0)
        {
            Console.WriteLine($"Checking for new KeyPair {keyPairName}...");
            var keyPairs = await DescribeKeyPairs(keyPairName);
            if (keyPairs.Any())
            {
                return kp;
            }

            Thread.Sleep(5000);
            retries--;
        }
        _logger.LogError($"Unable to find newly created KeyPair
{keyPairName}.");
        throw new DoesNotExistException("KeyPair not found");
    }
    catch (AmazonEC2Exception ec2Exception)
    {
        if (ec2Exception.ErrorCode == "InvalidKeyPair.Duplicate")
        {
            _logger.LogError(
                $"A key pair called {keyPairName} already exists.");
        }

        throw;
    }
    catch (Exception ex)
    {
        _logger.LogError(
            $"An error occurred while creating the key pair.: {ex.Message}");
        throw;
    }
}

/// <summary>
/// Save KeyPair information to a temporary file.
/// </summary>
/// <param name="keyPair">The name of the key pair.</param>
/// <returns>The full path to the temporary file.</returns>
public string SaveKeyPair(KeyPair keyPair)
{
    var tempPath = Path.GetTempPath();

```

```

        var tempFileName = $"{tempPath}\\{Path.GetRandomFileName()}";
        var pemFileName = Path.ChangeExtension(tempFileName, "pem");

        // Save the key pair to a file in a temporary folder.
        using var stream = new FileStream(pemFileName, FileMode.Create);
        using var writer = new StreamWriter(stream);
        writer.WriteLine(keyPair.KeyMaterial);

        return pemFileName;
    }

    /// <summary>
    /// Create an Amazon EC2 security group with a specified name and description.
    /// </summary>
    /// <param name="groupName">The name for the new security group.</param>
    /// <param name="groupDescription">A description of the new security group.</
param>
    /// <returns>The group Id of the new security group.</returns>
    public async Task<string> CreateSecurityGroup(string groupName, string
groupDescription)
    {
        try
        {
            var response = await _amazonEC2.CreateSecurityGroupAsync(
                new CreateSecurityGroupRequest(groupName, groupDescription));

            // Wait until the security group exists.
            int retries = 5;
            while (retries-- > 0)
            {
                var groups = await DescribeSecurityGroups(response.GroupId);
                if (groups.Any())
                {
                    return response.GroupId;
                }

                Thread.Sleep(5000);
                retries--;
            }
            _logger.LogError($"Unable to find newly created group {groupName}.");
            throw new DoesNotExistException("security group not found");
        }
        catch (AmazonEC2Exception ec2Exception)
        {

```

```

        if (ec2Exception.ErrorCode == "ResourceAlreadyExists")
        {
            _logger.LogError(
                $"A security group with the name {groupName} already exists.
{ec2Exception.Message}");
        }
        throw;
    }
    catch (Exception ex)
    {
        _logger.LogError(
            $"An error occurred while creating the security group.:
{ex.Message}");
        throw;
    }
}

/// <summary>
/// Create a new Amazon EC2 VPC.
/// </summary>
/// <param name="cidrBlock">The CIDR block for the new security group.</param>
/// <returns>The VPC Id of the new VPC.</returns>
public async Task<string?> CreateVPC(string cidrBlock)
{
    try
    {
        var response = await _amazonEC2.CreateVpcAsync(new CreateVpcRequest
        {
            CidrBlock = cidrBlock,
        });

        Vpc vpc = response.Vpc;
        Console.WriteLine($"Created VPC with ID: {vpc.VpcId}.");
        return vpc.VpcId;
    }
    catch (AmazonEC2Exception ex)
    {
        Console.WriteLine($"Couldn't create VPC because: {ex.Message}");
        return null;
    }
}

```

```
/// <summary>
/// Delete an Amazon EC2 key pair.
/// </summary>
/// <param name="keyPairName">The name of the key pair to delete.</param>
/// <returns>A Boolean value indicating the success of the action.</returns>
public async Task<bool> DeleteKeyPair(string keyPairName)
{
    try
    {
        await _amazonEC2.DeleteKeyPairAsync(new
DeleteKeyPairRequest(keyPairName)).ConfigureAwait(false);
        return true;
    }
    catch (AmazonEC2Exception ec2Exception)
    {
        if (ec2Exception.ErrorCode == "InvalidKeyPair.NotFound")
        {
            _logger.LogError($"KeyPair {keyPairName} does not exist and cannot
be deleted. Please verify the key pair name and try again.");
        }

        return false;
    }
    catch (Exception ex)
    {
        Console.WriteLine($"Couldn't delete the key pair because:
{ex.Message}");
        return false;
    }
}

/// <summary>
/// Delete the temporary file where the key pair information was saved.
/// </summary>
/// <param name="tempFileName">The path to the temporary file.</param>
public void DeleteTempFile(string tempFileName)
{
    if (File.Exists(tempFileName))
    {
        File.Delete(tempFileName);
    }
}

/// <summary>
```

```

/// Delete an Amazon EC2 security group.
/// </summary>
/// <param name="groupName">The name of the group to delete.</param>
/// <returns>A Boolean value indicating the success of the action.</returns>
public async Task<bool> DeleteSecurityGroup(string groupId)
{
    try
    {
        var response =
            await _amazonEC2.DeleteSecurityGroupAsync(
                new DeleteSecurityGroupRequest { GroupId = groupId });
        return response.HttpStatusCode == HttpStatusCode.OK;
    }
    catch (AmazonEC2Exception ec2Exception)
    {
        if (ec2Exception.ErrorCode == "InvalidGroup.NotFound")
        {
            _logger.LogError(
                $"Security Group {groupId} does not exist and cannot be deleted.
Please verify the ID and try again.");
        }

        return false;
    }
    catch (Exception ex)
    {
        Console.WriteLine($"Couldn't delete the security group because:
{ex.Message}");
        return false;
    }
}

/// <summary>
/// Delete an Amazon EC2 VPC.
/// </summary>
/// <returns>A Boolean value indicating the success of the action.</returns>
public async Task<bool> DeleteVpc(string vpcId)
{
    var request = new DeleteVpcRequest
    {
        VpcId = vpcId,
    };

    var response = await _amazonEC2.DeleteVpcAsync(request);

```

```
        return response.HttpStatusCode == System.Net.HttpStatusCode.OK;
    }

    /// <summary>
    /// Get information about existing Amazon EC2 images.
    /// </summary>
    /// <returns>A list of image information.</returns>
    public async Task<List<Image>> DescribeImages(List<string>? imageIds)
    {
        var request = new DescribeImagesRequest();
        if (imageIds is not null)
        {
            // If the imageIds list is not null, add the list
            // to the request object.
            request.ImageIds = imageIds;
        }

        var response = await _amazonEC2.DescribeImagesAsync(request);
        return response.Images;
    }

    /// <summary>
    /// Display the information returned by DescribeImages.
    /// </summary>
    /// <param name="images">The list of image information to display.</param>
    public void DisplayImageInfo(List<Image> images)
    {
        images.ForEach(image =>
        {
            Console.WriteLine($"{image.Name} Created on: {image.CreationDate}");
        });
    }

    /// <summary>
    /// Get information about an Amazon EC2 instance.
    /// </summary>
    /// <param name="instanceId">The instance Id of the EC2 instance.</param>
    /// <returns>An EC2 instance.</returns>
    public async Task<Instance> DescribeInstance(string instanceId)
    {
        var response = await _amazonEC2.DescribeInstancesAsync(
```



```

        new DescribeInstancesRequest { InstanceIds = new List<string>
{ instanceId } });
        return response.Reservations[0].Instances[0];
    }

    /// <summary>
    /// Display EC2 instance information.
    /// </summary>
    /// <param name="instance">The instance Id of the EC2 instance.</param>
    public void DisplayInstanceInformation(Instance instance)
    {
        Console.WriteLine($"ID: {instance.InstanceId}");
        Console.WriteLine($"Image ID: {instance.ImageId}");
        Console.WriteLine($"{{instance.InstanceType}}");
        Console.WriteLine($"Key Name: {instance.KeyName}");
        Console.WriteLine($"VPC ID: {instance.VpcId}");
        Console.WriteLine($"Public IP: {instance.PublicIpAddress}");
        Console.WriteLine($"State: {instance.State.Name}");
    }

    /// <summary>
    /// Get information about EC2 instances with a particular state.
    /// </summary>
    /// <param name="tagName">The name of the tag to filter on.</param>
    /// <param name="tagValue">The value of the tag to look for.</param>
    /// <returns>True if successful.</returns>
    public async Task<bool> GetInstancesWithState(string state)
    {
        try
        {
            // Filters the results of the instance list.
            var filters = new List<Filter>
            {
                new Filter
                {
                    Name = $"instance-state-name",
                    Values = new List<string> { state, },
                },
            };
            var request = new DescribeInstancesRequest { Filters = filters, };

            Console.WriteLine($"\\nShowing instances with state {state}");
            var paginator = _amazonEC2.Paginators.DescribeInstances(request);

```

```

        await foreach (var response in paginator.Responses)
        {
            foreach (var reservation in response.Reservations)
            {
                foreach (var instance in reservation.Instances)
                {
                    Console.Write($"Instance ID: {instance.InstanceId} ");
                    Console.WriteLine($"\\tCurrent State:
{instance.State.Name}");
                }
            }
        }

        return true;
    }
    catch (AmazonEC2Exception ec2Exception)
    {
        if (ec2Exception.ErrorCode == "InvalidParameterValue")
        {
            _logger.LogError(
                $"Invalid parameter value for filtering instances.");
        }

        return false;
    }
    catch (Exception ex)
    {
        Console.WriteLine($"Couldn't list instances because: {ex.Message}");
        return false;
    }
}

/// <summary>
/// Describe the instance types available.
/// </summary>
/// <returns>A list of instance type information.</returns>
public async Task<List<InstanceTypeInfo>>
DescribeInstanceTypes(ArchitectureValues architecture)
{
    try
    {
        var request = new DescribeInstanceTypesRequest();

        var filters = new List<Filter>

```

```

        {
            new Filter("processor-info.supported-architecture",
                new List<string> { architecture.ToString() })
        };
        filters.Add(new Filter("instance-type", new() { "*.micro",
            "*.small" }));

        request.Filters = filters;
        var instanceTypes = new List<InstanceTypeInfo>();

        var paginator = _amazonEC2.Paginators.DescribeInstanceTypes(request);
        await foreach (var instanceType in paginator.InstanceTypes)
        {
            instanceTypes.Add(instanceType);
        }

        return instanceTypes;
    }
    catch (AmazonEC2Exception ec2Exception)
    {
        if (ec2Exception.ErrorCode == "InvalidParameterValue")
        {
            _logger.LogError(
                $"Parameters are invalid. Ensure architecture and size strings conform to DescribeInstanceTypes API reference.");
        }

        throw;
    }
    catch (Exception ex)
    {
        Console.WriteLine($"Couldn't delete the security group because: {ex.Message}");
        throw;
    }
}

/// <summary>
/// Get information about an Amazon EC2 key pair.
/// </summary>
/// <param name="keyPairName">The name of the key pair.</param>
/// <returns>A list of key pair information.</returns>
public async Task<List<KeyPairInfo>> DescribeKeyPairs(string keyPairName)
{

```

```

        try
        {
            var request = new DescribeKeyPairsRequest();
            if (!string.IsNullOrEmpty(keyPairName))
            {
                request = new DescribeKeyPairsRequest
                {
                    KeyNames = new List<string> { keyPairName }
                };
            }

            var response = await _amazonEC2.DescribeKeyPairsAsync(request);
            return response.KeyPairs.ToList();
        }
        catch (AmazonEC2Exception ec2Exception)
        {
            if (ec2Exception.ErrorCode == "InvalidKeyPair.NotFound")
            {
                _logger.LogError(
                    $"A key pair called {keyPairName} does not exist.");
            }

            throw;
        }
        catch (Exception ex)
        {
            _logger.LogError(
                $"An error occurred while describing the key pair.: {ex.Message}");
            throw;
        }
    }

    /// <summary>
    /// Retrieve information for one or all Amazon EC2 security group.
    /// </summary>
    /// <param name="groupId">The optional Id of a specific Amazon EC2 security
group.</param>
    /// <returns>A list of security group information.</returns>
    public async Task<List<SecurityGroup>> DescribeSecurityGroups(string groupId)
    {
        try
        {
            var securityGroups = new List<SecurityGroup>();

```

```

        var request = new DescribeSecurityGroupsRequest();

        if (!string.IsNullOrEmpty(groupId))
        {
            var groupIds = new List<string> { groupId };
            request.GroupIds = groupIds;
        }

        var paginatorForSecurityGroups =
            _amazonEC2.Paginators.DescribeSecurityGroups(request);

        await foreach (var securityGroup in
paginatorForSecurityGroups.SecurityGroups)
        {
            securityGroups.Add(securityGroup);
        }

        return securityGroups;
    }
    catch (AmazonEC2Exception ec2Exception)
    {
        if (ec2Exception.ErrorCode == "InvalidGroup.NotFound")
        {
            _logger.LogError(
                $"A security group {groupId} does not exist.");
        }

        throw;
    }
    catch (Exception ex)
    {
        _logger.LogError(
            $"An error occurred while listing security groups. {ex.Message}");
        throw;
    }
}

/// <summary>
/// Display the information returned by the call to
/// DescribeSecurityGroupsAsync.
/// </summary>
/// <param name="securityGroup">A list of security group information.</param>
public void DisplaySecurityGroupInfoAsync(SecurityGroup securityGroup)

```

```

{
    Console.WriteLine($"{securityGroup.GroupName}");
    Console.WriteLine("Ingress permissions:");
    securityGroup.IpPermissions.ForEach(permission =>
    {
        Console.WriteLine($"  \tFromPort: {permission.FromPort}");
        Console.WriteLine($"  \tIpProtocol: {permission.IpProtocol}");

        Console.WriteLine($"  \tIpv4Ranges: ");
        permission.Ipv4Ranges.ForEach(range => { Console.Write($"{range.CidrIp}
"); });

        Console.WriteLine($"  \n\tIpv6Ranges:");
        permission.Ipv6Ranges.ForEach(range =>
{ Console.Write($"{range.CidrIpv6} "); });

        Console.WriteLine($"  \n\tPrefixListIds: ");
        permission.PrefixListIds.ForEach(id => Console.Write($"{id.Id} "));

        Console.WriteLine($"  \n\tTo Port: {permission.ToPort}");
    });
    Console.WriteLine("Egress permissions:");
    securityGroup.IpPermissionsEgress.ForEach(permission =>
    {
        Console.WriteLine($"  \tFromPort: {permission.FromPort}");
        Console.WriteLine($"  \tIpProtocol: {permission.IpProtocol}");

        Console.WriteLine($"  \tIpv4Ranges: ");
        permission.Ipv4Ranges.ForEach(range => { Console.Write($"{range.CidrIp}
"); });

        Console.WriteLine($"  \n\tIpv6Ranges:");
        permission.Ipv6Ranges.ForEach(range =>
{ Console.Write($"{range.CidrIpv6} "); });

        Console.WriteLine($"  \n\tPrefixListIds: ");
        permission.PrefixListIds.ForEach(id => Console.Write($"{id.Id} "));

        Console.WriteLine($"  \n\tTo Port: {permission.ToPort}");
    });
}

/// <summary>

```

```

    /// Disassociate an Elastic IP address from an EC2 instance.
    /// </summary>
    /// <param name="associationId">The association Id.</param>
    /// <returns>A Boolean value indicating the success of the action.</returns>
    public async Task<bool> DisassociateIp(string associationId)
    {
        try
        {
            var response = await _amazonEC2.DisassociateAddressAsync(
                new DisassociateAddressRequest { AssociationId = associationId });
            return response.HttpStatusCode == HttpStatusCode.OK;
        }
        catch (AmazonEC2Exception ec2Exception)
        {
            if (ec2Exception.ErrorCode == "InvalidAssociationID.NotFound")
            {
                _logger.LogError(
                    $"AssociationId is invalid, unable to disassociate address.
{ec2Exception.Message}");
            }

            return false;
        }
        catch (Exception ex)
        {
            _logger.LogError(
                $"An error occurred while disassociating the Elastic IP.:
{ex.Message}");
            return false;
        }
    }

    /// <summary>
    /// Reboot a specific EC2 instance.
    /// </summary>
    /// <param name="ec2InstanceId">The instance Id of the instance that will be
    rebooted.</param>
    /// <returns>Async Task.</returns>
    public async Task<bool> RebootInstances(string ec2InstanceId)
    {
        try
        {
            var request = new RebootInstancesRequest
            {

```

```

        InstanceIds = new List<string> { ec2InstanceId },
    };

    await _amazonEC2.RebootInstancesAsync(request);

    // Wait for the instance to be running.
    Console.WriteLine("Waiting for the instance to start.");
    await WaitForInstanceState(ec2InstanceId, InstanceStateName.Running);

    return true;
}
catch (AmazonEC2Exception ec2Exception)
{
    if (ec2Exception.ErrorCode == "InvalidInstanceId")
    {
        _logger.LogError(
            $"InstanceId {ec2InstanceId} is invalid, unable to reboot.
{ec2Exception.Message}");
    }
    return false;
}
catch (Exception ex)
{
    _logger.LogError(
        $"An error occurred while rebooting the instance {ec2InstanceId}.:
{ex.Message}");
    return false;
}
}

/// <summary>
/// Release an Elastic IP address. After the Elastic IP address is released,
/// it can no longer be used.
/// </summary>
/// <param name="allocationId">The allocation Id of the Elastic IP address.</
param>
/// <returns>True if successful.</returns>
public async Task<bool> ReleaseAddress(string allocationId)
{
    try
    {
        var request = new ReleaseAddressRequest { AllocationId = allocationId };

        var response = await _amazonEC2.ReleaseAddressAsync(request);
    }
}

```



```

        return response.HttpStatusCode == HttpStatusCode.OK;
    }
    catch (AmazonEC2Exception ec2Exception)
    {
        if (ec2Exception.ErrorCode == "InvalidAllocationID.NotFound")
        {
            _logger.LogError(
                $"AllocationId {allocationId} was not found.
{ec2Exception.Message}");
        }

        return false;
    }
    catch (Exception ex)
    {
        _logger.LogError(
            $"An error occurred while releasing the AllocationId
{allocationId}.: {ex.Message}");
        return false;
    }
}

/// <summary>
/// Create and run an EC2 instance.
/// </summary>
/// <param name="ImageId">The image Id of the image used as a basis for the
/// EC2 instance.</param>
/// <param name="instanceType">The instance type of the EC2 instance to
create.</param>
/// <param name="keyName">The name of the key pair to associate with the
/// instance.</param>
/// <param name="groupId">The Id of the Amazon EC2 security group that will be
/// allowed to interact with the new EC2 instance.</param>
/// <returns>The instance Id of the new EC2 instance.</returns>
public async Task<string> RunInstances(string imageId, string instanceType,
string keyName, string groupId)
{
    try
    {
        var request = new RunInstancesRequest
        {
            ImageId = imageId,
            InstanceType = instanceType,
            KeyName = keyName,

```

```

        MinCount = 1,
        MaxCount = 1,
        SecurityGroupIds = new List<string> { groupId }
    };
    var response = await _amazonEC2.RunInstancesAsync(request);
    var instanceId = response.Reservation.Instances[0].InstanceId;

    Console.WriteLine("Waiting for the instance to start.");
    await WaitForInstanceState(instanceId, InstanceStateName.Running);

    return instanceId;
}
catch (AmazonEC2Exception ec2Exception)
{
    if (ec2Exception.ErrorCode == "InvalidGroupId.NotFound")
    {
        _logger.LogError(
            $"GroupId {groupId} was not found. {ec2Exception.Message}");
    }

    throw;
}
catch (Exception ex)
{
    _logger.LogError(
        $"An error occurred while running the instance.: {ex.Message}");
    throw;
}
}

/// <summary>
/// Start an EC2 instance.
/// </summary>
/// <param name="ec2InstanceId">The instance Id of the Amazon EC2 instance
/// to start.</param>
/// <returns>Async task.</returns>
public async Task StartInstances(string ec2InstanceId)
{
    try
    {
        var request = new StartInstancesRequest
        {
            InstanceIds = new List<string> { ec2InstanceId },

```

```

        };

        await _amazonEC2.StartInstancesAsync(request);

        Console.WriteLine("Waiting for instance to start. ");
        await WaitForInstanceState(ec2InstanceId, InstanceStateName.Running);
    }
    catch (AmazonEC2Exception ec2Exception)
    {
        if (ec2Exception.ErrorCode == "InvalidInstanceId")
        {
            _logger.LogError(
                $"InstanceId is invalid, unable to start.
{ec2Exception.Message}");
        }

        throw;
    }
    catch (Exception ex)
    {
        _logger.LogError(
            $"An error occurred while starting the instance.: {ex.Message}");
        throw;
    }
}

/// <summary>
/// Stop an EC2 instance.
/// </summary>
/// <param name="ec2InstanceId">The instance Id of the EC2 instance to
/// stop.</param>
/// <returns>Async task.</returns>
public async Task StopInstances(string ec2InstanceId)
{
    try
    {
        var request = new StopInstancesRequest
        {
            InstanceIds = new List<string> { ec2InstanceId },
        };

        await _amazonEC2.StopInstancesAsync(request);
        Console.WriteLine("Waiting for the instance to stop.");
        await WaitForInstanceState(ec2InstanceId, InstanceStateName.Stopped);
    }
}

```

```

        Console.WriteLine("\nThe instance has stopped.");
    }
    catch (AmazonEC2Exception ec2Exception)
    {
        if (ec2Exception.ErrorCode == "InvalidInstanceId")
        {
            _logger.LogError(
                $"InstanceId is invalid, unable to stop.
{ec2Exception.Message}");
        }

        throw;
    }
    catch (Exception ex)
    {
        _logger.LogError(
            $"An error occurred while stopping the instance.: {ex.Message}");
        throw;
    }
}

/// <summary>
/// Terminate an EC2 instance.
/// </summary>
/// <param name="ec2InstanceId">The instance Id of the EC2 instance
/// to terminate.</param>
/// <returns>Async task.</returns>
public async Task<List<InstanceStateChange>> TerminateInstances(string
ec2InstanceId)
{
    try
    {
        var request = new TerminateInstancesRequest
        {
            InstanceIds = new List<string> { ec2InstanceId }
        };

        var response = await _amazonEC2.TerminateInstancesAsync(request);
        Console.Write("Waiting for the instance to terminate.");
        await WaitForInstanceState(ec2InstanceId, InstanceStateName.Terminated);

        Console.WriteLine($"The instance {ec2InstanceId} has been
terminated.");
    }
}

```

```

        return response.TerminatingInstances;
    }
    catch (AmazonEC2Exception ec2Exception)
    {
        if (ec2Exception.ErrorCode == "InvalidInstanceId")
        {
            _logger.LogError(
                $"InstanceId is invalid, unable to terminate.
{ec2Exception.Message}");
        }

        throw;
    }
    catch (Exception ex)
    {
        _logger.LogError(
            $"An error occurred while terminating the instance.: {ex.Message}");
        throw;
    }
}

/// <summary>
/// Wait until an EC2 instance is in a specified state.
/// </summary>
/// <param name="instanceId">The instance Id.</param>
/// <param name="stateName">The state to wait for.</param>
/// <returns>A Boolean value indicating the success of the action.</returns>
public async Task<bool> WaitForInstanceState(string instanceId,
InstanceStateName stateName)
{
    var request = new DescribeInstancesRequest
    {
        InstanceIds = new List<string> { instanceId }
    };

    // Wait until the instance is in the specified state.
    var hasState = false;
    do
    {
        // Wait 5 seconds.
        Thread.Sleep(5000);

        // Check for the desired state.
        var response = await _amazonEC2.DescribeInstancesAsync(request);

```

```
        var instance = response.Reservations[0].Instances[0];
        hasState = instance.State.Name == stateName;
        Console.WriteLine(". ");
    } while (!hasState);

    return hasState;
}
}
```

• 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的下列主題。

- [AllocateAddress](#)
- [AssociateAddress](#)
- [AuthorizeSecurityGroupIngress](#)
- [CreateKeyPair](#)
- [CreateSecurityGroup](#)
- [DeleteKeyPair](#)
- [DeleteSecurityGroup](#)
- [DescribeImages](#)
- [DescribeInstanceTypes](#)
- [DescribeInstances](#)
- [DescribeKeyPairs](#)
- [DescribeSecurityGroups](#)
- [DisassociateAddress](#)
- [ReleaseAddress](#)
- [RunInstances](#)
- [StartInstances](#)
- [StopInstances](#)
- [TerminateInstances](#)
- [UnmonitorInstances](#)

動作

AllocateAddress

以下程式碼範例顯示如何使用 AllocateAddress。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Allocates an Elastic IP address that can be associated with an Amazon EC2
/// instance. By using an Elastic IP address, you can keep the public IP address
/// constant even when you restart the associated instance.
/// </summary>
/// <returns>The response object for the allocated address.</returns>
public async Task<AllocateAddressResponse> AllocateAddress()
{
    var request = new AllocateAddressRequest();

    try
    {
        var response = await _amazonEC2.AllocateAddressAsync(request);
        Console.WriteLine($"Allocated IP: {response.PublicIp} with allocation ID
{response.AllocationId}.");
        return response;
    }
    catch (AmazonEC2Exception ec2Exception)
    {
        if (ec2Exception.ErrorCode == "AddressLimitExceeded")
        {
            // For more information on Elastic IP address quotas, see:
            // https://docs.aws.amazon.com/AWSEC2/latest/UserGuide/elastic-ip-
addresses-eip.html#using-instance-addressing-limit
            _logger.LogError($"Unable to allocate Elastic IP, address limit
exceeded. {ec2Exception.Message}");
        }
    }
}
```

```

        throw;
    }
    catch (Exception ex)
    {
        _logger.LogError($"An error occurred while allocating Elastic IP.:
{ex.Message}");
        throw;
    }
}

```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [AllocateAddress](#)。

AssociateAddress

以下程式碼範例顯示如何使用 AssociateAddress。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```

/// <summary>
/// Associates an Elastic IP address with an instance. When this association is
/// created, the Elastic IP's public IP address is immediately used as the
public
/// IP address of the associated instance.
/// </summary>
/// <param name="allocationId">The allocation Id of an Elastic IP address.</
param>
/// <param name="instanceId">The instance Id of the EC2 instance to
/// associate the address with.</param>
/// <returns>The association Id that represents
/// the association of the Elastic IP address with an instance.</returns>
public async Task<string> AssociateAddress(string allocationId, string
instanceId)
{
    try
    {

```



```
var request = new AssociateAddressRequest
{
    AllocationId = allocationId,
    InstanceId = instanceId
};

var response = await _amazonEC2.AssociateAddressAsync(request);
return response.AssociationId;
}
catch (AmazonEC2Exception ec2Exception)
{
    if (ec2Exception.ErrorCode == "InvalidInstanceId")
    {
        _logger.LogError(
            $"InstanceId is invalid, unable to associate address.
{ec2Exception.Message}");
    }

    throw;
}
catch (Exception ex)
{
    _logger.LogError(
        $"An error occurred while associating the Elastic IP.:
{ex.Message}");
    throw;
}
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [AssociateAddress](#)。

AuthorizeSecurityGroupIngress

以下程式碼範例顯示如何使用 AuthorizeSecurityGroupIngress。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```

/// <summary>
/// Authorize the local computer ingress to EC2 instances associated
/// with the virtual private cloud (VPC) security group.
/// </summary>
/// <param name="groupName">The name of the security group.</param>
/// <returns>A Boolean value indicating the success of the action.</returns>
public async Task<bool> AuthorizeSecurityGroupIngress(string groupName)
{
    try
    {
        // Get the IP address for the local computer.
        var ipAddress = await GetIpAddress();
        Console.WriteLine($"Your IP address is: {ipAddress}");
        var ipRanges =
            new List<IpRange> { new IpRange { CidrIp = $"{ipAddress}/32" } };
        var permission = new IpPermission
        {
            Ipv4Ranges = ipRanges,
            IpProtocol = "tcp",
            FromPort = 22,
            ToPort = 22
        };
        var permissions = new List<IpPermission> { permission };
        var response = await _amazonEC2.AuthorizeSecurityGroupIngressAsync(
            new AuthorizeSecurityGroupIngressRequest(groupName, permissions));
        return response.HttpStatusCode == HttpStatusCode.OK;
    }
    catch (AmazonEC2Exception ec2Exception)
    {
        if (ec2Exception.ErrorCode == "InvalidPermission.Duplicate")
        {
            _logger.LogError(
                $"The ingress rule already exists. {ec2Exception.Message}");
        }

        throw;
    }
    catch (Exception ex)
    {
        _logger.LogError(
            $"An error occurred while authorizing ingress.: {ex.Message}");
        throw;
    }
}

```

```

    }

    /// <summary>
    /// Authorize the local computer for ingress to
    /// the Amazon EC2 SecurityGroup.
    /// </summary>
    /// <returns>The IPv4 address of the computer running the scenario.</returns>
    private static async Task<string> GetIpAddress()
    {
        var httpClient = new HttpClient();
        var ipString = await httpClient.GetStringAsync("https://
checkip.amazonaws.com");

        // The IP address is returned with a new line
        // character on the end. Trim off the whitespace and
        // return the value to the caller.
        return ipString.Trim();
    }

```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [AuthorizeSecurityGroupIngress](#)。

CreateKeyPair

以下程式碼範例顯示如何使用 CreateKeyPair。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```

    /// <summary>
    /// Create an Amazon EC2 key pair with a specified name.
    /// </summary>
    /// <param name="keyPairName">The name for the new key pair.</param>
    /// <returns>The Amazon EC2 key pair created.</returns>
    public async Task<KeyPair?> CreateKeyPair(string keyPairName)

```

```
{
    try
    {
        var request = new CreateKeyPairRequest { KeyName = keyPairName, };

        var response = await _amazonEC2.CreateKeyPairAsync(request);

        var kp = response.KeyPair;
        // Return the key pair so it can be saved if needed.

        // Wait until the key pair exists.
        int retries = 5;
        while (retries-- > 0)
        {
            Console.WriteLine($"Checking for new KeyPair {keyPairName}...");
            var keyPairs = await DescribeKeyPairs(keyPairName);
            if (keyPairs.Any())
            {
                return kp;
            }

            Thread.Sleep(5000);
            retries--;
        }
        _logger.LogError($"Unable to find newly created KeyPair {keyPairName}.");
        throw new DoesNotExistException("KeyPair not found");
    }
    catch (AmazonEC2Exception ec2Exception)
    {
        if (ec2Exception.ErrorCode == "InvalidKeyPair.Duplicate")
        {
            _logger.LogError(
                $"A key pair called {keyPairName} already exists.");
        }

        throw;
    }
    catch (Exception ex)
    {
        _logger.LogError(
            $"An error occurred while creating the key pair.: {ex.Message}");
        throw;
    }
}
```

```

}

/// <summary>
/// Save KeyPair information to a temporary file.
/// </summary>
/// <param name="keyPair">The name of the key pair.</param>
/// <returns>The full path to the temporary file.</returns>
public string SaveKeyPair(KeyPair keyPair)
{
    var tempPath = Path.GetTempPath();
    var tempFileName = $"{tempPath}\\{Path.GetRandomFileName()}";
    var pemFileName = Path.ChangeExtension(tempFileName, "pem");

    // Save the key pair to a file in a temporary folder.
    using var stream = new FileStream(pemFileName, FileMode.Create);
    using var writer = new StreamWriter(stream);
    writer.WriteLine(keyPair.KeyMaterial);

    return pemFileName;
}

```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [CreateKeyPair](#)。

CreateLaunchTemplate

以下程式碼範例顯示如何使用 CreateLaunchTemplate。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```

/// <summary>
/// Creates an Amazon EC2 launch template to use with Amazon EC2 Auto Scaling.
/// The launch template specifies a Bash script in its user data field that runs
after
/// the instance is started. This script installs the Python packages and starts
a Python

```

```

    /// web server on the instance.
    /// </summary>
    /// <param name="startupScriptPath">The path to a Bash script file that is
run.</param>
    /// <param name="instancePolicyPath">The path to a permissions policy to create
and attach to the profile.</param>
    /// <returns>The template object.</returns>
    public async Task<Amazon.EC2.Model.LaunchTemplate> CreateTemplate(string
startupScriptPath, string instancePolicyPath)
    {
        try
        {
            await CreateKeyPair(_keyPairName);
            await CreateInstanceProfileWithName(_instancePolicyName,
_instanceRoleName,
                _instanceProfileName, instancePolicyPath);

            var startServerText = await File.ReadAllTextAsync(startupScriptPath);
            var plainTextBytes =
System.Text.Encoding.UTF8.GetBytes(startServerText);

            var amiLatest = await _amazonSsm.GetParameterAsync(
                new GetParameterRequest() { Name = _amiParam });
            var amiId = amiLatest.Parameter.Value;
            var launchTemplateResponse = await _amazonEc2.CreateLaunchTemplateAsync(
                new CreateLaunchTemplateRequest()
                {
                    LaunchTemplateName = _launchTemplateName,
                    LaunchTemplateData = new RequestLaunchTemplateData()
                    {
                        InstanceType = _instanceType,
                        ImageId = amiId,
                        IamInstanceProfile =
                            new
LaunchTemplateIamInstanceProfileSpecificationRequest()
                            {
                                Name = _instanceProfileName
                            },
                        KeyName = _keyPairName,
                        UserData = System.Convert.ToBase64String(plainTextBytes)
                    }
                });
            return launchTemplateResponse.LaunchTemplate;
        }
    }
}

```

```
    }
    catch (AmazonEC2Exception ec2Exception)
    {
        if (ec2Exception.ErrorCode ==
            "InvalidLaunchTemplateName.AlreadyExistsException")
        {
            _logger.LogError($"Could not create the template, the name
{_launchTemplateName} already exists. " +
                            $"Please try again with a unique name.");
        }

        throw;
    }
    catch (Exception ex)
    {
        _logger.LogError($"An error occurred while creating the template.:
{ex.Message}");
        throw;
    }
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [CreateLaunchTemplate](#)。

CreateSecurityGroup

以下程式碼範例顯示如何使用 CreateSecurityGroup。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Create an Amazon EC2 security group with a specified name and description.
/// </summary>
/// <param name="groupName">The name for the new security group.</param>
```

```
    /// <param name="groupDescription">A description of the new security group.</  
param>  
    /// <returns>The group Id of the new security group.</returns>  
    public async Task<string> CreateSecurityGroup(string groupName, string  
groupDescription)  
    {  
        try  
        {  
            var response = await _amazonEC2.CreateSecurityGroupAsync(  
                new CreateSecurityGroupRequest(groupName, groupDescription));  
  
            // Wait until the security group exists.  
            int retries = 5;  
            while (retries-- > 0)  
            {  
                var groups = await DescribeSecurityGroups(response.GroupId);  
                if (groups.Any())  
                {  
                    return response.GroupId;  
                }  
  
                Thread.Sleep(5000);  
                retries--;  
            }  
            _logger.LogError($"Unable to find newly created group {groupName}.");  
            throw new DoesNotExistException("security group not found");  
        }  
        catch (AmazonEC2Exception ec2Exception)  
        {  
            if (ec2Exception.ErrorCode == "ResourceAlreadyExists")  
            {  
                _logger.LogError(  
                    $"A security group with the name {groupName} already exists.  
{ec2Exception.Message}");  
            }  
            throw;  
        }  
        catch (Exception ex)  
        {  
            _logger.LogError(  
                $"An error occurred while creating the security group.:  
{ex.Message}");  
            throw;  
        }  
    }  
}
```



```
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [CreateSecurityGroup](#)。

DeleteKeyPair

以下程式碼範例顯示如何使用 DeleteKeyPair。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Delete an Amazon EC2 key pair.
/// </summary>
/// <param name="keyPairName">The name of the key pair to delete.</param>
/// <returns>A Boolean value indicating the success of the action.</returns>
public async Task<bool> DeleteKeyPair(string keyPairName)
{
    try
    {
        await _amazonEC2.DeleteKeyPairAsync(new
DeleteKeyPairRequest(keyPairName)).ConfigureAwait(false);
        return true;
    }
    catch (AmazonEC2Exception ec2Exception)
    {
        if (ec2Exception.ErrorCode == "InvalidKeyPair.NotFound")
        {
            _logger.LogError($"KeyPair {keyPairName} does not exist and cannot
be deleted. Please verify the key pair name and try again.");
        }

        return false;
    }
}
```

```
    }
    catch (Exception ex)
    {
        Console.WriteLine($"Couldn't delete the key pair because:
{ex.Message}");
        return false;
    }
}

/// <summary>
/// Delete the temporary file where the key pair information was saved.
/// </summary>
/// <param name="tempFileName">The path to the temporary file.</param>
public void DeleteTempFile(string tempFileName)
{
    if (File.Exists(tempFileName))
    {
        File.Delete(tempFileName);
    }
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [DeleteKeyPair](#)。

DeleteLaunchTemplate

以下程式碼範例顯示如何使用 DeleteLaunchTemplate。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Delete a launch template by name.
/// </summary>
/// <param name="templateName">The name of the template to delete.</param>
/// <returns>Async task.</returns>
```

```
public async Task DeleteTemplateByName(string templateName)
{
    try
    {
        await _amazonEc2.DeleteLaunchTemplateAsync(
            new DeleteLaunchTemplateRequest()
            {
                LaunchTemplateName = templateName
            });
    }
    catch (AmazonEC2Exception ec2Exception)
    {
        if (ec2Exception.ErrorCode ==
            "InvalidLaunchTemplateName.NotFoundException")
        {
            _logger.LogError(
                $"Could not delete the template, the name {_launchTemplateName}
was not found.");
        }

        throw;
    }
    catch (Exception ex)
    {
        _logger.LogError($"An error occurred while deleting the template.:
{ex.Message}");
        throw;
    }
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [DeleteLaunchTemplate](#)。

DeleteSecurityGroup

以下程式碼範例顯示如何使用 DeleteSecurityGroup。

適用於 .NET 的 SDK

 Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Delete an Amazon EC2 security group.
/// </summary>
/// <param name="groupName">The name of the group to delete.</param>
/// <returns>A Boolean value indicating the success of the action.</returns>
public async Task<bool> DeleteSecurityGroup(string groupId)
{
    try
    {
        var response =
            await _amazonEC2.DeleteSecurityGroupAsync(
                new DeleteSecurityGroupRequest { GroupId = groupId });
        return response.HttpStatusCode == HttpStatusCode.OK;
    }
    catch (AmazonEC2Exception ec2Exception)
    {
        if (ec2Exception.ErrorCode == "InvalidGroup.NotFound")
        {
            _logger.LogError(
                $"Security Group {groupId} does not exist and cannot be deleted.
Please verify the ID and try again.");
        }

        return false;
    }
    catch (Exception ex)
    {
        Console.WriteLine($"Couldn't delete the security group because:
{ex.Message}");
        return false;
    }
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [DeleteSecurityGroup](#)。

DescribeAvailabilityZones

以下程式碼範例顯示如何使用 DescribeAvailabilityZones。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Get a list of Availability Zones in the AWS Region of the Amazon EC2 Client.
/// </summary>
/// <returns>A list of availability zones.</returns>
public async Task<List<string>> DescribeAvailabilityZones()
{
    try
    {
        var zoneResponse = await _amazonEc2.DescribeAvailabilityZonesAsync(
            new DescribeAvailabilityZonesRequest());
        return zoneResponse.AvailabilityZones.Select(z => z.ZoneName).ToList();
    }
    catch (AmazonEC2Exception ec2Exception)
    {
        _logger.LogError($"An Amazon EC2 error occurred while listing
availability zones.: {ec2Exception.Message}");
        throw;
    }
    catch (Exception ex)
    {
        _logger.LogError($"An error occurred while listing availability zones.:
{ex.Message}");
        throw;
    }
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [DescribeAvailabilityZones](#)。

DescribeIamInstanceProfileAssociations

以下程式碼範例顯示如何使用 DescribeIamInstanceProfileAssociations。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Get the instance profile association data for an instance.
/// </summary>
/// <param name="instanceId">The Id of the instance.</param>
/// <returns>Instance profile associations data.</returns>
public async Task<IamInstanceProfileAssociation> GetInstanceProfile(string
instanceId)
{
    try
    {
        var response = await
_amazonEc2.DescribeIamInstanceProfileAssociationsAsync(
            new DescribeIamInstanceProfileAssociationsRequest()
            {
                Filters = new List<Amazon.EC2.Model.Filter>()
                {
                    new("instance-id", new List<string>() { instanceId })
                },
            });
        return response.IamInstanceProfileAssociations[0];
    }
    catch (AmazonEC2Exception ec2Exception)
    {
        if (ec2Exception.ErrorCode == "InvalidInstanceID.NotFound")
        {
            _logger.LogError(ec2Exception, $"Instance {instanceId} not found");
        }
    }
}
```

```

        throw;
    }
    catch (Exception ex)
    {
        _logger.LogError(ex, $"An error occurred while creating the template.: {ex.Message}");
        throw;
    }
}

```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [DescribeInstanceProfileAssociations](#)。

DescribeInstanceTypes

以下程式碼範例顯示如何使用 DescribeInstanceTypes。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```

/// <summary>
/// Describe the instance types available.
/// </summary>
/// <returns>A list of instance type information.</returns>
public async Task<List<InstanceTypeInfo>>
DescribeInstanceTypes(ArchitectureValues architecture)
{
    try
    {
        var request = new DescribeInstanceTypesRequest();

        var filters = new List<Filter>
        {
            new Filter("processor-info.supported-architecture",

```

```

        new List<string> { architecture.ToString() })
    };
    filters.Add(new Filter("instance-type", new() { "*.micro",
        "*.small" }));

    request.Filters = filters;
    var instanceTypes = new List<InstanceTypeInfo>();

    var paginator = _amazonEC2.Paginators.DescribeInstanceTypes(request);
    await foreach (var instanceType in paginator.InstanceTypes)
    {
        instanceTypes.Add(instanceType);
    }

    return instanceTypes;
}
catch (AmazonEC2Exception ec2Exception)
{
    if (ec2Exception.ErrorCode == "InvalidParameterValue")
    {
        _logger.LogError(
            $"Parameters are invalid. Ensure architecture and size strings
conform to DescribeInstanceTypes API reference.");
    }

    throw;
}
catch (Exception ex)
{
    Console.WriteLine($"Couldn't delete the security group because:
{ex.Message}");
    throw;
}
}

```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [DescribeInstanceTypes](#)。

DescribeInstances

以下程式碼範例顯示如何使用 DescribeInstances。

適用於 .NET 的 SDK

 Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Get information about EC2 instances with a particular state.
/// </summary>
/// <param name="tagName">The name of the tag to filter on.</param>
/// <param name="tagValue">The value of the tag to look for.</param>
/// <returns>True if successful.</returns>
public async Task<bool> GetInstancesWithState(string state)
{
    try
    {
        // Filters the results of the instance list.
        var filters = new List<Filter>
        {
            new Filter
            {
                Name = $"instance-state-name",
                Values = new List<string> { state, },
            },
        };
        var request = new DescribeInstancesRequest { Filters = filters, };

        Console.WriteLine($"\\nShowing instances with state {state}");
        var paginator = _amazonEC2.Paginators.DescribeInstances(request);

        await foreach (var response in paginator.Responses)
        {
            foreach (var reservation in response.Reservations)
            {
                foreach (var instance in reservation.Instances)
                {
                    Console.Write($"Instance ID: {instance.InstanceId} ");
                    Console.WriteLine($"\\tCurrent State:
{instance.State.Name}");
                }
            }
        }
    }
}
```

```

        }
    }

    return true;
}
catch (AmazonEC2Exception ec2Exception)
{
    if (ec2Exception.ErrorCode == "InvalidParameterValue")
    {
        _logger.LogError(
            $"Invalid parameter value for filtering instances.");
    }

    return false;
}
catch (Exception ex)
{
    Console.WriteLine($"Couldn't list instances because: {ex.Message}");
    return false;
}
}

```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [DescribeInstances](#)。

DescribeKeyPairs

以下程式碼範例顯示如何使用 DescribeKeyPairs。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```

/// <summary>
/// Get information about an Amazon EC2 key pair.
/// </summary>
/// <param name="keyPairName">The name of the key pair.</param>

```

```
/// <returns>A list of key pair information.</returns>
public async Task<List<KeyPairInfo>> DescribeKeyPairs(string keyPairName)
{
    try
    {
        var request = new DescribeKeyPairsRequest();
        if (!string.IsNullOrEmpty(keyPairName))
        {
            request = new DescribeKeyPairsRequest
            {
                KeyNames = new List<string> { keyPairName }
            };
        }

        var response = await _amazonEC2.DescribeKeyPairsAsync(request);
        return response.KeyPairs.ToList();
    }
    catch (AmazonEC2Exception ec2Exception)
    {
        if (ec2Exception.ErrorCode == "InvalidKeyPair.NotFound")
        {
            _logger.LogError(
                $"A key pair called {keyPairName} does not exist.");
        }

        throw;
    }
    catch (Exception ex)
    {
        _logger.LogError(
            $"An error occurred while describing the key pair.: {ex.Message}");
        throw;
    }
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [DescribeKeyPairs](#)。

DescribeSecurityGroups

以下程式碼範例顯示如何使用 DescribeSecurityGroups。

適用於 .NET 的 SDK

 Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Retrieve information for one or all Amazon EC2 security group.
/// </summary>
/// <param name="groupId">The optional Id of a specific Amazon EC2 security
group.</param>
/// <returns>A list of security group information.</returns>
public async Task<List<SecurityGroup>> DescribeSecurityGroups(string groupId)
{
    try
    {
        var securityGroups = new List<SecurityGroup>();
        var request = new DescribeSecurityGroupsRequest();

        if (!string.IsNullOrEmpty(groupId))
        {
            var groupIds = new List<string> { groupId };
            request.GroupIds = groupIds;
        }

        var paginatorForSecurityGroups =
            _amazonEC2.Paginators.DescribeSecurityGroups(request);

        await foreach (var securityGroup in
paginatorForSecurityGroups.SecurityGroups)
        {
            securityGroups.Add(securityGroup);
        }

        return securityGroups;
    }
    catch (AmazonEC2Exception ec2Exception)
    {
        if (ec2Exception.ErrorCode == "InvalidGroup.NotFound")
```

```

        {
            _logger.LogError(
                $"A security group {groupId} does not exist.");
        }

        throw;
    }
    catch (Exception ex)
    {
        _logger.LogError(
            $"An error occurred while listing security groups. {ex.Message}");
        throw;
    }
}

/// <summary>
/// Display the information returned by the call to
/// DescribeSecurityGroupsAsync.
/// </summary>
/// <param name="securityGroup">A list of security group information.</param>
public void DisplaySecurityGroupInfoAsync(SecurityGroup securityGroup)
{
    Console.WriteLine($"{securityGroup.GroupName}");
    Console.WriteLine("Ingress permissions:");
    securityGroup.IpPermissions.ForEach(permission =>
    {
        Console.WriteLine($"  \tFromPort: {permission.FromPort}");
        Console.WriteLine($"  \tIpProtocol: {permission.IpProtocol}");

        Console.WriteLine($"  \tIpv4Ranges: ");
        permission.Ipv4Ranges.ForEach(range => { Console.Write($"{range.CidrIp}

"); });

        Console.WriteLine($"  \n\tIpv6Ranges:");
        permission.Ipv6Ranges.ForEach(range =>
        { Console.Write($"{range.CidrIpv6} "); });

        Console.WriteLine($"  \n\tPrefixListIds: ");
        permission.PrefixListIds.ForEach(id => Console.Write($"{id.Id} "));

        Console.WriteLine($"  \n\tTo Port: {permission.ToPort}");
    });
    Console.WriteLine("Egress permissions:");
    securityGroup.IpPermissionsEgress.ForEach(permission =>

```

```

    {
        Console.WriteLine($"\\tFromPort: {permission.FromPort}");
        Console.WriteLine($"\\tIpProtocol: {permission.IpProtocol}");

        Console.WriteLine($"\\tIpv4Ranges: ");
        permission.Ipv4Ranges.ForEach(range => { Console.Write($"{range.CidrIp}
"); });

        Console.WriteLine($"\\n\\tIpv6Ranges:");
        permission.Ipv6Ranges.ForEach(range =>
{ Console.Write($"{range.CidrIpv6} "); });

        Console.WriteLine($"\\n\\tPrefixListIds: ");
        permission.PrefixListIds.ForEach(id => Console.Write($"{id.Id} "));

        Console.WriteLine($"\\n\\tTo Port: {permission.ToPort}");
    });
}

```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [DescribeSecurityGroups](#)。

DescribeSubnets

以下程式碼範例顯示如何使用 DescribeSubnets。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```

/// <summary>
/// Get all the subnets for a Vpc in a set of availability zones.
/// </summary>
/// <param name="vpcId">The Id of the Vpc.</param>
/// <param name="availabilityZones">The list of availability zones.</param>

```

```

    /// <returns>The collection of subnet objects.</returns>
    public async Task<List<Subnet>> GetAllVpcSubnetsForZones(string vpcId,
List<string> availabilityZones)
    {
        try
        {
            var subnets = new List<Subnet>();
            var subnetPaginator = _amazonEc2.Paginators.DescribeSubnets(
                new DescribeSubnetsRequest()
                {
                    Filters = new List<Amazon.EC2.Model.Filter>()
                    {
                        new("vpc-id", new List<string>() { vpcId }),
                        new("availability-zone", availabilityZones),
                        new("default-for-az", new List<string>() { "true" })
                    }
                });

            // Get the entire list using the paginator.
            await foreach (var subnet in subnetPaginator.Subnets)
            {
                subnets.Add(subnet);
            }

            return subnets;
        }
        catch (AmazonEC2Exception ec2Exception)
        {
            if (ec2Exception.ErrorCode == "InvalidVpcID.NotFound")
            {
                _logger.LogError(ec2Exception, $"The specified VPC ID {vpcId} does
not exist.");
            }

            throw;
        }
        catch (Exception ex)
        {
            _logger.LogError(ex, $"An error occurred while describing the subnets.:
{ex.Message}");
            throw;
        }
    }
}

```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [DescribeSubnets](#)。

DescribeVpcs

以下程式碼範例顯示如何使用 DescribeVpcs。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Get the default VPC for the account.
/// </summary>
/// <returns>The default VPC object.</returns>
public async Task<Vpc> GetDefaultVpc()
{
    try
    {
        var vpcResponse = await _amazonEc2.DescribeVpcsAsync(
            new DescribeVpcsRequest()
            {
                Filters = new List<Amazon.EC2.Model.Filter>()
                {
                    new("is-default", new List<string>() { "true" })
                }
            });
        return vpcResponse.Vpcs[0];
    }
    catch (AmazonEC2Exception ec2Exception)
    {
        if (ec2Exception.ErrorCode == "UnauthorizedOperation")
        {
            _logger.LogError(ec2Exception, $"You do not have the necessary
permissions to describe VPCs.");
        }
    }
}
```



```

        throw;
    }
    catch (Exception ex)
    {
        _logger.LogError(ex, $"An error occurred while describing the vpcs.: {ex.Message}");
        throw;
    }
}

```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [DescribeVpcs](#)。

DisassociateAddress

以下程式碼範例顯示如何使用 DisassociateAddress。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```

/// <summary>
/// Disassociate an Elastic IP address from an EC2 instance.
/// </summary>
/// <param name="associationId">The association Id.</param>
/// <returns>A Boolean value indicating the success of the action.</returns>
public async Task<bool> DisassociateIp(string associationId)
{
    try
    {
        var response = await _amazonEC2.DisassociateAddressAsync(
            new DisassociateAddressRequest { AssociationId = associationId });
        return response.HttpStatusCode == HttpStatusCode.OK;
    }
    catch (AmazonEC2Exception ec2Exception)
    {
        if (ec2Exception.ErrorCode == "InvalidAssociationID.NotFound")
        {

```

```

        _logger.LogError(
            $"AssociationId is invalid, unable to disassociate address.
{ec2Exception.Message}");
    }

    return false;
}
catch (Exception ex)
{
    _logger.LogError(
        $"An error occurred while disassociating the Elastic IP.:
{ex.Message}");
    return false;
}
}

```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [DisassociateAddress](#)。

RebootInstances

以下程式碼範例顯示如何使用 RebootInstances。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

依執行個體的 ID 重新啟動執行個體。

```

/// <summary>
/// Reboot a specific EC2 instance.
/// </summary>
/// <param name="ec2InstanceId">The instance Id of the instance that will be
rebooted.</param>
/// <returns>Async Task.</returns>
public async Task<bool> RebootInstances(string ec2InstanceId)
{

```

```

        try
        {
            var request = new RebootInstancesRequest
            {
                InstanceIds = new List<string> { ec2InstanceId },
            };

            await _amazonEC2.RebootInstancesAsync(request);

            // Wait for the instance to be running.
            Console.WriteLine("Waiting for the instance to start.");
            await WaitForInstanceState(ec2InstanceId, InstanceStateName.Running);

            return true;
        }
        catch (AmazonEC2Exception ec2Exception)
        {
            if (ec2Exception.ErrorCode == "InvalidInstanceId")
            {
                _logger.LogError(
                    $"InstanceId {ec2InstanceId} is invalid, unable to reboot. {ec2Exception.Message}");
            }
            return false;
        }
        catch (Exception ex)
        {
            _logger.LogError(
                $"An error occurred while rebooting the instance {ec2InstanceId}.: {ex.Message}");
            return false;
        }
    }

    /// <summary>
    /// Wait until an EC2 instance is in a specified state.
    /// </summary>
    /// <param name="instanceId">The instance Id.</param>
    /// <param name="stateName">The state to wait for.</param>
    /// <returns>A Boolean value indicating the success of the action.</returns>
    public async Task<bool> WaitForInstanceState(string instanceId,
        InstanceStateName stateName)
    {
        var request = new DescribeInstancesRequest

```

```

    {
        InstanceIds = new List<string> { instanceId }
    };

    // Wait until the instance is in the specified state.
    var hasState = false;
    do
    {
        // Wait 5 seconds.
        Thread.Sleep(5000);

        // Check for the desired state.
        var response = await _amazonEC2.DescribeInstancesAsync(request);
        var instance = response.Reservations[0].Instances[0];
        hasState = instance.State.Name == stateName;
        Console.Write(". ");
    } while (!hasState);

    return hasState;
}

```

取代執行個體的設定檔，重新開機，然後重新啟動 Web 伺服器。

```

    /// <summary>
    /// Replace the profile associated with a running instance. After the profile is
    /// replaced, the instance
    /// is rebooted to ensure that it uses the new profile. When the instance is
    /// ready, Systems Manager is
    /// used to restart the Python web server.
    /// </summary>
    /// <param name="instanceId">The Id of the instance to update.</param>
    /// <param name="credsProfileName">The name of the new profile to associate with
    the specified instance.</param>
    /// <param name="associationId">The Id of the existing profile association for
    the instance.</param>
    /// <returns>Async task.</returns>
    public async Task ReplaceInstanceProfile(string instanceId, string
    credsProfileName, string associationId)
    {
        try
        {

```

```

        await _amazonEc2.ReplaceIamInstanceProfileAssociationAsync(
            new ReplaceIamInstanceProfileAssociationRequest()
            {
                AssociationId = associationId,
                IamInstanceProfile = new IamInstanceProfileSpecification()
                {
                    Name = credsProfileName
                }
            });
        // Allow time before resetting.
        Thread.Sleep(25000);

        await _amazonEc2.RebootInstancesAsync(
            new RebootInstancesRequest(new List<string>() { instanceId }));
        Thread.Sleep(25000);
        var instanceReady = false;
        var retries = 5;
        while (retries-- > 0 && !instanceReady)
        {
            var instancesPaginator =
                _amazonSsm.Paginators.DescribeInstanceInformation(
                    new DescribeInstanceInformationRequest());
            // Get the entire list using the paginator.
            await foreach (var instance in
instancesPaginator.InstanceInformationList)
            {
                instanceReady = instance.InstanceId == instanceId;
                if (instanceReady)
                {
                    break;
                }
            }
        }
        Console.WriteLine("Waiting for instance to be running.");
        await WaitForInstanceState(instanceId, InstanceStateName.Running);
        Console.WriteLine("Instance ready.");
        Console.WriteLine($"Sending restart command to instance {instanceId}");
        await _amazonSsm.SendCommandAsync(
            new SendCommandRequest()
            {
                InstanceIds = new List<string>() { instanceId },
                DocumentName = "AWS-RunShellScript",
                Parameters = new Dictionary<string, List<string>>()
                {

```

```

        {
            "commands",
            new List<string>() { "cd / && sudo python3 server.py
80" }
        }
    });
    Console.WriteLine($"Restarted the web server on instance {instanceId}");
}
catch (AmazonEC2Exception ec2Exception)
{
    if (ec2Exception.ErrorCode == "InvalidInstanceID.NotFound")
    {
        _logger.LogError(ec2Exception, $"Instance {instanceId} not found");
    }

    throw;
}
catch (Exception ex)
{
    _logger.LogError(ex, $"An error occurred while replacing the template.:
{ex.Message}");
    throw;
}
}
}

```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [RebootInstances](#)。

ReleaseAddress

以下程式碼範例顯示如何使用 ReleaseAddress。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
```

```

    /// Release an Elastic IP address. After the Elastic IP address is released,
    /// it can no longer be used.
    /// </summary>
    /// <param name="allocationId">The allocation Id of the Elastic IP address.</
param>
    /// <returns>True if successful.</returns>
    public async Task<bool> ReleaseAddress(string allocationId)
    {
        try
        {
            var request = new ReleaseAddressRequest { AllocationId = allocationId };

            var response = await _amazonEC2.ReleaseAddressAsync(request);
            return response.HttpStatusCode == HttpStatusCode.OK;
        }
        catch (AmazonEC2Exception ec2Exception)
        {
            if (ec2Exception.ErrorCode == "InvalidAllocationID.NotFound")
            {
                _logger.LogError(
                    $"AllocationId {allocationId} was not found.
{ec2Exception.Message}");
            }

            return false;
        }
        catch (Exception ex)
        {
            _logger.LogError(
                $"An error occurred while releasing the AllocationId
{allocationId}.: {ex.Message}");
            return false;
        }
    }
}

```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [ReleaseAddress](#)。

ReplaceIamInstanceProfileAssociation

以下程式碼範例顯示如何使用 ReplaceIamInstanceProfileAssociation。

適用於 .NET 的 SDK

 Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Replace the profile associated with a running instance. After the profile is
replaced, the instance
/// is rebooted to ensure that it uses the new profile. When the instance is
ready, Systems Manager is
/// used to restart the Python web server.
/// </summary>
/// <param name="instanceId">The Id of the instance to update.</param>
/// <param name="credsProfileName">The name of the new profile to associate with
the specified instance.</param>
/// <param name="associationId">The Id of the existing profile association for
the instance.</param>
/// <returns>Async task.</returns>
public async Task ReplaceInstanceProfile(string instanceId, string
credsProfileName, string associationId)
{
    try
    {
        await _amazonEc2.ReplaceIamInstanceProfileAssociationAsync(
            new ReplaceIamInstanceProfileAssociationRequest()
            {
                AssociationId = associationId,
                IamInstanceProfile = new IamInstanceProfileSpecification()
                {
                    Name = credsProfileName
                }
            });
        // Allow time before resetting.
        Thread.Sleep(25000);

        await _amazonEc2.RebootInstancesAsync(
            new RebootInstancesRequest(new List<string>() { instanceId }));
        Thread.Sleep(25000);
        var instanceReady = false;
```



```

        var retries = 5;
        while (retries-- > 0 && !instanceReady)
        {
            var instancesPaginator =
                _amazonSsm.Paginators.DescribeInstanceInformation(
                    new DescribeInstanceInformationRequest());
            // Get the entire list using the paginator.
            await foreach (var instance in
instancesPaginator.InstanceInformationList)
            {
                instanceReady = instance.InstanceId == instanceId;
                if (instanceReady)
                {
                    break;
                }
            }
        }
        Console.WriteLine("Waiting for instance to be running.");
        await WaitForInstanceState(instanceId, InstanceStateName.Running);
        Console.WriteLine("Instance ready.");
        Console.WriteLine($"Sending restart command to instance {instanceId}");
        await _amazonSsm.SendCommandAsync(
            new SendCommandRequest()
            {
                InstanceIds = new List<string>() { instanceId },
                DocumentName = "AWS-RunShellScript",
                Parameters = new Dictionary<string, List<string>>()
                {
                    {
                        "commands",
                        new List<string>() { "cd / && sudo python3 server.py
80" }
                    }
                }
            });
        Console.WriteLine($"Restarted the web server on instance {instanceId}");
    }
    catch (AmazonEC2Exception ec2Exception)
    {
        if (ec2Exception.ErrorCode == "InvalidInstanceID.NotFound")
        {
            _logger.LogError(ec2Exception, $"Instance {instanceId} not found");
        }
    }

```

```

        throw;
    }
    catch (Exception ex)
    {
        _logger.LogError(ex, $"An error occurred while replacing the template.:
{ex.Message}");
        throw;
    }
}

```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK SDK API 參考》中的 [ReplaceIamInstanceProfileAssociation](#)。

RunInstances

以下程式碼範例顯示如何使用 RunInstances。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```

/// <summary>
/// Create and run an EC2 instance.
/// </summary>
/// <param name="ImageId">The image Id of the image used as a basis for the
/// EC2 instance.</param>
/// <param name="instanceType">The instance type of the EC2 instance to
create.</param>
/// <param name="keyName">The name of the key pair to associate with the
/// instance.</param>
/// <param name="groupId">The Id of the Amazon EC2 security group that will be
/// allowed to interact with the new EC2 instance.</param>
/// <returns>The instance Id of the new EC2 instance.</returns>
public async Task<string> RunInstances(string imageId, string instanceType,
string keyName, string groupId)
{

```

```
try
{
    var request = new RunInstancesRequest
    {
        ImageId = imageId,
        InstanceType = instanceType,
        KeyName = keyName,
        MinCount = 1,
        MaxCount = 1,
        SecurityGroupIds = new List<string> { groupId }
    };
    var response = await _amazonEC2.RunInstancesAsync(request);
    var instanceId = response.Reservation.Instances[0].InstanceId;

    Console.WriteLine("Waiting for the instance to start.");
    await WaitForInstanceState(instanceId, InstanceStateName.Running);

    return instanceId;
}
catch (AmazonEC2Exception ec2Exception)
{
    if (ec2Exception.ErrorCode == "InvalidGroupId.NotFound")
    {
        _logger.LogError(
            $"GroupId {groupId} was not found. {ec2Exception.Message}");
    }

    throw;
}
catch (Exception ex)
{
    _logger.LogError(
        $"An error occurred while running the instance.: {ex.Message}");
    throw;
}
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [RunInstances](#)。

StartInstances

以下程式碼範例顯示如何使用 StartInstances。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Start an EC2 instance.
/// </summary>
/// <param name="ec2InstanceId">The instance Id of the Amazon EC2 instance
/// to start.</param>
/// <returns>Async task.</returns>
public async Task StartInstances(string ec2InstanceId)
{
    try
    {
        var request = new StartInstancesRequest
        {
            InstanceIds = new List<string> { ec2InstanceId },
        };

        await _amazonEC2.StartInstancesAsync(request);

        Console.WriteLine("Waiting for instance to start. ");
        await WaitForInstanceState(ec2InstanceId, InstanceStateName.Running);
    }
    catch (AmazonEC2Exception ec2Exception)
    {
        if (ec2Exception.ErrorCode == "InvalidInstanceId")
        {
            _logger.LogError(
                $"InstanceId is invalid, unable to start. {ec2Exception.Message}");
        }

        throw;
    }
}
```

```

        catch (Exception ex)
        {
            _logger.LogError(
                $"An error occurred while starting the instance.: {ex.Message}");
            throw;
        }
    }

    /// <summary>
    /// Wait until an EC2 instance is in a specified state.
    /// </summary>
    /// <param name="instanceId">The instance Id.</param>
    /// <param name="stateName">The state to wait for.</param>
    /// <returns>A Boolean value indicating the success of the action.</returns>
    public async Task<bool> WaitForInstanceState(string instanceId,
InstanceStateName stateName)
    {
        var request = new DescribeInstancesRequest
        {
            InstanceIds = new List<string> { instanceId }
        };

        // Wait until the instance is in the specified state.
        var hasState = false;
        do
        {
            // Wait 5 seconds.
            Thread.Sleep(5000);

            // Check for the desired state.
            var response = await _amazonEC2.DescribeInstancesAsync(request);
            var instance = response.Reservations[0].Instances[0];
            hasState = instance.State.Name == stateName;
            Console.WriteLine(". ");
        } while (!hasState);

        return hasState;
    }

```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [StartInstances](#)。

StopInstances

以下程式碼範例顯示如何使用 StopInstances。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Stop an EC2 instance.
/// </summary>
/// <param name="ec2InstanceId">The instance Id of the EC2 instance to
/// stop.</param>
/// <returns>Async task.</returns>
public async Task StopInstances(string ec2InstanceId)
{
    try
    {
        var request = new StopInstancesRequest
        {
            InstanceIds = new List<string> { ec2InstanceId },
        };

        await _amazonEC2.StopInstancesAsync(request);
        Console.Write("Waiting for the instance to stop.");
        await WaitForInstanceState(ec2InstanceId, InstanceStateName.Stopped);

        Console.WriteLine("\nThe instance has stopped.");
    }
    catch (AmazonEC2Exception ec2Exception)
    {
        if (ec2Exception.ErrorCode == "InvalidInstanceId")
        {
            _logger.LogError(
                $"InstanceId is invalid, unable to stop. {ec2Exception.Message}");
        }

        throw;
    }
}
```

```

    }
    catch (Exception ex)
    {
        _logger.LogError(
            $"An error occurred while stopping the instance.: {ex.Message}");
        throw;
    }
}

/// <summary>
/// Wait until an EC2 instance is in a specified state.
/// </summary>
/// <param name="instanceId">The instance Id.</param>
/// <param name="stateName">The state to wait for.</param>
/// <returns>A Boolean value indicating the success of the action.</returns>
public async Task<bool> WaitForInstanceState(string instanceId,
InstanceStateName stateName)
{
    var request = new DescribeInstancesRequest
    {
        InstanceIds = new List<string> { instanceId }
    };

    // Wait until the instance is in the specified state.
    var hasState = false;
    do
    {
        // Wait 5 seconds.
        Thread.Sleep(5000);

        // Check for the desired state.
        var response = await _amazonEC2.DescribeInstancesAsync(request);
        var instance = response.Reservations[0].Instances[0];
        hasState = instance.State.Name == stateName;
        Console.WriteLine(". ");
    } while (!hasState);

    return hasState;
}

```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [StopInstances](#)。

TerminateInstances

以下程式碼範例顯示如何使用 TerminateInstances。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Terminate an EC2 instance.
/// </summary>
/// <param name="ec2InstanceId">The instance Id of the EC2 instance
/// to terminate.</param>
/// <returns>Async task.</returns>
public async Task<List<InstanceStateChange>> TerminateInstances(string
ec2InstanceId)
{
    try
    {
        var request = new TerminateInstancesRequest
        {
            InstanceIds = new List<string> { ec2InstanceId }
        };

        var response = await _amazonEC2.TerminateInstancesAsync(request);
        Console.Write("Waiting for the instance to terminate.");
        await WaitForInstanceState(ec2InstanceId, InstanceStateName.Terminated);

        Console.WriteLine($"\\nThe instance {ec2InstanceId} has been
terminated.");
        return response.TerminatingInstances;
    }
    catch (AmazonEC2Exception ec2Exception)
    {
        if (ec2Exception.ErrorCode == "InvalidInstanceId")
        {
            _logger.LogError(
                $"InstanceId is invalid, unable to terminate.
{ec2Exception.Message}");
        }
    }
}
```



```

        }

        throw;
    }
    catch (Exception ex)
    {
        _logger.LogError(
            $"An error occurred while terminating the instance.: {ex.Message}");
        throw;
    }
}

/// <summary>
/// Wait until an EC2 instance is in a specified state.
/// </summary>
/// <param name="instanceId">The instance Id.</param>
/// <param name="stateName">The state to wait for.</param>
/// <returns>A Boolean value indicating the success of the action.</returns>
public async Task<bool> WaitForInstanceState(string instanceId,
InstanceStateName stateName)
{
    var request = new DescribeInstancesRequest
    {
        InstanceIds = new List<string> { instanceId }
    };

    // Wait until the instance is in the specified state.
    var hasState = false;
    do
    {
        // Wait 5 seconds.
        Thread.Sleep(5000);

        // Check for the desired state.
        var response = await _amazonEC2.DescribeInstancesAsync(request);
        var instance = response.Reservations[0].Instances[0];
        hasState = instance.State.Name == stateName;
        Console.WriteLine(". ");
    } while (!hasState);

    return hasState;
}

```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [TerminateInstances](#)。

案例

建置及管理彈性服務

下列程式碼範例會示範如何建立負載平衡的 Web 服務，以傳回書籍、影片和歌曲建議。此範例顯示服務如何回應失故障，以及如何在發生故障時重組服務以提高復原能力。

- 使用 Amazon EC2 Auto Scaling 群組根據啟動範本建立 Amazon Elastic Compute Cloud (Amazon EC2) 執行個體，並將執行個體數量保持在指定範圍內。
- 使用 Elastic Load Balancing 處理和分發 HTTP 請求。
- 監控 Auto Scaling 群組中執行個體的運作狀態，並且只將請求轉送給運作良好的執行個體。
- 在每個 EC2 執行個體上執行一個 Python Web 伺服器來處理 HTTP 請求。Web 伺服器會回應建議和運作狀態檢查。
- 使用 Amazon DynamoDB 資料表模擬建議服務。
- 透過更新 AWS Systems Manager 參數來控制 Web 伺服器對請求和運作狀態檢查的回應。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

在命令提示中執行互動式案例。

```
static async Task Main(string[] args)
{
    _configuration = new ConfigurationBuilder()
        .SetBasePath(Directory.GetCurrentDirectory())
        .AddJsonFile("settings.json") // Load settings from .json file.
        .AddJsonFile("settings.local.json",
            true) // Optionally, load local settings.
        .Build();
```

```

// Set up dependency injection for the AWS services.
using var host = Host.CreateDefaultBuilder(args)
    .ConfigureLogging(logging =>
        logging.AddFilter("System", LogLevel.Debug)
        .AddFilter<DebugLoggerProvider>("Microsoft",
LogLevel.Information)
        .AddFilter<ConsoleLoggerProvider>("Microsoft", LogLevel.Trace))
    .ConfigureServices((_, services) =>
        services.AddAWSService<IAmazonIdentityManagementService>()
        .AddAWSService<IAmazonDynamoDB>()
        .AddAWSService<IAmazonElasticLoadBalancingV2>()
        .AddAWSService<IAmazonSimpleSystemsManagement>()
        .AddAWSService<IAmazonAutoScaling>()
        .AddAWSService<IAmazonEC2>()
        .AddTransient<AutoScalerWrapper>()
        .AddTransient<ElasticLoadBalancerWrapper>()
        .AddTransient<SmParameterWrapper>()
        .AddTransient<Recommendations>()
        .AddSingleton<IConfiguration>(_configuration)
    )
    .Build();

ServicesSetup(host);
ResourcesSetup();

try
{
    Console.WriteLine(new string('-', 80));
    Console.WriteLine("Welcome to the Resilient Architecture Example
Scenario.");
    Console.WriteLine(new string('-', 80));
    await Deploy(true);

    Console.WriteLine("Now let's begin the scenario.");
    Console.WriteLine(new string('-', 80));
    await Demo(true);

    Console.WriteLine(new string('-', 80));
    Console.WriteLine("Finally, let's clean up our resources.");
    Console.WriteLine(new string('-', 80));

    await DestroyResources(true);

```

```

        Console.WriteLine(new string('-', 80));
        Console.WriteLine("Resilient Architecture Example Scenario is
complete.");
        Console.WriteLine(new string('-', 80));
    }
    catch (Exception ex)
    {
        Console.WriteLine(new string('-', 80));
        Console.WriteLine($"There was a problem running the scenario:
{ex.Message}");
        await DestroyResources(true);
        Console.WriteLine(new string('-', 80));
    }
}

/// <summary>
/// Setup any common resources, also used for integration testing.
/// </summary>
public static void ResourcesSetup()
{
    _httpClient = new HttpClient();
}

/// <summary>
/// Populate the services for use within the console application.
/// </summary>
/// <param name="host">The services host.</param>
private static void ServicesSetup(IHost host)
{
    _elasticLoadBalancerWrapper =
host.Services.GetRequiredService<ElasticLoadBalancerWrapper>();
    _iamClient =
host.Services.GetRequiredService<IAmazonIdentityManagementService>();
    _recommendations = host.Services.GetRequiredService<Recommendations>();
    _autoScalerWrapper = host.Services.GetRequiredService<AutoScalerWrapper>();
    _smParameterWrapper =
host.Services.GetRequiredService<SmParameterWrapper>();
}

/// <summary>
/// Deploy necessary resources for the scenario.
/// </summary>
/// <param name="interactive">True to run as interactive.</param>

```

```
/// <returns>True if successful.</returns>
public static async Task<bool> Deploy(bool interactive)
{
    var protocol = "HTTP";
    var port = 80;
    var sshPort = 22;

    Console.WriteLine(
        "\nFor this demo, we'll use the AWS SDK for .NET to create several AWS
resources\n" +
        "to set up a load-balanced web service endpoint and explore some ways to
make it resilient\n" +
        "against various kinds of failures.\n\n" +
        "Some of the resources create by this demo are:\n");

    Console.WriteLine(
        "\t* A DynamoDB table that the web service depends on to provide book,
movie, and song recommendations.");
    Console.WriteLine(
        "\t* An EC2 launch template that defines EC2 instances that each contain
a Python web server.");
    Console.WriteLine(
        "\t* An EC2 Auto Scaling group that manages EC2 instances across several
Availability Zones.");
    Console.WriteLine(
        "\t* An Elastic Load Balancing (ELB) load balancer that targets the Auto
Scaling group to distribute requests.");
    Console.WriteLine(new string('-', 80));
    Console.WriteLine("Press Enter when you're ready to start deploying
resources.");
    if (interactive)
        Console.ReadLine();

    // Create and populate the DynamoDB table.
    var databaseTableName = _configuration["databaseName"];
    var recommendationsPath = Path.Join(_configuration["resourcePath"],
        "recommendations_objects.json");
    Console.WriteLine($"Creating and populating a DynamoDB table named
{databaseTableName}.");
    await _recommendations.CreateDatabaseWithName(databaseTableName);
    await _recommendations.PopulateDatabase(databaseTableName,
recommendationsPath);
    Console.WriteLine(new string('-', 80));
}
```

```
// Create the EC2 Launch Template.

Console.WriteLine(
    $"Creating an EC2 launch template that runs 'server_startup_script.sh'
when an instance starts.\n"
    + "\nThis script starts a Python web server defined in the `server.py`
script. The web server\n"
    + "listens to HTTP requests on port 80 and responds to requests to '/'
and to '/healthcheck'.\n"
    + "For demo purposes, this server is run as the root user. In
production, the best practice is to\n"
    + "run a web server, such as Apache, with least-privileged
credentials.");
Console.WriteLine(
    "\nThe template also defines an IAM policy that each instance uses to
assume a role that grants\n"
    + "permissions to access the DynamoDB recommendation table and Systems
Manager parameters\n"
    + "that control the flow of the demo.");

var startupScriptPath = Path.Join(_configuration["resourcePath"],
    "server_startup_script.sh");
var instancePolicyPath = Path.Join(_configuration["resourcePath"],
    "instance_policy.json");
await _autoScalerWrapper.CreateTemplate(startupScriptPath,
instancePolicyPath);
Console.WriteLine(new string('-', 80));

Console.WriteLine(
    "Creating an EC2 Auto Scaling group that maintains three EC2 instances,
each in a different\n"
    + "Availability Zone.\n");
var zones = await _autoScalerWrapper.DescribeAvailabilityZones();
await _autoScalerWrapper.CreateGroupOfSize(3, _autoScalerWrapper.GroupName,
zones);
Console.WriteLine(new string('-', 80));

Console.WriteLine(
    "At this point, you have EC2 instances created. Once each instance
starts, it listens for\n"
    + "HTTP requests. You can see these instances in the console or continue
with the demo.\n");

Console.WriteLine(new string('-', 80));
```

```

        Console.WriteLine("Press Enter when you're ready to continue.");
        if (interactive)
            Console.ReadLine();

        Console.WriteLine("Creating variables that control the flow of the demo.");
        await _smParameterWrapper.Reset();

        Console.WriteLine(
            "\nCreating an Elastic Load Balancing target group and load balancer. The target group\n"
            + "defines how the load balancer connects to instances. The load balancer provides a\n"
            + "single endpoint where clients connect and dispatches requests to instances in the group.");

        var defaultVpc = await _autoScalerWrapper.GetDefaultVpc();
        var subnets = await
            _autoScalerWrapper.GetAllVpcSubnetsForZones(defaultVpc.VpcId, zones);
        var subnetIds = subnets.Select(s => s.SubnetId).ToList();
        var targetGroup = await
            _elasticLoadBalancerWrapper.CreateTargetGroupOnVpc(_elasticLoadBalancerWrapper.TargetGroupProtocol,
            protocol, port, defaultVpc.VpcId);

        await
            _elasticLoadBalancerWrapper.CreateLoadBalancerAndListener(_elasticLoadBalancerWrapper.LoadBalancerSubnetIds,
            subnetIds, targetGroup);
        await
            _autoScalerWrapper.AttachLoadBalancerToGroup(_autoScalerWrapper.GroupName,
            targetGroup.TargetGroupArn);
        Console.WriteLine("\nVerifying access to the load balancer endpoint...");
        var endPoint = await
            _elasticLoadBalancerWrapper.GetEndpointForLoadBalancerByName(_elasticLoadBalancerWrapper.LoadBalancerName);
        var loadBalancerAccess = await
            _elasticLoadBalancerWrapper.VerifyLoadBalancerEndpoint(endPoint);

        if (!loadBalancerAccess)
        {
            Console.WriteLine("\nCouldn't connect to the load balancer, verifying that the port is open...");

            var ipString = await _httpClient.GetStringAsync("https://checkip.amazonaws.com");
            ipString = ipString.Trim();

```

```

        var defaultSecurityGroup = await
_autoScalerWrapper.GetDefaultSecurityGroupForVpc(defaultVpc);
        var portIsOpen =
_autoScalerWrapper.VerifyInboundPortForGroup(defaultSecurityGroup, port, ipString);
        var sshPortIsOpen =
_autoScalerWrapper.VerifyInboundPortForGroup(defaultSecurityGroup, sshPort,
ipString);

        if (!portIsOpen)
        {
            Console.WriteLine(
                "\nFor this example to work, the default security group for your
default VPC must\n"
                + "allows access from this computer. You can either add it
automatically from this\n"
                + "example or add it yourself using the AWS Management Console.
\n");

            if (!interactive || GetYesNoResponse(
                "Do you want to add a rule to the security group to allow
inbound traffic from your computer's IP address?"))
            {
                await
_autoScalerWrapper.OpenInboundPort(defaultSecurityGroup.GroupId, port, ipString);
            }

            if (!sshPortIsOpen)
            {
                if (!interactive || GetYesNoResponse(
                    "Do you want to add a rule to the security group to allow
inbound SSH traffic for debugging from your computer's IP address?"))
                {
                    await
_autoScalerWrapper.OpenInboundPort(defaultSecurityGroup.GroupId, sshPort,
ipString);
                }
            }

            loadBalancerAccess = await
_elasticLoadBalancerWrapper.VerifyLoadBalancerEndpoint(endPoint);
        }

        if (loadBalancerAccess)
        {

```



```

        Console.WriteLine("Your load balancer is ready. You can access it by
browsing to:");
        Console.WriteLine($"\\thttp://{endPoint}\\n");
    }
    else
    {
        Console.WriteLine(
            "\\nCouldn't get a successful response from the load balancer
endpoint. Troubleshoot by\\n"
            + "manually verifying that your VPC and security group are
configured correctly and that\\n"
            + "you can successfully make a GET request to the load balancer
endpoint:\\n");
        Console.WriteLine($"\\thttp://{endPoint}\\n");
    }
    Console.WriteLine(new string('-', 80));
    Console.WriteLine("Press Enter when you're ready to continue with the
demo.");
    if (interactive)
        Console.ReadLine();
    return true;
}

/// <summary>
/// Demonstrate the steps of the scenario.
/// </summary>
/// <param name="interactive">True to run as an interactive scenario.</param>
/// <returns>Async task.</returns>
public static async Task<bool> Demo(bool interactive)
{
    var ssmOnlyPolicy = Path.Join(_configuration["resourcePath"],
        "ssm_only_policy.json");

    Console.WriteLine(new string('-', 80));
    Console.WriteLine("Resetting parameters to starting values for demo.");
    await _smParameterWrapper.Reset();

    Console.WriteLine("\\nThis part of the demonstration shows how to toggle
different parts of the system\\n" +
        "to create situations where the web service fails, and
shows how using a resilient\\n" +
        "architecture can keep the web service running in spite of
these failures.");
    Console.WriteLine(new string('-', 88));

```

```

        Console.WriteLine("At the start, the load balancer endpoint returns
recommendations and reports that all targets are healthy.");
        if (interactive)
            await DemoActionChoices();

        Console.WriteLine($"The web service running on the EC2 instances gets
recommendations by querying a DynamoDB table.\n" +
            $"The table name is contained in a Systems Manager
parameter named '{_smParameterWrapper.TableParameter}'.\n" +
            $"To simulate a failure of the recommendation service,
let's set this parameter to name a non-existent table.\n");
        await
        _smParameterWrapper.PutParameterByName(_smParameterWrapper.TableParameter, "this-
is-not-a-table");
        Console.WriteLine("\nNow, sending a GET request to the load balancer
endpoint returns a failure code. But, the service reports as\n" +
            "healthy to the load balancer because shallow health
checks don't check for failure of the recommendation service.");
        if (interactive)
            await DemoActionChoices();

        Console.WriteLine("Instead of failing when the recommendation service fails,
the web service can return a static response.");
        Console.WriteLine("While this is not a perfect solution, it presents the
customer with a somewhat better experience than failure.");

        await
        _smParameterWrapper.PutParameterByName(_smParameterWrapper.FailureResponseParameter,
"static");

        Console.WriteLine("\nNow, sending a GET request to the load balancer
endpoint returns a static response.");
        Console.WriteLine("The service still reports as healthy because health
checks are still shallow.");
        if (interactive)
            await DemoActionChoices();

        Console.WriteLine("Let's reinstate the recommendation service.\n");
        await
        _smParameterWrapper.PutParameterByName(_smParameterWrapper.TableParameter,
        _smParameterWrapper.TableName);
        Console.WriteLine(
            "\nLet's also substitute bad credentials for one of the instances in the
target group so that it can't\n" +

```

```

        "access the DynamoDB recommendation table.\n"
    );
    await _autoScalerWrapper.CreateInstanceProfileWithName(
        _autoScalerWrapper.BadCredsPolicyName,
        _autoScalerWrapper.BadCredsRoleName,
        _autoScalerWrapper.BadCredsProfileName,
        ssmOnlyPolicy,
        new List<string> { "AmazonSSMManagedInstanceCore" }
    );
    var instances = await
    _autoScalerWrapper.GetInstancesByGroupName(_autoScalerWrapper.GroupName);
    var badInstanceId = instances.First();
    var instanceProfile = await
    _autoScalerWrapper.GetInstanceProfile(badInstanceId);
    Console.WriteLine(
        $"Replacing the profile for instance {badInstanceId} with a profile that
contains\n" +
        "bad credentials...\n"
    );
    await _autoScalerWrapper.ReplaceInstanceProfile(
        badInstanceId,
        _autoScalerWrapper.BadCredsProfileName,
        instanceProfile.AssociationId
    );
    Console.WriteLine(
        "Now, sending a GET request to the load balancer endpoint returns either
a recommendation or a static response,\n" +
        "depending on which instance is selected by the load balancer.\n"
    );
    if (interactive)
        await DemoActionChoices();

    Console.WriteLine("\nLet's implement a deep health check. For this demo, a
deep health check tests whether");
    Console.WriteLine("the web service can access the DynamoDB table that it
depends on for recommendations. Note that");
    Console.WriteLine("the deep health check is only for ELB routing and not for
Auto Scaling instance health.");
    Console.WriteLine("This kind of deep health check is not recommended for
Auto Scaling instance health, because it");
    Console.WriteLine("risks accidental termination of all instances in the Auto
Scaling group when a dependent service fails.");

```

```
        Console.WriteLine("\nBy implementing deep health checks, the load balancer  
can detect when one of the instances is failing");  
        Console.WriteLine("and take that instance out of rotation.");  
  
        await  
_smParameterWrapper.PutParameterByName(_smParameterWrapper.HealthCheckParameter,  
"deep");  
  
        Console.WriteLine($"Now, checking target health indicates that the  
instance with bad credentials ({badInstanceId})");  
        Console.WriteLine("is unhealthy. Note that it might take a minute or two for  
the load balancer to detect the unhealthy");  
        Console.WriteLine("instance. Sending a GET request to the load balancer  
endpoint always returns a recommendation, because");  
        Console.WriteLine("the load balancer takes unhealthy instances out of its  
rotation.");  
  
        if (interactive)  
            await DemoActionChoices();  
  
        Console.WriteLine("\nBecause the instances in this demo are controlled by an  
auto scaler, the simplest way to fix an unhealthy");  
        Console.WriteLine("instance is to terminate it and let the auto scaler start  
a new instance to replace it.");  
  
        await _autoScalerWrapper.TryTerminateInstanceById(badInstanceId);  
  
        Console.WriteLine($"Even while the instance is terminating and the new  
instance is starting, sending a GET");  
        Console.WriteLine("request to the web service continues to get a successful  
recommendation response because");  
        Console.WriteLine("starts and reports as healthy, it is included in the load  
balancing rotation.");  
        Console.WriteLine("Note that terminating and replacing an instance typically  
takes several minutes, during which time you");  
        Console.WriteLine("can see the changing health check status until the new  
instance is running and healthy.");  
  
        if (interactive)  
            await DemoActionChoices();  
  
        Console.WriteLine("\nIf the recommendation service fails now, deep health  
checks mean all instances report as unhealthy.");
```

```

        await
        _smParameterWrapper.PutParameterByName(_smParameterWrapper.TableParameter, "this-
is-not-a-table");

        Console.WriteLine($"\\nWhen all instances are unhealthy, the load balancer
continues to route requests even to");
        Console.WriteLine("unhealthy instances, allowing them to fail open and
return a static response rather than fail");
        Console.WriteLine("closed and report failure to the customer.");

        if (interactive)
            await DemoActionChoices();
        await _smParameterWrapper.Reset();

        Console.WriteLine(new string('-', 80));
        return true;
    }

    /// <summary>
    /// Clean up the resources from the scenario.
    /// </summary>
    /// <param name="interactive">True to ask the user for cleanup.</param>
    /// <returns>Async task.</returns>
    public static async Task<bool> DestroyResources(bool interactive)
    {
        Console.WriteLine(new string('-', 80));
        Console.WriteLine(
            "To keep things tidy and to avoid unwanted charges on your account, we
can clean up all AWS resources\\n" +
            "that were created for this demo."
        );

        if (!interactive || GetYesNoResponse("Do you want to clean up all demo
resources? (y/n) "))
        {
            await
            _elasticLoadBalancerWrapper.DeleteLoadBalancerByName(_elasticLoadBalancerWrapper.LoadBalancerName);
            await
            _elasticLoadBalancerWrapper.DeleteTargetGroupByName(_elasticLoadBalancerWrapper.TargetGroupName);
            await
            _autoScalerWrapper.TerminateAndDeleteAutoScalingGroupWithName(_autoScalerWrapper.GroupName);
            await
            _autoScalerWrapper.DeleteKeyPairByName(_autoScalerWrapper.KeyPairName);

```

```

        await
        _autoScalerWrapper.DeleteTemplateByName(_autoScalerWrapper.LaunchTemplateName);
        await _autoScalerWrapper.DeleteInstanceProfile(
            _autoScalerWrapper.BadCredsProfileName,
            _autoScalerWrapper.BadCredsRoleName
        );
        await
        _recommendations.DestroyDatabaseByName(_recommendations.TableName);
    }
    else
    {
        Console.WriteLine(
            "Ok, we'll leave the resources intact.\n" +
            "Don't forget to delete them when you're done with them or you might
incur unexpected charges."
        );
    }

    Console.WriteLine(new string('-', 80));
    return true;
}

```

建立包裝 Auto Scaling 和 Amazon EC2 動作的類別。

```

/// <summary>
/// Encapsulates Amazon EC2 Auto Scaling and EC2 management methods.
/// </summary>
public class AutoScalerWrapper
{
    private readonly IAmazonAutoScaling _amazonAutoScaling;
    private readonly IAmazonEC2 _amazonEc2;
    private readonly IAmazonSimpleSystemsManagement _amazonSsm;
    private readonly IAmazonIdentityManagementService _amazonIam;
    private readonly ILogger<AutoScalerWrapper> _logger;

    private readonly string _instanceType = "";
    private readonly string _amiParam = "";
    private readonly string _launchTemplateName = "";
    private readonly string _groupName = "";
    private readonly string _instancePolicyName = "";
    private readonly string _instanceRoleName = "";
    private readonly string _instanceProfileName = "";

```

```

private readonly string _badCredsProfileName = "";
private readonly string _badCredsRoleName = "";
private readonly string _badCredsPolicyName = "";
private readonly string _keyPairName = "";

public string GroupName => _groupName;
public string KeyPairName => _keyPairName;
public string LaunchTemplateName => _launchTemplateName;
public string InstancePolicyName => _instancePolicyName;
public string BadCredsProfileName => _badCredsProfileName;
public string BadCredsRoleName => _badCredsRoleName;
public string BadCredsPolicyName => _badCredsPolicyName;

/// <summary>
/// Constructor for the AutoScalerWrapper.
/// </summary>
/// <param name="amazonAutoScaling">The injected AutoScaling client.</param>
/// <param name="amazonEc2">The injected EC2 client.</param>
/// <param name="amazonIam">The injected IAM client.</param>
/// <param name="amazonSsm">The injected SSM client.</param>
public AutoScalerWrapper(
    IAmazonAutoScaling amazonAutoScaling,
    IAmazonEC2 amazonEc2,
    IAmazonSimpleSystemsManagement amazonSsm,
    IAmazonIdentityManagementService amazonIam,
    IConfiguration configuration,
    ILogger<AutoScalerWrapper> logger)
{
    _amazonAutoScaling = amazonAutoScaling;
    _amazonEc2 = amazonEc2;
    _amazonSsm = amazonSsm;
    _amazonIam = amazonIam;
    _logger = logger;

    var prefix = configuration["resourcePrefix"];
    _instanceType = configuration["instanceType"];
    _amiParam = configuration["amiParam"];

    _launchTemplateName = prefix + "-template";
    _groupName = prefix + "-group";
    _instancePolicyName = prefix + "-pol";
    _instanceRoleName = prefix + "-role";
    _instanceProfileName = prefix + "-prof";
    _badCredsPolicyName = prefix + "-bc-pol";

```

```

        _badCredsRoleName = prefix + "-bc-role";
        _badCredsProfileName = prefix + "-bc-prof";
        _keyPairName = prefix + "-key-pair";
    }

    /// <summary>
    /// Create a policy, role, and profile that is associated with instances with a
    specified name.
    /// An instance's associated profile defines a role that is assumed by the
    /// instance. The role has attached policies that specify the AWS permissions
    granted to
    /// clients that run on the instance.
    /// </summary>
    /// <param name="policyName">Name to use for the policy.</param>
    /// <param name="roleName">Name to use for the role.</param>
    /// <param name="profileName">Name to use for the profile.</param>
    /// <param name="ssmOnlyPolicyFile">Path to a policy file for SSM.</param>
    /// <param name="awsManagedPolicies">AWS Managed policies to be attached to the
    role.</param>
    /// <returns>The Arn of the profile.</returns>
    public async Task<string> CreateInstanceProfileWithName(
        string policyName,
        string roleName,
        string profileName,
        string ssmOnlyPolicyFile,
        List<string>? awsManagedPolicies = null)
    {

        var assumeRoleDoc = "{" +
            "\"Version\": \"2012-10-17\", " +
            "\"Statement\": [{" +
                "\"Effect\": \"Allow\", " +
                "\"Principal\": { " +
                "\"Service\": [ " +
                    "\"ec2.amazonaws.com\" " +
                "]" +
                "}, " +
                "\"Action\": \"sts:AssumeRole\" " +
            "}] " +
            "}";

        var policyDocument = await File.ReadAllTextAsync(ssmOnlyPolicyFile);

        var policyArn = "";

```



```
try
{
    var createPolicyResult = await _amazonIam.CreatePolicyAsync(
        new CreatePolicyRequest
        {
            PolicyName = policyName,
            PolicyDocument = policyDocument
        });
    policyArn = createPolicyResult.Policy.Arn;
}
catch (EntityAlreadyExistsException)
{
    // The policy already exists, so we look it up to get the Arn.
    var policiesPaginator = _amazonIam.Paginators.ListPolicies(
        new ListPoliciesRequest()
        {
            Scope = PolicyScopeType.Local
        });
    // Get the entire list using the paginator.
    await foreach (var policy in policiesPaginator.Policies)
    {
        if (policy.PolicyName.Equals(policyName))
        {
            policyArn = policy.Arn;
        }
    }

    if (policyArn == null)
    {
        throw new InvalidOperationException("Policy not found");
    }
}

try
{
    await _amazonIam.CreateRoleAsync(new CreateRoleRequest()
    {
        RoleName = roleName,
        AssumeRolePolicyDocument = assumeRoleDoc,
    });
    await _amazonIam.AttachRolePolicyAsync(new AttachRolePolicyRequest()
    {
        RoleName = roleName,
```

```

        PolicyArn = policyArn
    });
    if (awsManagedPolicies != null)
    {
        foreach (var awsPolicy in awsManagedPolicies)
        {
            await _amazonIam.AttachRolePolicyAsync(new
AttachRolePolicyRequest()
            {
                PolicyArn = $"arn:aws:iam::aws:policy/{awsPolicy}",
                RoleName = roleName
            });
        }
    }
}
catch (EntityAlreadyExistsException)
{
    Console.WriteLine("Role already exists.");
}

string profileArn = "";
try
{
    var profileCreateResponse = await _amazonIam.CreateInstanceProfileAsync(
        new CreateInstanceProfileRequest()
        {
            InstanceProfileName = profileName
        });
    // Allow time for the profile to be ready.
    profileArn = profileCreateResponse.InstanceProfile.Arn;
    Thread.Sleep(10000);
    await _amazonIam.AddRoleToInstanceProfileAsync(
        new AddRoleToInstanceProfileRequest()
        {
            InstanceProfileName = profileName,
            RoleName = roleName
        });
}
catch (EntityAlreadyExistsException)
{
    Console.WriteLine("Policy already exists.");
    var profileGetResponse = await _amazonIam.GetInstanceProfileAsync(
        new GetInstanceProfileRequest()

```

```

        {
            InstanceProfileName = profileName
        });
        profileArn = profileGetResponse.InstanceProfile.Arn;
    }
    return profileArn;
}

/// <summary>
/// Create a new key pair and save the file.
/// </summary>
/// <param name="newKeyPairName">The name of the new key pair.</param>
/// <returns>Async task.</returns>
public async Task CreateKeyPair(string newKeyPairName)
{
    try
    {
        var keyResponse = await _amazonEc2.CreateKeyPairAsync(
            new CreateKeyPairRequest() { KeyName = newKeyPairName });
        await File.WriteAllTextAsync($"{newKeyPairName}.pem",
            keyResponse.KeyPair.KeyMaterial);
        Console.WriteLine($"Created key pair {newKeyPairName}.");
    }
    catch (AlreadyExistsException)
    {
        Console.WriteLine("Key pair already exists.");
    }
}

/// <summary>
/// Delete the key pair and file by name.
/// </summary>
/// <param name="deleteKeyPairName">The key pair to delete.</param>
/// <returns>Async task.</returns>
public async Task DeleteKeyPairByName(string deleteKeyPairName)
{
    try
    {
        await _amazonEc2.DeleteKeyPairAsync(
            new DeleteKeyPairRequest() { KeyName = deleteKeyPairName });
        File.Delete($"{deleteKeyPairName}.pem");
    }
    catch (FileNotFoundException)
    {
    }
}

```

```

        Console.WriteLine($"Key pair {deleteKeyPairName} not found.");
    }
}

/// <summary>
/// Creates an Amazon EC2 launch template to use with Amazon EC2 Auto Scaling.
/// The launch template specifies a Bash script in its user data field that runs
after
/// the instance is started. This script installs the Python packages and starts
a Python
/// web server on the instance.
/// </summary>
/// <param name="startupScriptPath">The path to a Bash script file that is
run.</param>
/// <param name="instancePolicyPath">The path to a permissions policy to create
and attach to the profile.</param>
/// <returns>The template object.</returns>
public async Task<Amazon.EC2.Model.LaunchTemplate> CreateTemplate(string
startupScriptPath, string instancePolicyPath)
{
    try
    {
        await CreateKeyPair(_keyPairName);
        await CreateInstanceProfileWithName(_instancePolicyName,
_instanceRoleName,
        _instanceProfileName, instancePolicyPath);

        var startServerText = await File.ReadAllTextAsync(startupScriptPath);
        var plainTextBytes =
System.Text.Encoding.UTF8.GetBytes(startServerText);

        var amiLatest = await _amazonSsm.GetParameterAsync(
            new GetParameterRequest() { Name = _amiParam });
        var amiId = amiLatest.Parameter.Value;
        var launchTemplateResponse = await _amazonEc2.CreateLaunchTemplateAsync(
            new CreateLaunchTemplateRequest()
            {
                LaunchTemplateName = _launchTemplateName,
                LaunchTemplateData = new RequestLaunchTemplateData()
                {
                    InstanceType = _instanceType,
                    ImageId = amiId,
                    IamInstanceProfile =
                        new

```

```

LaunchTemplateIamInstanceProfileSpecificationRequest()
    {
        Name = _instanceProfileName
    },
    KeyName = _keyPairName,
    UserData = System.Convert.ToBase64String(plainTextBytes)
}
});
return launchTemplateResponse.LaunchTemplate;
}
catch (AmazonEC2Exception ec2Exception)
{
    if (ec2Exception.ErrorCode ==
"InvalidLaunchTemplateName.AlreadyExistsException")
    {
        _logger.LogError($"Could not create the template, the name
{_launchTemplateName} already exists. " +
                        $"Please try again with a unique name.");
    }

    throw;
}
catch (Exception ex)
{
    _logger.LogError($"An error occurred while creating the template.:
{ex.Message}");
    throw;
}
}

/// <summary>
/// Get a list of Availability Zones in the AWS Region of the Amazon EC2 Client.
/// </summary>
/// <returns>A list of availability zones.</returns>
public async Task<List<string>> DescribeAvailabilityZones()
{
    try
    {
        var zoneResponse = await _amazonEc2.DescribeAvailabilityZonesAsync(
            new DescribeAvailabilityZonesRequest());
        return zoneResponse.AvailabilityZones.Select(z => z.ZoneName).ToList();
    }
    catch (AmazonEC2Exception ec2Exception)

```

```

        {
            _logger.LogError($"An Amazon EC2 error occurred while listing
availability zones.: {ec2Exception.Message}");
            throw;
        }
        catch (Exception ex)
        {
            _logger.LogError($"An error occurred while listing availability zones.:
{ex.Message}");
            throw;
        }
    }

    /// <summary>
    /// Create an EC2 Auto Scaling group of a specified size and name.
    /// </summary>
    /// <param name="groupSize">The size for the group.</param>
    /// <param name="groupName">The name for the group.</param>
    /// <param name="availabilityZones">The availability zones for the group.</
param>
    /// <returns>Async task.</returns>
    public async Task CreateGroupOfSize(int groupSize, string groupName,
List<string> availabilityZones)
    {
        try
        {
            await _amazonAutoScaling.CreateAutoScalingGroupAsync(
                new CreateAutoScalingGroupRequest()
                {
                    AutoScalingGroupName = groupName,
                    AvailabilityZones = availabilityZones,
                    LaunchTemplate =
                        new Amazon.AutoScaling.Model.LaunchTemplateSpecification()
                        {
                            LaunchTemplateName = _launchTemplateName,
                            Version = "$Default"
                        },
                    MaxSize = groupSize,
                    MinSize = groupSize
                });
            Console.WriteLine($"Created EC2 Auto Scaling group {groupName} with size
{groupSize}.");
        }
        catch (EntityAlreadyExistsException)
    }

```

```

        {
            Console.WriteLine($"EC2 Auto Scaling group {groupName} already
exists.");
        }
    }

    /// <summary>
    /// Get the default VPC for the account.
    /// </summary>
    /// <returns>The default VPC object.</returns>
    public async Task<Vpc> GetDefaultVpc()
    {
        try
        {
            var vpcResponse = await _amazonEc2.DescribeVpcsAsync(
                new DescribeVpcsRequest()
                {
                    Filters = new List<Amazon.EC2.Model.Filter>()
                    {
                        new("is-default", new List<string>() { "true" })
                    }
                });
            return vpcResponse.Vpcs[0];
        }
        catch (AmazonEC2Exception ec2Exception)
        {
            if (ec2Exception.ErrorCode == "UnauthorizedOperation")
            {
                _logger.LogError(ec2Exception, $"You do not have the necessary
permissions to describe VPCs.");
            }

            throw;
        }
        catch (Exception ex)
        {
            _logger.LogError(ex, $"An error occurred while describing the vpcs.:
{ex.Message}");
            throw;
        }
    }

    /// <summary>
    /// Get all the subnets for a Vpc in a set of availability zones.

```

```

    /// </summary>
    /// <param name="vpcId">The Id of the Vpc.</param>
    /// <param name="availabilityZones">The list of availability zones.</param>
    /// <returns>The collection of subnet objects.</returns>
    public async Task<List<Subnet>> GetAllVpcSubnetsForZones(string vpcId,
List<string> availabilityZones)
    {
        try
        {
            var subnets = new List<Subnet>();
            var subnetPaginator = _amazonEc2.Paginators.DescribeSubnets(
                new DescribeSubnetsRequest()
                {
                    Filters = new List<Amazon.EC2.Model.Filter>()
                    {
                        new("vpc-id", new List<string>() { vpcId }),
                        new("availability-zone", availabilityZones),
                        new("default-for-az", new List<string>() { "true" })
                    }
                });

            // Get the entire list using the paginator.
            await foreach (var subnet in subnetPaginator.Subnets)
            {
                subnets.Add(subnet);
            }

            return subnets;
        }
        catch (AmazonEC2Exception ec2Exception)
        {
            if (ec2Exception.ErrorCode == "InvalidVpcID.NotFound")
            {
                _logger.LogError(ec2Exception, $"The specified VPC ID {vpcId} does
not exist.");
            }

            throw;
        }
        catch (Exception ex)
        {
            _logger.LogError(ex, $"An error occurred while describing the subnets.:
{ex.Message}");
            throw;
        }
    }

```



```

    }
}

/// <summary>
/// Delete a launch template by name.
/// </summary>
/// <param name="templateName">The name of the template to delete.</param>
/// <returns>Async task.</returns>
public async Task DeleteTemplateByName(string templateName)
{
    try
    {
        await _amazonEc2.DeleteLaunchTemplateAsync(
            new DeleteLaunchTemplateRequest()
            {
                LaunchTemplateName = templateName
            });
    }
    catch (AmazonEC2Exception ec2Exception)
    {
        if (ec2Exception.ErrorCode ==
            "InvalidLaunchTemplateName.NotFoundException")
        {
            _logger.LogError(
                $"Could not delete the template, the name {_launchTemplateName}
was not found.");
        }

        throw;
    }
    catch (Exception ex)
    {
        _logger.LogError($"An error occurred while deleting the template.:
{ex.Message}");
        throw;
    }
}

/// <summary>
/// Detaches a role from an instance profile, detaches policies from the role,
/// and deletes all the resources.
/// </summary>
/// <param name="profileName">The name of the profile to delete.</param>
/// <param name="roleName">The name of the role to delete.</param>

```

```
/// <returns>Async task.</returns>
public async Task DeleteInstanceProfile(string profileName, string roleName)
{
    try
    {
        await _amazonIam.RemoveRoleFromInstanceProfileAsync(
            new RemoveRoleFromInstanceProfileRequest()
            {
                InstanceProfileName = profileName,
                RoleName = roleName
            });
        await _amazonIam.DeleteInstanceProfileAsync(
            new DeleteInstanceProfileRequest() { InstanceProfileName =
profileName });
        var attachedPolicies = await _amazonIam.ListAttachedRolePoliciesAsync(
            new ListAttachedRolePoliciesRequest() { RoleName = roleName });
        foreach (var policy in attachedPolicies.AttachedPolicies)
        {
            await _amazonIam.DetachRolePolicyAsync(
                new DetachRolePolicyRequest()
                {
                    RoleName = roleName,
                    PolicyArn = policy.PolicyArn
                });
            // Delete the custom policies only.
            if (!policy.PolicyArn.StartsWith("arn:aws:iam::aws"))
            {
                await _amazonIam.DeletePolicyAsync(
                    new Amazon.IdentityManagement.Model.DeletePolicyRequest()
                    {
                        PolicyArn = policy.PolicyArn
                    });
            }
        }

        await _amazonIam.DeleteRoleAsync(
            new DeleteRoleRequest() { RoleName = roleName });
    }
    catch (NoSuchEntityException)
    {
        Console.WriteLine($"Instance profile {profileName} does not exist.");
    }
}
```

```
/// <summary>
/// Gets data about the instances in an EC2 Auto Scaling group by its group
name.
/// </summary>
/// <param name="group">The name of the auto scaling group.</param>
/// <returns>A collection of instance Ids.</returns>
public async Task<IEnumerable<string>> GetInstancesByGroupName(string group)
{
    var instanceResponse = await
_amazonAutoScaling.DescribeAutoScalingGroupsAsync(
    new DescribeAutoScalingGroupsRequest()
    {
        AutoScalingGroupNames = new List<string>() { group }
    });
    var instanceIds = instanceResponse.AutoScalingGroups.SelectMany(
        g => g.Instances.Select(i => i.InstanceId));
    return instanceIds;
}

/// <summary>
/// Get the instance profile association data for an instance.
/// </summary>
/// <param name="instanceId">The Id of the instance.</param>
/// <returns>Instance profile associations data.</returns>
public async Task<IamInstanceProfileAssociation> GetInstanceProfile(string
instanceId)
{
    try
    {
        var response = await
_amazonEc2.DescribeIamInstanceProfileAssociationsAsync(
        new DescribeIamInstanceProfileAssociationsRequest()
        {
            Filters = new List<Amazon.EC2.Model.Filter>()
            {
                new("instance-id", new List<string>() { instanceId })
            },
        });
        return response.IamInstanceProfileAssociations[0];
    }
    catch (AmazonEC2Exception ec2Exception)
    {
        if (ec2Exception.ErrorCode == "InvalidInstanceID.NotFound")
        {

```

```

        _logger.LogError(ec2Exception, $"Instance {instanceId} not found");
    }

    throw;
}
catch (Exception ex)
{
    _logger.LogError(ex, $"An error occurred while creating the template.: {ex.Message}");
    throw;
}
}

/// <summary>
/// Replace the profile associated with a running instance. After the profile is
replaced, the instance
/// is rebooted to ensure that it uses the new profile. When the instance is
ready, Systems Manager is
/// used to restart the Python web server.
/// </summary>
/// <param name="instanceId">The Id of the instance to update.</param>
/// <param name="credsProfileName">The name of the new profile to associate with
the specified instance.</param>
/// <param name="associationId">The Id of the existing profile association for
the instance.</param>
/// <returns>Async task.</returns>
public async Task ReplaceInstanceProfile(string instanceId, string
credsProfileName, string associationId)
{
    try
    {
        await _amazonEc2.ReplaceIamInstanceProfileAssociationAsync(
            new ReplaceIamInstanceProfileAssociationRequest()
            {
                AssociationId = associationId,
                IamInstanceProfile = new IamInstanceProfileSpecification()
                {
                    Name = credsProfileName
                }
            });
        // Allow time before resetting.
        Thread.Sleep(25000);

        await _amazonEc2.RebootInstancesAsync(

```

```

        new RebootInstancesRequest(new List<string>() { instanceId }));
Thread.Sleep(25000);
var instanceReady = false;
var retries = 5;
while (retries-- > 0 && !instanceReady)
{
    var instancesPaginator =
        _amazonSsm.Paginators.DescribeInstanceInformation(
            new DescribeInstanceInformationRequest());
    // Get the entire list using the paginator.
    await foreach (var instance in
instancesPaginator.InstanceInformationList)
    {
        instanceReady = instance.InstanceId == instanceId;
        if (instanceReady)
        {
            break;
        }
    }
}
Console.WriteLine("Waiting for instance to be running.");
await WaitForInstanceState(instanceId, InstanceStateName.Running);
Console.WriteLine("Instance ready.");
Console.WriteLine($"Sending restart command to instance {instanceId}");
await _amazonSsm.SendCommandAsync(
    new SendCommandRequest()
    {
        InstanceIds = new List<string>() { instanceId },
        DocumentName = "AWS-RunShellScript",
        Parameters = new Dictionary<string, List<string>>()
        {
            {
                "commands",
                new List<string>() { "cd / && sudo python3 server.py
80" }
            }
        }
    });
Console.WriteLine($"Restarted the web server on instance {instanceId}");
}
catch (AmazonEC2Exception ec2Exception)
{
    if (ec2Exception.ErrorCode == "InvalidInstanceID.NotFound")
    {

```

```

        _logger.LogError(ec2Exception, $"Instance {instanceId} not found");
    }

    throw;
}
catch (Exception ex)
{
    _logger.LogError(ex, $"An error occurred while replacing the template.:
{ex.Message}");
    throw;
}
}

/// <summary>
/// Try to terminate an instance by its Id.
/// </summary>
/// <param name="instanceId">The Id of the instance to terminate.</param>
/// <returns>Async task.</returns>
public async Task TryTerminateInstanceById(string instanceId)
{
    var stopping = false;
    Console.WriteLine($"Stopping {instanceId}...");
    while (!stopping)
    {
        try
        {
            await _amazonAutoScaling.TerminateInstanceInAutoScalingGroupAsync(
                new TerminateInstanceInAutoScalingGroupRequest()
                {
                    InstanceId = instanceId,
                    ShouldDecrementDesiredCapacity = false
                });
            stopping = true;
        }
        catch (ScalingActivityInProgressException)
        {
            Console.WriteLine($"Scaling activity in progress for {instanceId}.
Waiting...");
            Thread.Sleep(10000);
        }
    }
}

/// <summary>

```

```

    /// Tries to delete the EC2 Auto Scaling group. If the group is in use or in
    progress,
    /// waits and retries until the group is successfully deleted.
    /// </summary>
    /// <param name="groupName">The name of the group to try to delete.</param>
    /// <returns>Async task.</returns>
    public async Task TryDeleteGroupByName(string groupName)
    {
        var stopped = false;
        while (!stopped)
        {
            try
            {
                await _amazonAutoScaling.DeleteAutoScalingGroupAsync(
                    new DeleteAutoScalingGroupRequest()
                    {
                        AutoScalingGroupName = groupName
                    });
                stopped = true;
            }
            catch (Exception e)
            when ((e is ScalingActivityInProgressException)
                || (e is Amazon.AutoScaling.Model.ResourceInUseException))
            {
                Console.WriteLine($"Some instances are still running. Waiting...");
                Thread.Sleep(10000);
            }
        }
    }

    /// <summary>
    /// Terminate instances and delete the Auto Scaling group by name.
    /// </summary>
    /// <param name="groupName">The name of the group to delete.</param>
    /// <returns>Async task.</returns>
    public async Task TerminateAndDeleteAutoScalingGroupWithName(string groupName)
    {
        var describeGroupsResponse = await
        _amazonAutoScaling.DescribeAutoScalingGroupsAsync(
            new DescribeAutoScalingGroupsRequest()
            {
                AutoScalingGroupNames = new List<string>() { groupName }
            });
        if (describeGroupsResponse.AutoScalingGroups.Any())

```

```

    {
        // Update the size to 0.
        await _amazonAutoScaling.UpdateAutoScalingGroupAsync(
            new UpdateAutoScalingGroupRequest()
            {
                AutoScalingGroupName = groupName,
                MinSize = 0
            });
        var group = describeGroupsResponse.AutoScalingGroups[0];
        foreach (var instance in group.Instances)
        {
            await TryTerminateInstanceById(instance.InstanceId);
        }

        await TryDeleteGroupByName(groupName);
    }
    else
    {
        Console.WriteLine($"No groups found with name {groupName}.");
    }
}

/// <summary>
/// Get the default security group for a specified Vpc.
/// </summary>
/// <param name="vpc">The Vpc to search.</param>
/// <returns>The default security group.</returns>
public async Task<SecurityGroup> GetDefaultSecurityGroupForVpc(Vpc vpc)
{
    var groupResponse = await _amazonEc2.DescribeSecurityGroupsAsync(
        new DescribeSecurityGroupsRequest()
        {
            Filters = new List<Amazon.EC2.Model.Filter>()
            {
                new ("group-name", new List<string>() { "default" }),
                new ("vpc-id", new List<string>() { vpc.VpcId })
            }
        });
    return groupResponse.SecurityGroups[0];
}

/// <summary>

```



```

    /// Verify the default security group of a Vpc allows ingress from the calling
    computer.
    /// This can be done by allowing ingress from this computer's IP address.
    /// In some situations, such as connecting from a corporate network, you must
    instead specify
    /// a prefix list Id. You can also temporarily open the port to any IP address
    while running this example.
    /// If you do, be sure to remove public access when you're done.
    /// </summary>
    /// <param name="vpc">The group to check.</param>
    /// <param name="port">The port to verify.</param>
    /// <param name="ipAddress">This computer's IP address.</param>
    /// <returns>True if the ip address is allowed on the group.</returns>
    public bool VerifyInboundPortForGroup(SecurityGroup group, int port, string
ipAddress)
    {
        var portIsOpen = false;
        foreach (var ipPermission in group.IpPermissions)
        {
            if (ipPermission.FromPort == port)
            {
                foreach (var ipRange in ipPermission.Ipv4Ranges)
                {
                    var cidr = ipRange.CidrIp;
                    if (cidr.StartsWith(ipAddress) || cidr == "0.0.0.0/0")
                    {
                        portIsOpen = true;
                    }
                }

                if (ipPermission.PrefixListIds.Any())
                {
                    portIsOpen = true;
                }

                if (!portIsOpen)
                {
                    Console.WriteLine("The inbound rule does not appear to be open
to either this computer's IP\n" +
                                "address, to all IP addresses (0.0.0.0/0), or
to a prefix list ID.");
                }
            }
            else
            {

```

```

        break;
    }
}

return portIsOpen;
}

/// <summary>
/// Add an ingress rule to the specified security group that allows access on
the
/// specified port from the specified IP address.
/// </summary>
/// <param name="groupId">The Id of the security group to modify.</param>
/// <param name="port">The port to open.</param>
/// <param name="ipAddress">The IP address to allow access.</param>
/// <returns>Async task.</returns>
public async Task OpenInboundPort(string groupId, int port, string ipAddress)
{
    await _amazonEc2.AuthorizeSecurityGroupIngressAsync(
        new AuthorizeSecurityGroupIngressRequest()
        {
            GroupId = groupId,
            IpPermissions = new List<IpPermission>()
            {
                new IpPermission()
                {
                    FromPort = port,
                    ToPort = port,
                    IpProtocol = "tcp",
                    Ipv4Ranges = new List<IpRange>()
                    {
                        new IpRange() { CidrIp = $"{ipAddress}/32" }
                    }
                }
            }
        });
}

/// <summary>
/// Attaches an Elastic Load Balancing (ELB) target group to this EC2 Auto
Scaling group.
/// The
/// </summary>

```

```

    /// <param name="autoScalingGroupName">The name of the Auto Scaling group.</param>
    /// <param name="targetGroupArn">The Arn for the target group.</param>
    /// <returns>Async task.</returns>
    public async Task AttachLoadBalancerToGroup(string autoScalingGroupName, string
targetGroupArn)
    {
        await _amazonAutoScaling.AttachLoadBalancerTargetGroupsAsync(
            new AttachLoadBalancerTargetGroupsRequest()
            {
                AutoScalingGroupName = autoScalingGroupName,
                TargetGroupARNs = new List<string>() { targetGroupArn }
            });
    }

    /// <summary>
    /// Wait until an EC2 instance is in a specified state.
    /// </summary>
    /// <param name="instanceId">The instance Id.</param>
    /// <param name="stateName">The state to wait for.</param>
    /// <returns>A Boolean value indicating the success of the action.</returns>
    public async Task<bool> WaitForInstanceState(string instanceId,
InstanceStateName stateName)
    {
        var request = new DescribeInstancesRequest
        {
            InstanceIds = new List<string> { instanceId }
        };

        // Wait until the instance is in the specified state.
        var hasState = false;
        do
        {
            // Wait 5 seconds.
            Thread.Sleep(5000);

            // Check for the desired state.
            var response = await _amazonEc2.DescribeInstancesAsync(request);
            var instance = response.Reservations[0].Instances[0];
            hasState = instance.State.Name == stateName;
            Console.WriteLine(". ");
        } while (!hasState);

        return hasState;
    }

```

```
}
}
```

建立包裝 Elastic Load Balancing 動作的類別。

```
/// <summary>
/// Encapsulates Elastic Load Balancer actions.
/// </summary>
public class ElasticLoadBalancerWrapper
{
    private readonly IAmazonElasticLoadBalancingV2 _amazonElasticLoadBalancingV2;
    private string? _endpoint = null;
    private readonly string _targetGroupName = "";
    private readonly string _loadBalancerName = "";
    HttpClient _httpClient = new();

    public string TargetGroupName => _targetGroupName;
    public string LoadBalancerName => _loadBalancerName;

    /// <summary>
    /// Constructor for the Elastic Load Balancer wrapper.
    /// </summary>
    /// <param name="amazonElasticLoadBalancingV2">The injected load balancing v2
client.</param>
    /// <param name="configuration">The injected configuration.</param>
    public ElasticLoadBalancerWrapper(
        IAmazonElasticLoadBalancingV2 amazonElasticLoadBalancingV2,
        IConfiguration configuration)
    {
        _amazonElasticLoadBalancingV2 = amazonElasticLoadBalancingV2;
        var prefix = configuration["resourcePrefix"];
        _targetGroupName = prefix + "-tg";
        _loadBalancerName = prefix + "-lb";
    }

    /// <summary>
    /// Get the HTTP Endpoint of a load balancer by its name.
    /// </summary>
    /// <param name="loadBalancerName">The name of the load balancer.</param>
    /// <returns>The HTTP endpoint.</returns>
```

```

    public async Task<string> GetEndpointForLoadBalancerByName(string
loadBalancerName)
    {
        if (_endpoint == null)
        {
            var endpointResponse =
                await _amazonElasticLoadBalancingV2.DescribeLoadBalancersAsync(
                    new DescribeLoadBalancersRequest()
                    {
                        Names = new List<string>() { loadBalancerName }
                    });
            _endpoint = endpointResponse.LoadBalancers[0].DNSName;
        }

        return _endpoint;
    }

    /// <summary>
    /// Return the GET response for an endpoint as text.
    /// </summary>
    /// <param name="endpoint">The endpoint for the request.</param>
    /// <returns>The request response.</returns>
    public async Task<string> GetEndPointResponse(string endpoint)
    {
        var endpointResponse = await _httpClient.GetAsync($"http://{endpoint}");
        var textResponse = await endpointResponse.Content.ReadAsStringAsync();
        return textResponse!;
    }

    /// <summary>
    /// Get the target health for a group by name.
    /// </summary>
    /// <param name="groupName">The name of the group.</param>
    /// <returns>The collection of health descriptions.</returns>
    public async Task<List<TargetHealthDescription>>
CheckTargetHealthForGroup(string groupName)
    {
        List<TargetHealthDescription> result = null!;
        try
        {
            var groupResponse =
                await _amazonElasticLoadBalancingV2.DescribeTargetGroupsAsync(
                    new DescribeTargetGroupsRequest()
                    {

```

```

        Names = new List<string>() { groupName }
    });
    var healthResponse =
        await _amazonElasticLoadBalancingV2.DescribeTargetHealthAsync(
            new DescribeTargetHealthRequest()
            {
                TargetGroupArn =
groupResponse.TargetGroups[0].TargetGroupArn
            });
    ;
    result = healthResponse.TargetHealthDescriptions;
}
catch (TargetGroupNotFoundException)
{
    Console.WriteLine($"Target group {groupName} not found.");
}
return result;
}

/// <summary>
/// Create an Elastic Load Balancing target group. The target group specifies
how the load balancer forwards
/// requests to instances in the group and how instance health is checked.
///
/// To speed up this demo, the health check is configured with shortened times
and lower thresholds. In production,
/// you might want to decrease the sensitivity of your health checks to avoid
unwanted failures.
/// </summary>
/// <param name="groupName">The name for the group.</param>
/// <param name="protocol">The protocol, such as HTTP.</param>
/// <param name="port">The port to use to forward requests, such as 80.</param>
/// <param name="vpcId">The Id of the Vpc in which the load balancer exists.</
param>
/// <returns>The new TargetGroup object.</returns>
public async Task<TargetGroup> CreateTargetGroupOnVpc(string groupName,
ProtocolEnum protocol, int port, string vpcId)
{
    var createResponse = await
_amazonElasticLoadBalancingV2.CreateTargetGroupAsync(
        new CreateTargetGroupRequest()
        {
            Name = groupName,
            Protocol = protocol,

```

```

        Port = port,
        HealthCheckPath = "/healthcheck",
        HealthCheckIntervalSeconds = 10,
        HealthCheckTimeoutSeconds = 5,
        HealthyThresholdCount = 2,
        UnhealthyThresholdCount = 2,
        VpcId = vpcId
    });
    var targetGroup = createResponse.TargetGroups[0];
    return targetGroup;
}

/// <summary>
/// Create an Elastic Load Balancing load balancer that uses the specified
subnets
/// and forwards requests to the specified target group.
/// </summary>
/// <param name="name">The name for the new load balancer.</param>
/// <param name="subnetIds">Subnets for the load balancer.</param>
/// <param name="targetGroup">Target group for forwarded requests.</param>
/// <returns>The new LoadBalancer object.</returns>
public async Task<LoadBalancer> CreateLoadBalancerAndListener(string name,
List<string> subnetIds, TargetGroup targetGroup)
{
    var createLbResponse = await
    _amazonElasticLoadBalancingV2.CreateLoadBalancerAsync(
        new CreateLoadBalancerRequest()
        {
            Name = name,
            Subnets = subnetIds
        });
    var loadBalancerArn = createLbResponse.LoadBalancers[0].LoadBalancerArn;

    // Wait for load balancer to be available.
    var loadBalancerReady = false;
    while (!loadBalancerReady)
    {
        try
        {
            var describeResponse =
                await _amazonElasticLoadBalancingV2.DescribeLoadBalancersAsync(
                    new DescribeLoadBalancersRequest()
                    {
                        Names = new List<string>() { name }
                    }
                );
        }
        catch { }
    }
}

```

```

        });

        var loadBalancerState =
describeResponse.LoadBalancers[0].State.Code;

        loadBalancerReady = loadBalancerState ==
LoadBalancerStateEnum.Active;
    }
    catch (LoadBalancerNotFoundException)
    {
        loadBalancerReady = false;
    }
    Thread.Sleep(10000);
}
// Create the listener.
await _amazonElasticLoadBalancingV2.CreateListenerAsync(
    new CreateListenerRequest()
    {
        LoadBalancerArn = loadBalancerArn,
        Protocol = targetGroup.Protocol,
        Port = targetGroup.Port,
        DefaultActions = new List<Action>()
        {
            new Action()
            {
                Type = ActionTypeEnum.Forward,
                TargetGroupArn = targetGroup.TargetGroupArn
            }
        }
    });
return createLbResponse.LoadBalancers[0];
}

/// <summary>
/// Verify this computer can successfully send a GET request to the
/// load balancer endpoint.
/// </summary>
/// <param name="endpoint">The endpoint to check.</param>
/// <returns>True if successful.</returns>
public async Task<bool> VerifyLoadBalancerEndpoint(string endpoint)
{
    var success = false;
    var retries = 3;
    while (!success && retries > 0)

```



```

        {
            try
            {
                var endpointResponse = await _httpClient.GetAsync($"http://{
{endpoint}}");
                Console.WriteLine($"Response: {endpointResponse.StatusCode}.");

                if (endpointResponse.IsSuccessStatusCode)
                {
                    success = true;
                }
                else
                {
                    retries = 0;
                }
            }
            catch (HttpRequestException)
            {
                Console.WriteLine("Connection error, retrying...");
                retries--;
                Thread.Sleep(10000);
            }
        }

        return success;
    }

    /// <summary>
    /// Delete a load balancer by its specified name.
    /// </summary>
    /// <param name="name">The name of the load balancer to delete.</param>
    /// <returns>Async task.</returns>
    public async Task DeleteLoadBalancerByName(string name)
    {
        try
        {
            var describeLoadBalancerResponse =
                await _amazonElasticLoadBalancingV2.DescribeLoadBalancersAsync(
                    new DescribeLoadBalancersRequest()
                    {
                        Names = new List<string>() { name }
                    });
            var lbArn =
                describeLoadBalancerResponse.LoadBalancers[0].LoadBalancerArn;

```

```

        await _amazonElasticLoadBalancingV2.DeleteLoadBalancerAsync(
            new DeleteLoadBalancerRequest()
            {
                LoadBalancerArn = lbArn
            }
        );
    }
    catch (LoadBalancerNotFoundException)
    {
        Console.WriteLine($"Load balancer {name} not found.");
    }
}

/// <summary>
/// Delete a TargetGroup by its specified name.
/// </summary>
/// <param name="groupName">Name of the group to delete.</param>
/// <returns>Async task.</returns>
public async Task DeleteTargetGroupByName(string groupName)
{
    var done = false;
    while (!done)
    {
        try
        {
            var groupResponse =
                await _amazonElasticLoadBalancingV2.DescribeTargetGroupsAsync(
                    new DescribeTargetGroupsRequest()
                    {
                        Names = new List<string>() { groupName }
                    });

            var targetArn = groupResponse.TargetGroups[0].TargetGroupArn;
            await _amazonElasticLoadBalancingV2.DeleteTargetGroupAsync(
                new DeleteTargetGroupRequest() { TargetGroupArn = targetArn });
            Console.WriteLine($"Deleted load balancing target group
{groupName}.");
            done = true;
        }
        catch (TargetGroupNotFoundException)
        {
            Console.WriteLine(
                $"Target group {groupName} not found, could not delete.");
            done = true;
        }
    }
}

```

```

        }
        catch (ResourceInUseException)
        {
            Console.WriteLine("Target group not yet released, waiting...");
            Thread.Sleep(10000);
        }
    }
}
}

```

建立使用 DynamoDB 模擬建議服務的類別。

```

/// <summary>
/// Encapsulates a DynamoDB table to use as a service that recommends books, movies,
/// and songs.
/// </summary>
public class Recommendations
{
    private readonly IAmazonDynamoDB _amazonDynamoDb;
    private readonly DynamoDBContext _context;
    private readonly string _tableName;

    public string TableName => _tableName;

    /// <summary>
    /// Constructor for the Recommendations service.
    /// </summary>
    /// <param name="amazonDynamoDb">The injected DynamoDb client.</param>
    /// <param name="configuration">The injected configuration.</param>
    public Recommendations(IAmazonDynamoDB amazonDynamoDb, IConfiguration
configuration)
    {
        _amazonDynamoDb = amazonDynamoDb;
        _context = new DynamoDBContext(_amazonDynamoDb);
        _tableName = configuration["databaseName"]!;
    }

    /// <summary>
    /// Create the DynamoDb table with a specified name.
    /// </summary>
    /// <param name="tableName">The name for the table.</param>
    /// <returns>True when ready.</returns>

```

```
public async Task<bool> CreateDatabaseWithName(string tableName)
{
    try
    {
        Console.WriteLine($"Creating table {tableName}...");
        var createRequest = new CreateTableRequest()
        {
            TableName = tableName,
            AttributeDefinitions = new List<AttributeDefinition>()
            {
                new AttributeDefinition()
                {
                    AttributeName = "MediaType",
                    AttributeType = ScalarAttributeType.S
                },
                new AttributeDefinition()
                {
                    AttributeName = "ItemId",
                    AttributeType = ScalarAttributeType.N
                }
            },
            KeySchema = new List<KeySchemaElement>()
            {
                new KeySchemaElement()
                {
                    AttributeName = "MediaType",
                    KeyType = KeyType.HASH
                },
                new KeySchemaElement()
                {
                    AttributeName = "ItemId",
                    KeyType = KeyType.RANGE
                }
            },
            ProvisionedThroughput = new ProvisionedThroughput()
            {
                ReadCapacityUnits = 5,
                WriteCapacityUnits = 5
            }
        };
        await _amazonDynamoDb.CreateTableAsync(createRequest);

        // Wait until the table is ACTIVE and then report success.
        Console.WriteLine("\nWaiting for table to become active...");
    }
}
```

```

        var request = new DescribeTableRequest
        {
            TableName = tableName
        };

        TableStatus status;
        do
        {
            Thread.Sleep(2000);

            var describeTableResponse = await
                _amazonDynamoDb.DescribeTableAsync(request);
            status = describeTableResponse.Table.TableStatus;

            Console.WriteLine(".");
        }
        while (status != "ACTIVE");

        return status == TableStatus.ACTIVE;
    }
    catch (ResourceInUseException)
    {
        Console.WriteLine($"Table {tableName} already exists.");
        return false;
    }
}

/// <summary>
/// Populate the database table with data from a specified path.
/// </summary>
/// <param name="databaseTableName">The name of the table.</param>
/// <param name="recommendationsPath">The path of the recommendations data.</
param>
/// <returns>Async task.</returns>
public async Task PopulateDatabase(string databaseTableName, string
recommendationsPath)
{
    var recommendationsText = await File.ReadAllTextAsync(recommendationsPath);
    var records =
        JsonSerializer.Deserialize<RecommendationModel[]>(recommendationsText);
    var batchWrite = _context.CreateBatchWrite<RecommendationModel>();

    foreach (var record in records!)

```

```

        {
            batchWrite.AddPutItem(record);
        }

        await batchWrite.ExecuteAsync();
    }

    /// <summary>
    /// Delete the recommendation table by name.
    /// </summary>
    /// <param name="tableName">The name of the recommendation table.</param>
    /// <returns>Async task.</returns>
    public async Task DestroyDatabaseByName(string tableName)
    {
        try
        {
            await _amazonDynamoDb.DeleteTableAsync(
                new DeleteTableRequest() { TableName = tableName });
            Console.WriteLine($"Table {tableName} was deleted.");
        }
        catch (ResourceNotFoundException)
        {
            Console.WriteLine($"Table {tableName} not found");
        }
    }
}

```

建立包裝 Systems Manager 動作的類別。

```

    /// <summary>
    /// Encapsulates Systems Manager parameter operations. This example uses these
    /// parameters
    /// to drive the demonstration of resilient architecture, such as failure of a
    /// dependency or
    /// how the service responds to a health check.
    /// </summary>
    public class SmParameterWrapper
    {
        private readonly IAmazonSimpleSystemsManagement _amazonSimpleSystemsManagement;

        private readonly string _tableParameter = "doc-example-resilient-architecture-
        table";
    }

```

```

    private readonly string _failureResponseParameter = "doc-example-resilient-
architecture-failure-response";
    private readonly string _healthCheckParameter = "doc-example-resilient-
architecture-health-check";
    private readonly string _tableName = "";

    public string TableParameter => _tableParameter;
    public string TableName => _tableName;
    public string HealthCheckParameter => _healthCheckParameter;
    public string FailureResponseParameter => _failureResponseParameter;

    /// <summary>
    /// Constructor for the SmParameterWrapper.
    /// </summary>
    /// <param name="amazonSimpleSystemsManagement">The injected Simple Systems
Management client.</param>
    /// <param name="configuration">The injected configuration.</param>
    public SmParameterWrapper(IAmazonSimpleSystemsManagement
amazonSimpleSystemsManagement, IConfiguration configuration)
    {
        _amazonSimpleSystemsManagement = amazonSimpleSystemsManagement;
        _tableName = configuration["databaseName"]!;
    }

    /// <summary>
    /// Reset the Systems Manager parameters to starting values for the demo.
    /// </summary>
    /// <returns>Async task.</returns>
    public async Task Reset()
    {
        await this.PutParameterByName(_tableParameter, _tableName);
        await this.PutParameterByName(_failureResponseParameter, "none");
        await this.PutParameterByName(_healthCheckParameter, "shallow");
    }

    /// <summary>
    /// Set the value of a named Systems Manager parameter.
    /// </summary>
    /// <param name="name">The name of the parameter.</param>
    /// <param name="value">The value to set.</param>
    /// <returns>Async task.</returns>
    public async Task PutParameterByName(string name, string value)
    {
        await _amazonSimpleSystemsManagement.PutParameterAsync(

```

```
        new PutParameterRequest() { Name = name, Value = value, Overwrite =  
true });  
    }  
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的下列主題。

- [AttachLoadBalancerTargetGroups](#)
- [CreateAutoScalingGroup](#)
- [CreateInstanceProfile](#)
- [CreateLaunchTemplate](#)
- [CreateListener](#)
- [CreateLoadBalancer](#)
- [CreateTargetGroup](#)
- [DeleteAutoScalingGroup](#)
- [DeleteInstanceProfile](#)
- [DeleteLaunchTemplate](#)
- [DeleteLoadBalancer](#)
- [DeleteTargetGroup](#)
- [DescribeAutoScalingGroups](#)
- [DescribeAvailabilityZones](#)
- [DescribeIamInstanceProfileAssociations](#)
- [DescribeInstances](#)
- [DescribeLoadBalancers](#)
- [DescribeSubnets](#)
- [DescribeTargetGroups](#)
- [DescribeTargetHealth](#)
- [DescribeVpcs](#)
- [RebootInstances](#)
- [ReplaceIamInstanceProfileAssociation](#)
- [TerminateInstanceInAutoScalingGroup](#)
- [UpdateAutoScalingGroup](#)

使用的 Amazon ECS 範例 適用於 .NET 的 SDK

下列程式碼範例示範如何使用 適用於 .NET 的 AWS SDK 搭配 Amazon ECS 執行動作和實作常見案例。

Actions 是大型程式的程式碼摘錄，必須在內容中執行。雖然動作會告訴您如何呼叫個別服務函數，但您可以在其相關情境中查看內容中的動作。

案例是向您展示如何呼叫服務中的多個函數或與其他 AWS 服務組合來完成特定任務的程式碼範例。

每個範例均包含完整原始碼的連結，您可在連結中找到如何設定和執行內容中程式碼的相關指示。

主題

- [動作](#)
- [案例](#)

動作

ListClusters

以下程式碼範例顯示如何使用 ListClusters。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// List cluster ARNs available.
/// </summary>
/// <returns>The ARN list of clusters.</returns>
public async Task<List<string>> GetClusterARNsAsync()
{
    Console.WriteLine("Getting a list of all the clusters in your AWS
account...");
```

```
List<string> clusterArnList = new List<string>();
// Get a list of all the clusters in your AWS account
try
{
    var listClustersResponse = _ecsClient.Paginators.ListClusters(new
ListClustersRequest
    {
    });

    var clusterArns = listClustersResponse.ClusterArns;

    // Print the ARNs of the clusters
    await foreach (var clusterArn in clusterArns)
    {
        clusterArnList.Add(clusterArn);
    }

    if (clusterArnList.Count == 0)
    {
        _logger.LogWarning("No clusters found in your AWS account.");
    }
    return clusterArnList;
}
catch (Exception e)
{
    _logger.LogError($"An error occurred while getting a list of all the
clusters in your AWS account. {e.InnerException}");
    throw new Exception($"An error occurred while getting a list of all the
clusters in your AWS account. {e.InnerException}");
}
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [ListClusters](#)。

ListServices

以下程式碼範例顯示如何使用 ListServices。

適用於 .NET 的 SDK

 Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// List service ARNs available.
/// </summary>
/// <param name="clusterARN">The arn of the ECS cluster.</param>
/// <returns>The ARN list of services in given cluster.</returns>
public async Task<List<string>> GetServiceARNsAsync(string clusterARN)
{
    List<string> serviceArns = new List<string>();

    var request = new ListServicesRequest
    {
        Cluster = clusterARN
    };
    // Call the ListServices API operation and get the list of service ARNs
    var serviceList = _ecsClient.Paginators.ListServices(request);

    await foreach (var serviceARN in serviceList.ServiceArns)
    {
        if (serviceARN is null)
            continue;

        serviceArns.Add(serviceARN);
    }

    if (serviceArns.Count == 0)
    {
        _logger.LogWarning($"No services found in cluster {clusterARN} .");
    }

    return serviceArns;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [ListServices](#)。

ListTasks

以下程式碼範例顯示如何使用 ListTasks。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// List task ARNs available.
/// </summary>
/// <param name="clusterARN">The arn of the ECS cluster.</param>
/// <returns>The ARN list of tasks in given cluster.</returns>
public async Task<List<string>> GetTaskARNsAsync(string clusterARN)
{
    // Set up the request to describe the tasks in the service
    var listTasksRequest = new ListTasksRequest
    {
        Cluster = clusterARN
    };
    List<string> taskArns = new List<string>();

    // Call the ListTasks API operation and get the list of task ARNs
    var tasks = _ecsClient.Paginators.ListTasks(listTasksRequest);

    await foreach (var task in tasks.TaskArns)
    {
        if (task is null)
            continue;

        taskArns.Add(task);
    }

    if (taskArns.Count == 0)
    {
        _logger.LogWarning("No tasks found in cluster: " + clusterARN);
    }
}
```

```
        return taskArns;
    }
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [ListTasks](#)。

案例

取得叢集、服務和任務的 ARN 資訊

以下程式碼範例顯示做法：

- 取得所有叢集的清單。
- 取得叢集的服務。
- 取得叢集的任務。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

在命令提示中執行互動式案例。

```
using Amazon.ECS;
using ECSActions;
using Microsoft.Extensions.Hosting;
using Microsoft.Extensions.Logging;
using Microsoft.Extensions.Logging.Console;
using Microsoft.Extensions.Logging.Debug;

namespace ECSScenario;

public class ECSScenario
{
    /*
        Before running this .NET code example, set up your development environment,
        including your credentials.
```

This .NET example performs the following tasks:

1. List ECS Cluster ARNs.
2. List services in every cluster
3. List Task ARNs in every cluster.

*/

```
private static ILogger logger = null!;
```

```
private static ECSWrapper _ecsWrapper = null!;
```

```
static async Task Main(string[] args)
```

```
{
```

```
    // Set up dependency injection for the Amazon service.
```

```
    using var host = Host.CreateDefaultBuilder(args)
```

```
        .ConfigureLogging(logging =>
```

```
            logging.AddFilter("System", LogLevel.Debug)
```

```
                .AddFilter<DebugLoggerProvider>("Microsoft",
```

```
LogLevel.Information)
```

```
                .AddFilter<ConsoleLoggerProvider>("Microsoft", LogLevel.Trace))
```

```
        .Build();
```

```
    ILoggerFactory loggerFactory = LoggerFactory.Create(builder =>
```

```
    {
```

```
        builder.AddConsole();
```

```
    });
```

```
    logger = LoggerFactory.Create(builder => { builder.AddConsole(); })
```

```
        .CreateLogger<ECSScenario>();
```

```
    var loggerECSWarpper = LoggerFactory.Create(builder =>
```

```
{ builder.AddConsole(); })
```

```
        .CreateLogger<ECSWrapper>());
```

```
    var amazonECSClient = new AmazonECSClient();
```

```
    _ecsWrapper = new ECSWrapper(amazonECSClient, loggerECSWarpper);
```

```
    Console.WriteLine(new string('-', 80));
```

```
    Console.WriteLine("Welcome to the Amazon ECS example scenario.");
```

```
    Console.WriteLine(new string('-', 80));
```

```
    try
```

```
{
```

```

        await ListClusterARNs();
        await ListServiceARNs();
        await ListTaskARNs();

    }
    catch (Exception ex)
    {
        logger.LogError(ex, "There was a problem executing the scenario.");
    }
}

/// <summary>
/// List ECS Cluster ARNs
/// </summary>
private static async Task ListClusterARNs()
{
    Console.WriteLine(new string('-', 80));
    Console.WriteLine($"1. List Cluster ARNs from ECS.");
    var arns = await _ecsWrapper.GetClusterARNsAsync();

    foreach (var arn in arns)
    {
        Console.WriteLine($"Cluster arn: {arn}");
        Console.WriteLine($"Cluster name: {arn.Split("/").Last()}");
    }

    Console.WriteLine(new string('-', 80));
}

/// <summary>
/// List services in every cluster
/// </summary>
private static async Task ListServiceARNs()
{
    Console.WriteLine(new string('-', 80));
    Console.WriteLine($"2. List Service ARNs in every cluster.");
    var clusterARNs = await _ecsWrapper.GetClusterARNsAsync();

    foreach (var clusterARN in clusterARNs)
    {
        Console.WriteLine($"Getting services for cluster name:
{clusterARN.Split("/").Last()}");
        Console.WriteLine(new string('.', 5));
    }
}

```

```

        var serviceARNs = await _ecsWrapper.GetServiceARNsAsync(clusterARN);

        foreach (var serviceARN in serviceARNs)
        {
            Console.WriteLine($"Service arn: {serviceARN}");
            Console.WriteLine($"Service name: {serviceARN.Split("/").Last()}");
        }
    }

    Console.WriteLine(new string('-', 80));
}

/// <summary>
/// List tasks in every cluster
/// </summary>
private static async Task ListTaskARNs()
{
    Console.WriteLine(new string('-', 80));
    Console.WriteLine($"3. List Task ARNs in every cluster.");
    var clusterARNs = await _ecsWrapper.GetClusterARNsAsync();

    foreach (var clusterARN in clusterARNs)
    {
        Console.WriteLine($"Getting tasks for cluster name:
{clusterARN.Split("/").Last()}");
        Console.WriteLine(new string('.', 5));

        var taskARNs = await _ecsWrapper.GetTaskARNsAsync(clusterARN);

        foreach (var taskARN in taskARNs)
        {
            Console.WriteLine($"Task arn: {taskARN}");
        }
    }
    Console.WriteLine(new string('-', 80));
}
}

```

案例呼叫並用以管理 Amazon ECS 動作的包裝函式方式。


```
using Amazon.ECS;
using Amazon.ECS.Model;
using Microsoft.Extensions.Logging;

namespace ECSActions;

public class ECSWrapper
{
    private readonly AmazonECSClient _ecsClient;
    private readonly ILogger<ECSWrapper> _logger;

    /// <summary>
    /// Constructor for the ECS wrapper.
    /// </summary>
    /// <param name="ecsClient">The injected ECS client.</param>
    /// <param name="logger">The injected logger for the wrapper.</param>
    public ECSWrapper(AmazonECSClient ecsClient, ILogger<ECSWrapper> logger)

    {
        _logger = logger;
        _ecsClient = ecsClient;
    }

    /// <summary>
    /// List cluster ARNs available.
    /// </summary>
    /// <returns>The ARN list of clusters.</returns>
    public async Task<List<string>> GetClusterARNsAsync()
    {
        Console.WriteLine("Getting a list of all the clusters in your AWS
account...");
        List<string> clusterArnList = new List<string>();
        // Get a list of all the clusters in your AWS account
        try
        {
            var listClustersResponse = _ecsClient.Paginators.ListClusters(new
ListClustersRequest
            {
            });

            var clusterArns = listClustersResponse.ClusterArns;
```

```

        // Print the ARNs of the clusters
        await foreach (var clusterArn in clusterArns)
        {
            clusterArnList.Add(clusterArn);
        }

        if (clusterArnList.Count == 0)
        {
            _logger.LogWarning("No clusters found in your AWS account.");
        }
        return clusterArnList;
    }
    catch (Exception e)
    {
        _logger.LogError($"An error occurred while getting a list of all the
clusters in your AWS account. {e.InnerException}");
        throw new Exception($"An error occurred while getting a list of all the
clusters in your AWS account. {e.InnerException}");
    }
}

/// <summary>
/// List service ARNs available.
/// </summary>
/// <param name="clusterARN">The arn of the ECS cluster.</param>
/// <returns>The ARN list of services in given cluster.</returns>
public async Task<List<string>> GetServiceARNsAsync(string clusterARN)
{
    List<string> serviceArns = new List<string>();

    var request = new ListServicesRequest
    {
        Cluster = clusterARN
    };
    // Call the ListServices API operation and get the list of service ARNs
    var serviceList = _ecsClient.Paginators.ListServices(request);

    await foreach (var serviceARN in serviceList.ServiceArns)
    {
        if (serviceARN is null)
            continue;

        serviceArns.Add(serviceARN);
    }
}

```

```
    }

    if (serviceArns.Count == 0)
    {
        _logger.LogWarning($"No services found in cluster {clusterARN} .");
    }

    return serviceArns;
}

/// <summary>
/// List task ARNs available.
/// </summary>
/// <param name="clusterARN">The arn of the ECS cluster.</param>
/// <returns>The ARN list of tasks in given cluster.</returns>
public async Task<List<string>> GetTaskARNsAsync(string clusterARN)
{
    // Set up the request to describe the tasks in the service
    var listTasksRequest = new ListTasksRequest
    {
        Cluster = clusterARN
    };
    List<string> taskArns = new List<string>();

    // Call the ListTasks API operation and get the list of task ARNs
    var tasks = _ecsClient.Paginators.ListTasks(listTasksRequest);

    await foreach (var task in tasks.TaskArns)
    {
        if (task is null)
            continue;

        taskArns.Add(task);
    }

    if (taskArns.Count == 0)
    {
        _logger.LogWarning("No tasks found in cluster: " + clusterARN);
    }

    return taskArns;
}
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的下列主題。
 - [ListClusters](#)
 - [ListServices](#)
 - [ListTasks](#)

Elastic Load Balancing - 使用的第 2 版範例 適用於 .NET 的 SDK

下列程式碼範例示範如何使用 適用於 .NET 的 AWS SDK 搭配 Elastic Load Balancing - 第 2 版，來執行動作並實作常見案例。

Actions 是大型程式的程式碼摘錄，必須在內容中執行。雖然動作會告訴您如何呼叫個別服務函數，但您可以在其相關情境中查看內容中的動作。

案例是向您展示如何呼叫服務中的多個函數或與其他 AWS 服務組合來完成特定任務的程式碼範例。

每個範例均包含完整原始碼的連結，您可在連結中找到如何設定和執行內容中程式碼的相關指示。

主題

- [動作](#)
- [案例](#)

動作

CreateListener

以下程式碼範例顯示如何使用 CreateListener。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
```

```

    /// Create an Elastic Load Balancing load balancer that uses the specified
    subnets
    /// and forwards requests to the specified target group.
    /// </summary>
    /// <param name="name">The name for the new load balancer.</param>
    /// <param name="subnetIds">Subnets for the load balancer.</param>
    /// <param name="targetGroup">Target group for forwarded requests.</param>
    /// <returns>The new LoadBalancer object.</returns>
    public async Task<LoadBalancer> CreateLoadBalancerAndListener(string name,
        List<string> subnetIds, TargetGroup targetGroup)
    {
        var createLbResponse = await
        _amazonElasticLoadBalancingV2.CreateLoadBalancerAsync(
            new CreateLoadBalancerRequest()
            {
                Name = name,
                Subnets = subnetIds
            });
        var loadBalancerArn = createLbResponse.LoadBalancers[0].LoadBalancerArn;

        // Wait for load balancer to be available.
        var loadBalancerReady = false;
        while (!loadBalancerReady)
        {
            try
            {
                var describeResponse =
                    await _amazonElasticLoadBalancingV2.DescribeLoadBalancersAsync(
                        new DescribeLoadBalancersRequest()
                        {
                            Names = new List<string>() { name }
                        });

                var loadBalancerState =
                    describeResponse.LoadBalancers[0].State.Code;

                loadBalancerReady = loadBalancerState ==
                    LoadBalancerStateEnum.Active;
            }
            catch (LoadBalancerNotFoundException)
            {
                loadBalancerReady = false;
            }
            Thread.Sleep(10000);
        }
    }

```

```

    }
    // Create the listener.
    await _amazonElasticLoadBalancingV2.CreateListenerAsync(
        new CreateListenerRequest()
        {
            LoadBalancerArn = loadBalancerArn,
            Protocol = targetGroup.Protocol,
            Port = targetGroup.Port,
            DefaultActions = new List<Action>()
            {
                new Action()
                {
                    Type = ActionTypeEnum.Forward,
                    TargetGroupArn = targetGroup.TargetGroupArn
                }
            }
        });
    return createLbResponse.LoadBalancers[0];
}

```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [CreateListener](#)。

CreateLoadBalancer

以下程式碼範例顯示如何使用 CreateLoadBalancer。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```

/// <summary>
/// Create an Elastic Load Balancing load balancer that uses the specified
subnets
/// and forwards requests to the specified target group.
/// </summary>
/// <param name="name">The name for the new load balancer.</param>
/// <param name="subnetIds">Subnets for the load balancer.</param>

```

```

    /// <param name="targetGroup">Target group for forwarded requests.</param>
    /// <returns>The new LoadBalancer object.</returns>
    public async Task<LoadBalancer> CreateLoadBalancerAndListener(string name,
        List<string> subnetIds, TargetGroup targetGroup)
    {
        var createLbResponse = await
        _amazonElasticLoadBalancingV2.CreateLoadBalancerAsync(
            new CreateLoadBalancerRequest()
            {
                Name = name,
                Subnets = subnetIds
            });
        var loadBalancerArn = createLbResponse.LoadBalancers[0].LoadBalancerArn;

        // Wait for load balancer to be available.
        var loadBalancerReady = false;
        while (!loadBalancerReady)
        {
            try
            {
                var describeResponse =
                    await _amazonElasticLoadBalancingV2.DescribeLoadBalancersAsync(
                        new DescribeLoadBalancersRequest()
                        {
                            Names = new List<string>() { name }
                        });

                var loadBalancerState =
                    describeResponse.LoadBalancers[0].State.Code;

                loadBalancerReady = loadBalancerState ==
                LoadBalancerStateEnum.Active;
            }
            catch (LoadBalancerNotFoundException)
            {
                loadBalancerReady = false;
            }
            Thread.Sleep(10000);
        }
        // Create the listener.
        await _amazonElasticLoadBalancingV2.CreateListenerAsync(
            new CreateListenerRequest()
            {
                LoadBalancerArn = loadBalancerArn,

```

```

        Protocol = targetGroup.Protocol,
        Port = targetGroup.Port,
        DefaultActions = new List<Action>()
        {
            new Action()
            {
                Type = ActionTypeEnum.Forward,
                TargetGroupArn = targetGroup.TargetGroupArn
            }
        }
    });
    return createLbResponse.LoadBalancers[0];
}

```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [CreateLoadBalancer](#)。

CreateTargetGroup

以下程式碼範例顯示如何使用 CreateTargetGroup。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```

/// <summary>
/// Create an Elastic Load Balancing target group. The target group specifies
how the load balancer forwards
/// requests to instances in the group and how instance health is checked.
///
/// To speed up this demo, the health check is configured with shortened times
and lower thresholds. In production,
/// you might want to decrease the sensitivity of your health checks to avoid
unwanted failures.
/// </summary>
/// <param name="groupName">The name for the group.</param>
/// <param name="protocol">The protocol, such as HTTP.</param>
/// <param name="port">The port to use to forward requests, such as 80.</param>

```



```

    /// <param name="vpcId">The Id of the Vpc in which the load balancer exists.</
param>
    /// <returns>The new TargetGroup object.</returns>
    public async Task<TargetGroup> CreateTargetGroupOnVpc(string groupName,
        ProtocolEnum protocol, int port, string vpcId)
    {
        var createResponse = await
        _amazonElasticLoadBalancingV2.CreateTargetGroupAsync(
            new CreateTargetGroupRequest()
            {
                Name = groupName,
                Protocol = protocol,
                Port = port,
                HealthCheckPath = "/healthcheck",
                HealthCheckIntervalSeconds = 10,
                HealthCheckTimeoutSeconds = 5,
                HealthyThresholdCount = 2,
                UnhealthyThresholdCount = 2,
                VpcId = vpcId
            });
        var targetGroup = createResponse.TargetGroups[0];
        return targetGroup;
    }

```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [CreateTargetGroup](#)。

DeleteLoadBalancer

以下程式碼範例顯示如何使用 DeleteLoadBalancer。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```

    /// <summary>
    /// Delete a load balancer by its specified name.

```

```
/// </summary>
/// <param name="name">The name of the load balancer to delete.</param>
/// <returns>Async task.</returns>
public async Task DeleteLoadBalancerByName(string name)
{
    try
    {
        var describeLoadBalancerResponse =
            await _amazonElasticLoadBalancingV2.DescribeLoadBalancersAsync(
                new DescribeLoadBalancersRequest()
                {
                    Names = new List<string>() { name }
                });
        var lbArn =
            describeLoadBalancerResponse.LoadBalancers[0].LoadBalancerArn;
        await _amazonElasticLoadBalancingV2.DeleteLoadBalancerAsync(
            new DeleteLoadBalancerRequest()
            {
                LoadBalancerArn = lbArn
            }
        );
    }
    catch (LoadBalancerNotFoundException)
    {
        Console.WriteLine($"Load balancer {name} not found.");
    }
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [DeleteLoadBalancer](#)。

DeleteTargetGroup

以下程式碼範例顯示如何使用 DeleteTargetGroup。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```

/// <summary>
/// Delete a TargetGroup by its specified name.
/// </summary>
/// <param name="groupName">Name of the group to delete.</param>
/// <returns>Async task.</returns>
public async Task DeleteTargetGroupByName(string groupName)
{
    var done = false;
    while (!done)
    {
        try
        {
            var groupResponse =
                await _amazonElasticLoadBalancingV2.DescribeTargetGroupsAsync(
                    new DescribeTargetGroupsRequest()
                    {
                        Names = new List<string>() { groupName }
                    });

            var targetArn = groupResponse.TargetGroups[0].TargetGroupArn;
            await _amazonElasticLoadBalancingV2.DeleteTargetGroupAsync(
                new DeleteTargetGroupRequest() { TargetGroupArn = targetArn });
            Console.WriteLine($"Deleted load balancing target group
{groupName}.");
            done = true;
        }
        catch (TargetGroupNotFoundException)
        {
            Console.WriteLine(
                $"Target group {groupName} not found, could not delete.");
            done = true;
        }
        catch (ResourceInUseException)
        {
            Console.WriteLine("Target group not yet released, waiting...");
            Thread.Sleep(10000);
        }
    }
}

```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [DeleteTargetGroup](#)。

DescribeLoadBalancers

以下程式碼範例顯示如何使用 DescribeLoadBalancers。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Get the HTTP Endpoint of a load balancer by its name.
/// </summary>
/// <param name="loadBalancerName">The name of the load balancer.</param>
/// <returns>The HTTP endpoint.</returns>
public async Task<string> GetEndpointForLoadBalancerByName(string
loadBalancerName)
{
    if (_endpoint == null)
    {
        var endpointResponse =
            await _amazonElasticLoadBalancingV2.DescribeLoadBalancersAsync(
                new DescribeLoadBalancersRequest()
                {
                    Names = new List<string>() { loadBalancerName }
                });
        _endpoint = endpointResponse.LoadBalancers[0].DNSName;
    }

    return _endpoint;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [DescribeLoadBalancers](#)。

DescribeTargetHealth

以下程式碼範例顯示如何使用 DescribeTargetHealth。

適用於 .NET 的 SDK

 Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Get the target health for a group by name.
/// </summary>
/// <param name="groupName">The name of the group.</param>
/// <returns>The collection of health descriptions.</returns>
public async Task<List<TargetHealthDescription>>
CheckTargetHealthForGroup(string groupName)
{
    List<TargetHealthDescription> result = null!;
    try
    {
        var groupResponse =
            await _amazonElasticLoadBalancingV2.DescribeTargetGroupsAsync(
                new DescribeTargetGroupsRequest()
                {
                    Names = new List<string>() { groupName }
                });
        var healthResponse =
            await _amazonElasticLoadBalancingV2.DescribeTargetHealthAsync(
                new DescribeTargetHealthRequest()
                {
                    TargetGroupArn =
groupResponse.TargetGroups[0].TargetGroupArn
                });
        ;
        result = healthResponse.TargetHealthDescriptions;
    }
    catch (TargetGroupNotFoundException)
    {
        Console.WriteLine($"Target group {groupName} not found.");
    }
    return result;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [DescribeTargetHealth](#)。

案例

建置及管理彈性服務

下列程式碼範例會示範如何建立負載平衡的 Web 服務，以傳回書籍、影片和歌曲建議。此範例顯示服務如何回應失故障，以及如何在發生故障時重組服務以提高復原能力。

- 使用 Amazon EC2 Auto Scaling 群組根據啟動範本建立 Amazon Elastic Compute Cloud (Amazon EC2) 執行個體，並將執行個體數量保持在指定範圍內。
- 使用 Elastic Load Balancing 處理和分發 HTTP 請求。
- 監控 Auto Scaling 群組中執行個體的運作狀態，並且只將請求轉送給運作良好的執行個體。
- 在每個 EC2 執行個體上執行一個 Python Web 伺服器來處理 HTTP 請求。Web 伺服器會回應建議和運作狀態檢查。
- 使用 Amazon DynamoDB 資料表模擬建議服務。
- 透過更新 AWS Systems Manager 參數來控制 Web 伺服器對請求和運作狀態檢查的回應。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

在命令提示中執行互動式案例。

```
static async Task Main(string[] args)
{
    _configuration = new ConfigurationBuilder()
        .SetBasePath(Directory.GetCurrentDirectory())
        .AddJsonFile("settings.json") // Load settings from .json file.
        .AddJsonFile("settings.local.json",
            true) // Optionally, load local settings.
        .Build();
```

```

// Set up dependency injection for the AWS services.
using var host = Host.CreateDefaultBuilder(args)
    .ConfigureLogging(logging =>
        logging.AddFilter("System", LogLevel.Debug)
        .AddFilter<DebugLoggerProvider>("Microsoft",
LogLevel.Information)
        .AddFilter<ConsoleLoggerProvider>("Microsoft", LogLevel.Trace))
    .ConfigureServices((_, services) =>
        services.AddAWSService<IAmazonIdentityManagementService>()
        .AddAWSService<IAmazonDynamoDB>()
        .AddAWSService<IAmazonElasticLoadBalancingV2>()
        .AddAWSService<IAmazonSimpleSystemsManagement>()
        .AddAWSService<IAmazonAutoScaling>()
        .AddAWSService<IAmazonEC2>()
        .AddTransient<AutoScalerWrapper>()
        .AddTransient<ElasticLoadBalancerWrapper>()
        .AddTransient<SmParameterWrapper>()
        .AddTransient<Recommendations>()
        .AddSingleton<IConfiguration>(_configuration)
    )
    .Build();

ServicesSetup(host);
ResourcesSetup();

try
{
    Console.WriteLine(new string('-', 80));
    Console.WriteLine("Welcome to the Resilient Architecture Example
Scenario.");
    Console.WriteLine(new string('-', 80));
    await Deploy(true);

    Console.WriteLine("Now let's begin the scenario.");
    Console.WriteLine(new string('-', 80));
    await Demo(true);

    Console.WriteLine(new string('-', 80));
    Console.WriteLine("Finally, let's clean up our resources.");
    Console.WriteLine(new string('-', 80));

    await DestroyResources(true);

```

```

        Console.WriteLine(new string('-', 80));
        Console.WriteLine("Resilient Architecture Example Scenario is
complete.");
        Console.WriteLine(new string('-', 80));
    }
    catch (Exception ex)
    {
        Console.WriteLine(new string('-', 80));
        Console.WriteLine($"There was a problem running the scenario:
{ex.Message}");
        await DestroyResources(true);
        Console.WriteLine(new string('-', 80));
    }
}

/// <summary>
/// Setup any common resources, also used for integration testing.
/// </summary>
public static void ResourcesSetup()
{
    _httpClient = new HttpClient();
}

/// <summary>
/// Populate the services for use within the console application.
/// </summary>
/// <param name="host">The services host.</param>
private static void ServicesSetup(IHost host)
{
    _elasticLoadBalancerWrapper =
host.Services.GetRequiredService<ElasticLoadBalancerWrapper>();
    _iamClient =
host.Services.GetRequiredService<IAmazonIdentityManagementService>();
    _recommendations = host.Services.GetRequiredService<Recommendations>();
    _autoScalerWrapper = host.Services.GetRequiredService<AutoScalerWrapper>();
    _smParameterWrapper =
host.Services.GetRequiredService<SmParameterWrapper>();
}

/// <summary>
/// Deploy necessary resources for the scenario.
/// </summary>
/// <param name="interactive">True to run as interactive.</param>
/// <returns>True if successful.</returns>

```



```

public static async Task<bool> Deploy(bool interactive)
{
    var protocol = "HTTP";
    var port = 80;
    var sshPort = 22;

    Console.WriteLine(
        "\nFor this demo, we'll use the AWS SDK for .NET to create several AWS
resources\n" +
        "to set up a load-balanced web service endpoint and explore some ways to
make it resilient\n" +
        "against various kinds of failures.\n\n" +
        "Some of the resources create by this demo are:\n");

    Console.WriteLine(
        "\t* A DynamoDB table that the web service depends on to provide book,
movie, and song recommendations.");
    Console.WriteLine(
        "\t* An EC2 launch template that defines EC2 instances that each contain
a Python web server.");
    Console.WriteLine(
        "\t* An EC2 Auto Scaling group that manages EC2 instances across several
Availability Zones.");
    Console.WriteLine(
        "\t* An Elastic Load Balancing (ELB) load balancer that targets the Auto
Scaling group to distribute requests.");
    Console.WriteLine(new string('-', 80));
    Console.WriteLine("Press Enter when you're ready to start deploying
resources.");
    if (interactive)
        Console.ReadLine();

    // Create and populate the DynamoDB table.
    var databaseTableName = _configuration["databaseName"];
    var recommendationsPath = Path.Join(_configuration["resourcePath"],
        "recommendations_objects.json");
    Console.WriteLine($"Creating and populating a DynamoDB table named
{databaseTableName}.");
    await _recommendations.CreateDatabaseWithName(databaseTableName);
    await _recommendations.PopulateDatabase(databaseTableName,
recommendationsPath);
    Console.WriteLine(new string('-', 80));

    // Create the EC2 Launch Template.

```

```

        Console.WriteLine(
            $"Creating an EC2 launch template that runs 'server_startup_script.sh'
when an instance starts.\n"
            + "\nThis script starts a Python web server defined in the `server.py`
script. The web server\n"
            + "listens to HTTP requests on port 80 and responds to requests to '/'
and to '/healthcheck'.\n"
            + "For demo purposes, this server is run as the root user. In
production, the best practice is to\n"
            + "run a web server, such as Apache, with least-privileged
credentials.");
        Console.WriteLine(
            "\nThe template also defines an IAM policy that each instance uses to
assume a role that grants\n"
            + "permissions to access the DynamoDB recommendation table and Systems
Manager parameters\n"
            + "that control the flow of the demo.");

        var startupScriptPath = Path.Join(_configuration["resourcePath"],
            "server_startup_script.sh");
        var instancePolicyPath = Path.Join(_configuration["resourcePath"],
            "instance_policy.json");
        await _autoScalerWrapper.CreateTemplate(startupScriptPath,
instancePolicyPath);
        Console.WriteLine(new string('-', 80));

        Console.WriteLine(
            "Creating an EC2 Auto Scaling group that maintains three EC2 instances,
each in a different\n"
            + "Availability Zone.\n");
        var zones = await _autoScalerWrapper.DescribeAvailabilityZones();
        await _autoScalerWrapper.CreateGroupOfSize(3, _autoScalerWrapper.GroupName,
zones);
        Console.WriteLine(new string('-', 80));

        Console.WriteLine(
            "At this point, you have EC2 instances created. Once each instance
starts, it listens for\n"
            + "HTTP requests. You can see these instances in the console or continue
with the demo.\n");

        Console.WriteLine(new string('-', 80));
        Console.WriteLine("Press Enter when you're ready to continue.");

```

```

        if (interactive)
            Console.ReadLine();

        Console.WriteLine("Creating variables that control the flow of the demo.");
        await _smParameterWrapper.Reset();

        Console.WriteLine(
            "\nCreating an Elastic Load Balancing target group and load balancer.
The target group\n"
            + "defines how the load balancer connects to instances. The load
balancer provides a\n"
            + "single endpoint where clients connect and dispatches requests to
instances in the group.");

        var defaultVpc = await _autoScalerWrapper.GetDefaultVpc();
        var subnets = await
            _autoScalerWrapper.GetAllVpcSubnetsForZones(defaultVpc.VpcId, zones);
        var subnetIds = subnets.Select(s => s.SubnetId).ToList();
        var targetGroup = await
            _elasticLoadBalancerWrapper.CreateTargetGroupOnVpc(_elasticLoadBalancerWrapper.TargetGroupN
protocol, port, defaultVpc.VpcId);

        await
            _elasticLoadBalancerWrapper.CreateLoadBalancerAndListener(_elasticLoadBalancerWrapper.LoadB
subnetIds, targetGroup);
        await
            _autoScalerWrapper.AttachLoadBalancerToGroup(_autoScalerWrapper.GroupName,
targetGroup.TargetGroupArn);
        Console.WriteLine("\nVerifying access to the load balancer endpoint...");
        var endPoint = await
            _elasticLoadBalancerWrapper.GetEndpointForLoadBalancerByName(_elasticLoadBalancerWrapper.Lo
        var loadBalancerAccess = await
            _elasticLoadBalancerWrapper.VerifyLoadBalancerEndpoint(endPoint);

        if (!loadBalancerAccess)
        {
            Console.WriteLine("\nCouldn't connect to the load balancer, verifying
that the port is open...");

            var ipString = await _httpClient.GetStringAsync("https://
checkip.amazonaws.com");
            ipString = ipString.Trim();

```

```

        var defaultSecurityGroup = await
_autoScalerWrapper.GetDefaultSecurityGroupForVpc(defaultVpc);
        var portIsOpen =
_autoScalerWrapper.VerifyInboundPortForGroup(defaultSecurityGroup, port, ipString);
        var sshPortIsOpen =
_autoScalerWrapper.VerifyInboundPortForGroup(defaultSecurityGroup, sshPort,
ipString);

        if (!portIsOpen)
        {
            Console.WriteLine(
                "\nFor this example to work, the default security group for your
default VPC must\n"
                + "allows access from this computer. You can either add it
automatically from this\n"
                + "example or add it yourself using the AWS Management Console.
\n");

            if (!interactive || GetYesNoResponse(
                "Do you want to add a rule to the security group to allow
inbound traffic from your computer's IP address?"))
            {
                await
_autoScalerWrapper.OpenInboundPort(defaultSecurityGroup.GroupId, port, ipString);
            }

            if (!sshPortIsOpen)
            {
                if (!interactive || GetYesNoResponse(
                    "Do you want to add a rule to the security group to allow
inbound SSH traffic for debugging from your computer's IP address?"))
                {
                    await
_autoScalerWrapper.OpenInboundPort(defaultSecurityGroup.GroupId, sshPort,
ipString);
                }
            }

            loadBalancerAccess = await
_elasticLoadBalancerWrapper.VerifyLoadBalancerEndpoint(endPoint);
        }

        if (loadBalancerAccess)
        {

```

```

        Console.WriteLine("Your load balancer is ready. You can access it by
browsing to:");
        Console.WriteLine($"\\thttp://{endPoint}\\n");
    }
    else
    {
        Console.WriteLine(
            "\\nCouldn't get a successful response from the load balancer
endpoint. Troubleshoot by\\n"
            + "manually verifying that your VPC and security group are
configured correctly and that\\n"
            + "you can successfully make a GET request to the load balancer
endpoint:\\n");
        Console.WriteLine($"\\thttp://{endPoint}\\n");
    }
    Console.WriteLine(new string('-', 80));
    Console.WriteLine("Press Enter when you're ready to continue with the
demo.");
    if (interactive)
        Console.ReadLine();
    return true;
}

/// <summary>
/// Demonstrate the steps of the scenario.
/// </summary>
/// <param name="interactive">True to run as an interactive scenario.</param>
/// <returns>Async task.</returns>
public static async Task<bool> Demo(bool interactive)
{
    var ssmOnlyPolicy = Path.Join(_configuration["resourcePath"],
        "ssm_only_policy.json");

    Console.WriteLine(new string('-', 80));
    Console.WriteLine("Resetting parameters to starting values for demo.");
    await _smParameterWrapper.Reset();

    Console.WriteLine("\\nThis part of the demonstration shows how to toggle
different parts of the system\\n" +
        "to create situations where the web service fails, and
shows how using a resilient\\n" +
        "architecture can keep the web service running in spite of
these failures.");
    Console.WriteLine(new string('-', 88));

```

```

        Console.WriteLine("At the start, the load balancer endpoint returns
recommendations and reports that all targets are healthy.");
        if (interactive)
            await DemoActionChoices();

        Console.WriteLine($"The web service running on the EC2 instances gets
recommendations by querying a DynamoDB table.\n" +
            $"The table name is contained in a Systems Manager
parameter named '{_smParameterWrapper.TableParameter}'.\n" +
            $"To simulate a failure of the recommendation service,
let's set this parameter to name a non-existent table.\n");
        await
        _smParameterWrapper.PutParameterByName(_smParameterWrapper.TableParameter, "this-
is-not-a-table");
        Console.WriteLine("\nNow, sending a GET request to the load balancer
endpoint returns a failure code. But, the service reports as\n" +
            "healthy to the load balancer because shallow health
checks don't check for failure of the recommendation service.");
        if (interactive)
            await DemoActionChoices();

        Console.WriteLine("Instead of failing when the recommendation service fails,
the web service can return a static response.");
        Console.WriteLine("While this is not a perfect solution, it presents the
customer with a somewhat better experience than failure.");

        await
        _smParameterWrapper.PutParameterByName(_smParameterWrapper.FailureResponseParameter,
"static");

        Console.WriteLine("\nNow, sending a GET request to the load balancer
endpoint returns a static response.");
        Console.WriteLine("The service still reports as healthy because health
checks are still shallow.");
        if (interactive)
            await DemoActionChoices();

        Console.WriteLine("Let's reinstate the recommendation service.\n");
        await
        _smParameterWrapper.PutParameterByName(_smParameterWrapper.TableParameter,
        _smParameterWrapper.TableName);
        Console.WriteLine(
            "\nLet's also substitute bad credentials for one of the instances in the
target group so that it can't\n" +

```

```

        "access the DynamoDB recommendation table.\n"
    );
    await _autoScalerWrapper.CreateInstanceProfileWithName(
        _autoScalerWrapper.BadCredsPolicyName,
        _autoScalerWrapper.BadCredsRoleName,
        _autoScalerWrapper.BadCredsProfileName,
        ssmOnlyPolicy,
        new List<string> { "AmazonSSMManagedInstanceCore" }
    );
    var instances = await
    _autoScalerWrapper.GetInstancesByGroupName(_autoScalerWrapper.GroupName);
    var badInstanceId = instances.First();
    var instanceProfile = await
    _autoScalerWrapper.GetInstanceProfile(badInstanceId);
    Console.WriteLine(
        $"Replacing the profile for instance {badInstanceId} with a profile that
contains\n" +
        "bad credentials...\n"
    );
    await _autoScalerWrapper.ReplaceInstanceProfile(
        badInstanceId,
        _autoScalerWrapper.BadCredsProfileName,
        instanceProfile.AssociationId
    );
    Console.WriteLine(
        "Now, sending a GET request to the load balancer endpoint returns either
a recommendation or a static response,\n" +
        "depending on which instance is selected by the load balancer.\n"
    );
    if (interactive)
        await DemoActionChoices();

    Console.WriteLine("\nLet's implement a deep health check. For this demo, a
deep health check tests whether");
    Console.WriteLine("the web service can access the DynamoDB table that it
depends on for recommendations. Note that");
    Console.WriteLine("the deep health check is only for ELB routing and not for
Auto Scaling instance health.");
    Console.WriteLine("This kind of deep health check is not recommended for
Auto Scaling instance health, because it");
    Console.WriteLine("risks accidental termination of all instances in the Auto
Scaling group when a dependent service fails.");

```

```
        Console.WriteLine("\nBy implementing deep health checks, the load balancer  
can detect when one of the instances is failing");  
        Console.WriteLine("and take that instance out of rotation.");  
  
        await  
_smParameterWrapper.PutParameterByName(_smParameterWrapper.HealthCheckParameter,  
"deep");  
  
        Console.WriteLine($"Now, checking target health indicates that the  
instance with bad credentials ({badInstanceId})");  
        Console.WriteLine("is unhealthy. Note that it might take a minute or two for  
the load balancer to detect the unhealthy");  
        Console.WriteLine("instance. Sending a GET request to the load balancer  
endpoint always returns a recommendation, because");  
        Console.WriteLine("the load balancer takes unhealthy instances out of its  
rotation.");  
  
        if (interactive)  
            await DemoActionChoices();  
  
        Console.WriteLine("\nBecause the instances in this demo are controlled by an  
auto scaler, the simplest way to fix an unhealthy");  
        Console.WriteLine("instance is to terminate it and let the auto scaler start  
a new instance to replace it.");  
  
        await _autoScalerWrapper.TryTerminateInstanceById(badInstanceId);  
  
        Console.WriteLine($"Even while the instance is terminating and the new  
instance is starting, sending a GET");  
        Console.WriteLine("request to the web service continues to get a successful  
recommendation response because");  
        Console.WriteLine("starts and reports as healthy, it is included in the load  
balancing rotation.");  
        Console.WriteLine("Note that terminating and replacing an instance typically  
takes several minutes, during which time you");  
        Console.WriteLine("can see the changing health check status until the new  
instance is running and healthy.");  
  
        if (interactive)  
            await DemoActionChoices();  
  
        Console.WriteLine("\nIf the recommendation service fails now, deep health  
checks mean all instances report as unhealthy.");
```



```

        await
        _smParameterWrapper.PutParameterByName(_smParameterWrapper.TableParameter, "this-
is-not-a-table");

        Console.WriteLine($"\\nWhen all instances are unhealthy, the load balancer
continues to route requests even to");
        Console.WriteLine("unhealthy instances, allowing them to fail open and
return a static response rather than fail");
        Console.WriteLine("closed and report failure to the customer.");

        if (interactive)
            await DemoActionChoices();
        await _smParameterWrapper.Reset();

        Console.WriteLine(new string('-', 80));
        return true;
    }

    /// <summary>
    /// Clean up the resources from the scenario.
    /// </summary>
    /// <param name="interactive">True to ask the user for cleanup.</param>
    /// <returns>Async task.</returns>
    public static async Task<bool> DestroyResources(bool interactive)
    {
        Console.WriteLine(new string('-', 80));
        Console.WriteLine(
            "To keep things tidy and to avoid unwanted charges on your account, we
can clean up all AWS resources\\n" +
            "that were created for this demo."
        );

        if (!interactive || GetYesNoResponse("Do you want to clean up all demo
resources? (y/n) "))
        {
            await
            _elasticLoadBalancerWrapper.DeleteLoadBalancerByName(_elasticLoadBalancerWrapper.LoadBalancerName);
            await
            _elasticLoadBalancerWrapper.DeleteTargetGroupByName(_elasticLoadBalancerWrapper.TargetGroupName);
            await
            _autoScalerWrapper.TerminateAndDeleteAutoScalingGroupWithName(_autoScalerWrapper.GroupName);
            await
            _autoScalerWrapper.DeleteKeyPairByName(_autoScalerWrapper.KeyPairName);

```

```

        await
        _autoScalerWrapper.DeleteTemplateByName(_autoScalerWrapper.LaunchTemplateName);
        await _autoScalerWrapper.DeleteInstanceProfile(
            _autoScalerWrapper.BadCredsProfileName,
            _autoScalerWrapper.BadCredsRoleName
        );
        await
        _recommendations.DestroyDatabaseByName(_recommendations.TableName);
    }
    else
    {
        Console.WriteLine(
            "Ok, we'll leave the resources intact.\n" +
            "Don't forget to delete them when you're done with them or you might
incur unexpected charges."
        );
    }

    Console.WriteLine(new string('-', 80));
    return true;
}

```

建立包裝 Auto Scaling 和 Amazon EC2 動作的類別。

```

/// <summary>
/// Encapsulates Amazon EC2 Auto Scaling and EC2 management methods.
/// </summary>
public class AutoScalerWrapper
{
    private readonly IAmazonAutoScaling _amazonAutoScaling;
    private readonly IAmazonEC2 _amazonEc2;
    private readonly IAmazonSimpleSystemsManagement _amazonSsm;
    private readonly IAmazonIdentityManagementService _amazonIam;
    private readonly ILogger<AutoScalerWrapper> _logger;

    private readonly string _instanceType = "";
    private readonly string _amiParam = "";
    private readonly string _launchTemplateName = "";
    private readonly string _groupName = "";
    private readonly string _instancePolicyName = "";
    private readonly string _instanceRoleName = "";
    private readonly string _instanceProfileName = "";
}

```

```

private readonly string _badCredsProfileName = "";
private readonly string _badCredsRoleName = "";
private readonly string _badCredsPolicyName = "";
private readonly string _keyPairName = "";

public string GroupName => _groupName;
public string KeyPairName => _keyPairName;
public string LaunchTemplateName => _launchTemplateName;
public string InstancePolicyName => _instancePolicyName;
public string BadCredsProfileName => _badCredsProfileName;
public string BadCredsRoleName => _badCredsRoleName;
public string BadCredsPolicyName => _badCredsPolicyName;

/// <summary>
/// Constructor for the AutoScalerWrapper.
/// </summary>
/// <param name="amazonAutoScaling">The injected AutoScaling client.</param>
/// <param name="amazonEc2">The injected EC2 client.</param>
/// <param name="amazonIam">The injected IAM client.</param>
/// <param name="amazonSsm">The injected SSM client.</param>
public AutoScalerWrapper(
    IAmazonAutoScaling amazonAutoScaling,
    IAmazonEC2 amazonEc2,
    IAmazonSimpleSystemsManagement amazonSsm,
    IAmazonIdentityManagementService amazonIam,
    IConfiguration configuration,
    ILogger<AutoScalerWrapper> logger)
{
    _amazonAutoScaling = amazonAutoScaling;
    _amazonEc2 = amazonEc2;
    _amazonSsm = amazonSsm;
    _amazonIam = amazonIam;
    _logger = logger;

    var prefix = configuration["resourcePrefix"];
    _instanceType = configuration["instanceType"];
    _amiParam = configuration["amiParam"];

    _launchTemplateName = prefix + "-template";
    _groupName = prefix + "-group";
    _instancePolicyName = prefix + "-pol";
    _instanceRoleName = prefix + "-role";
    _instanceProfileName = prefix + "-prof";
    _badCredsPolicyName = prefix + "-bc-pol";

```

```

        _badCredsRoleName = prefix + "-bc-role";
        _badCredsProfileName = prefix + "-bc-prof";
        _keyPairName = prefix + "-key-pair";
    }

    /// <summary>
    /// Create a policy, role, and profile that is associated with instances with a
    specified name.
    /// An instance's associated profile defines a role that is assumed by the
    /// instance. The role has attached policies that specify the AWS permissions
    granted to
    /// clients that run on the instance.
    /// </summary>
    /// <param name="policyName">Name to use for the policy.</param>
    /// <param name="roleName">Name to use for the role.</param>
    /// <param name="profileName">Name to use for the profile.</param>
    /// <param name="ssmOnlyPolicyFile">Path to a policy file for SSM.</param>
    /// <param name="awsManagedPolicies">AWS Managed policies to be attached to the
    role.</param>
    /// <returns>The Arn of the profile.</returns>
    public async Task<string> CreateInstanceProfileWithName(
        string policyName,
        string roleName,
        string profileName,
        string ssmOnlyPolicyFile,
        List<string>? awsManagedPolicies = null)
    {

        var assumeRoleDoc = "{" +
            "\"Version\": \"2012-10-17\", " +
            "\"Statement\": [{" +
                "\"Effect\": \"Allow\", " +
                "\"Principal\": { " +
                "\"Service\": [ " +
                    "\"ec2.amazonaws.com\" " +
                "]" +
                "}, " +
                "\"Action\": \"sts:AssumeRole\" " +
            "}] " +
            "};

        var policyDocument = await File.ReadAllTextAsync(ssmOnlyPolicyFile);

        var policyArn = "";

```

```
try
{
    var createPolicyResult = await _amazonIam.CreatePolicyAsync(
        new CreatePolicyRequest
        {
            PolicyName = policyName,
            PolicyDocument = policyDocument
        });
    policyArn = createPolicyResult.Policy.Arn;
}
catch (EntityAlreadyExistsException)
{
    // The policy already exists, so we look it up to get the Arn.
    var policiesPaginator = _amazonIam.Paginators.ListPolicies(
        new ListPoliciesRequest()
        {
            Scope = PolicyScopeType.Local
        });
    // Get the entire list using the paginator.
    await foreach (var policy in policiesPaginator.Policies)
    {
        if (policy.PolicyName.Equals(policyName))
        {
            policyArn = policy.Arn;
        }
    }

    if (policyArn == null)
    {
        throw new InvalidOperationException("Policy not found");
    }
}

try
{
    await _amazonIam.CreateRoleAsync(new CreateRoleRequest()
    {
        RoleName = roleName,
        AssumeRolePolicyDocument = assumeRoleDoc,
    });
    await _amazonIam.AttachRolePolicyAsync(new AttachRolePolicyRequest()
    {
        RoleName = roleName,
```

```

        PolicyArn = policyArn
    });
    if (awsManagedPolicies != null)
    {
        foreach (var awsPolicy in awsManagedPolicies)
        {
            await _amazonIam.AttachRolePolicyAsync(new
AttachRolePolicyRequest()
            {
                PolicyArn = $"arn:aws:iam::aws:policy/{awsPolicy}",
                RoleName = roleName
            });
        }
    }
}
catch (EntityAlreadyExistsException)
{
    Console.WriteLine("Role already exists.");
}

string profileArn = "";
try
{
    var profileCreateResponse = await _amazonIam.CreateInstanceProfileAsync(
        new CreateInstanceProfileRequest()
        {
            InstanceProfileName = profileName
        });
    // Allow time for the profile to be ready.
    profileArn = profileCreateResponse.InstanceProfile.Arn;
    Thread.Sleep(10000);
    await _amazonIam.AddRoleToInstanceProfileAsync(
        new AddRoleToInstanceProfileRequest()
        {
            InstanceProfileName = profileName,
            RoleName = roleName
        });
}
catch (EntityAlreadyExistsException)
{
    Console.WriteLine("Policy already exists.");
    var profileGetResponse = await _amazonIam.GetInstanceProfileAsync(
        new GetInstanceProfileRequest()

```

```

        {
            InstanceProfileName = profileName
        });
        profileArn = profileGetResponse.InstanceProfile.Arn;
    }
    return profileArn;
}

/// <summary>
/// Create a new key pair and save the file.
/// </summary>
/// <param name="newKeyPairName">The name of the new key pair.</param>
/// <returns>Async task.</returns>
public async Task CreateKeyPair(string newKeyPairName)
{
    try
    {
        var keyResponse = await _amazonEc2.CreateKeyPairAsync(
            new CreateKeyPairRequest() { KeyName = newKeyPairName });
        await File.WriteAllTextAsync($"{newKeyPairName}.pem",
            keyResponse.KeyPair.KeyMaterial);
        Console.WriteLine($"Created key pair {newKeyPairName}.");
    }
    catch (AlreadyExistsException)
    {
        Console.WriteLine("Key pair already exists.");
    }
}

/// <summary>
/// Delete the key pair and file by name.
/// </summary>
/// <param name="deleteKeyPairName">The key pair to delete.</param>
/// <returns>Async task.</returns>
public async Task DeleteKeyPairByName(string deleteKeyPairName)
{
    try
    {
        await _amazonEc2.DeleteKeyPairAsync(
            new DeleteKeyPairRequest() { KeyName = deleteKeyPairName });
        File.Delete($"{deleteKeyPairName}.pem");
    }
    catch (FileNotFoundException)
    {
    }
}

```

```

        Console.WriteLine($"Key pair {deleteKeyPairName} not found.");
    }
}

/// <summary>
/// Creates an Amazon EC2 launch template to use with Amazon EC2 Auto Scaling.
/// The launch template specifies a Bash script in its user data field that runs
after
/// the instance is started. This script installs the Python packages and starts
a Python
/// web server on the instance.
/// </summary>
/// <param name="startupScriptPath">The path to a Bash script file that is
run.</param>
/// <param name="instancePolicyPath">The path to a permissions policy to create
and attach to the profile.</param>
/// <returns>The template object.</returns>
public async Task<Amazon.EC2.Model.LaunchTemplate> CreateTemplate(string
startupScriptPath, string instancePolicyPath)
{
    try
    {
        await CreateKeyPair(_keyPairName);
        await CreateInstanceProfileWithName(_instancePolicyName,
_instanceRoleName,
        _instanceProfileName, instancePolicyPath);

        var startServerText = await File.ReadAllTextAsync(startupScriptPath);
        var plainTextBytes =
System.Text.Encoding.UTF8.GetBytes(startServerText);

        var amiLatest = await _amazonSsm.GetParameterAsync(
            new GetParameterRequest() { Name = _amiParam });
        var amiId = amiLatest.Parameter.Value;
        var launchTemplateResponse = await _amazonEc2.CreateLaunchTemplateAsync(
            new CreateLaunchTemplateRequest()
            {
                LaunchTemplateName = _launchTemplateName,
                LaunchTemplateData = new RequestLaunchTemplateData()
                {
                    InstanceType = _instanceType,
                    ImageId = amiId,
                    IamInstanceProfile =
                        new

```



```

LaunchTemplateIamInstanceProfileSpecificationRequest()
    {
        Name = _instanceProfileName
    },
    KeyName = _keyPairName,
    UserData = System.Convert.ToBase64String(plainTextBytes)
}
});
return launchTemplateResponse.LaunchTemplate;
}
catch (AmazonEC2Exception ec2Exception)
{
    if (ec2Exception.ErrorCode ==
"InvalidLaunchTemplateName.AlreadyExistsException")
    {
        _logger.LogError($"Could not create the template, the name
{_launchTemplateName} already exists. " +
                        $"Please try again with a unique name.");
    }

    throw;
}
catch (Exception ex)
{
    _logger.LogError($"An error occurred while creating the template.:
{ex.Message}");
    throw;
}
}

/// <summary>
/// Get a list of Availability Zones in the AWS Region of the Amazon EC2 Client.
/// </summary>
/// <returns>A list of availability zones.</returns>
public async Task<List<string>> DescribeAvailabilityZones()
{
    try
    {
        var zoneResponse = await _amazonEc2.DescribeAvailabilityZonesAsync(
            new DescribeAvailabilityZonesRequest());
        return zoneResponse.AvailabilityZones.Select(z => z.ZoneName).ToList();
    }
    catch (AmazonEC2Exception ec2Exception)

```

```

        {
            _logger.LogError($"An Amazon EC2 error occurred while listing
availability zones.: {ec2Exception.Message}");
            throw;
        }
        catch (Exception ex)
        {
            _logger.LogError($"An error occurred while listing availability zones.:
{ex.Message}");
            throw;
        }
    }

    /// <summary>
    /// Create an EC2 Auto Scaling group of a specified size and name.
    /// </summary>
    /// <param name="groupSize">The size for the group.</param>
    /// <param name="groupName">The name for the group.</param>
    /// <param name="availabilityZones">The availability zones for the group.</
param>
    /// <returns>Async task.</returns>
    public async Task CreateGroupOfSize(int groupSize, string groupName,
List<string> availabilityZones)
    {
        try
        {
            await _amazonAutoScaling.CreateAutoScalingGroupAsync(
                new CreateAutoScalingGroupRequest()
                {
                    AutoScalingGroupName = groupName,
                    AvailabilityZones = availabilityZones,
                    LaunchTemplate =
                        new Amazon.AutoScaling.Model.LaunchTemplateSpecification()
                        {
                            LaunchTemplateName = _launchTemplateName,
                            Version = "$Default"
                        },
                    MaxSize = groupSize,
                    MinSize = groupSize
                });
            Console.WriteLine($"Created EC2 Auto Scaling group {groupName} with size
{groupSize}.");
        }
        catch (EntityAlreadyExistsException)
    }

```

```

        {
            Console.WriteLine($"EC2 Auto Scaling group {groupName} already
exists.");
        }
    }

    /// <summary>
    /// Get the default VPC for the account.
    /// </summary>
    /// <returns>The default VPC object.</returns>
    public async Task<Vpc> GetDefaultVpc()
    {
        try
        {
            var vpcResponse = await _amazonEc2.DescribeVpcsAsync(
                new DescribeVpcsRequest()
                {
                    Filters = new List<Amazon.EC2.Model.Filter>()
                    {
                        new("is-default", new List<string>() { "true" })
                    }
                });
            return vpcResponse.Vpcs[0];
        }
        catch (AmazonEC2Exception ec2Exception)
        {
            if (ec2Exception.ErrorCode == "UnauthorizedOperation")
            {
                _logger.LogError(ec2Exception, $"You do not have the necessary
permissions to describe VPCs.");
            }

            throw;
        }
        catch (Exception ex)
        {
            _logger.LogError(ex, $"An error occurred while describing the vpcs.:
{ex.Message}");
            throw;
        }
    }

    /// <summary>
    /// Get all the subnets for a Vpc in a set of availability zones.

```

```

    /// </summary>
    /// <param name="vpcId">The Id of the Vpc.</param>
    /// <param name="availabilityZones">The list of availability zones.</param>
    /// <returns>The collection of subnet objects.</returns>
    public async Task<List<Subnet>> GetAllVpcSubnetsForZones(string vpcId,
List<string> availabilityZones)
    {
        try
        {
            var subnets = new List<Subnet>();
            var subnetPaginator = _amazonEc2.Paginators.DescribeSubnets(
                new DescribeSubnetsRequest()
                {
                    Filters = new List<Amazon.EC2.Model.Filter>()
                    {
                        new("vpc-id", new List<string>() { vpcId }),
                        new("availability-zone", availabilityZones),
                        new("default-for-az", new List<string>() { "true" })
                    }
                });

            // Get the entire list using the paginator.
            await foreach (var subnet in subnetPaginator.Subnets)
            {
                subnets.Add(subnet);
            }

            return subnets;
        }
        catch (AmazonEC2Exception ec2Exception)
        {
            if (ec2Exception.ErrorCode == "InvalidVpcID.NotFound")
            {
                _logger.LogError(ec2Exception, $"The specified VPC ID {vpcId} does
not exist.");
            }

            throw;
        }
        catch (Exception ex)
        {
            _logger.LogError(ex, $"An error occurred while describing the subnets.:
{ex.Message}");
            throw;
        }
    }

```

```

    }
}

/// <summary>
/// Delete a launch template by name.
/// </summary>
/// <param name="templateName">The name of the template to delete.</param>
/// <returns>Async task.</returns>
public async Task DeleteTemplateByName(string templateName)
{
    try
    {
        await _amazonEc2.DeleteLaunchTemplateAsync(
            new DeleteLaunchTemplateRequest()
            {
                LaunchTemplateName = templateName
            });
    }
    catch (AmazonEC2Exception ec2Exception)
    {
        if (ec2Exception.ErrorCode ==
            "InvalidLaunchTemplateName.NotFoundException")
        {
            _logger.LogError(
                $"Could not delete the template, the name {_launchTemplateName}
was not found.");
        }

        throw;
    }
    catch (Exception ex)
    {
        _logger.LogError($"An error occurred while deleting the template.:
{ex.Message}");
        throw;
    }
}

/// <summary>
/// Detaches a role from an instance profile, detaches policies from the role,
/// and deletes all the resources.
/// </summary>
/// <param name="profileName">The name of the profile to delete.</param>
/// <param name="roleName">The name of the role to delete.</param>

```

```
/// <returns>Async task.</returns>
public async Task DeleteInstanceProfile(string profileName, string roleName)
{
    try
    {
        await _amazonIam.RemoveRoleFromInstanceProfileAsync(
            new RemoveRoleFromInstanceProfileRequest()
            {
                InstanceProfileName = profileName,
                RoleName = roleName
            });
        await _amazonIam.DeleteInstanceProfileAsync(
            new DeleteInstanceProfileRequest() { InstanceProfileName =
profileName });
        var attachedPolicies = await _amazonIam.ListAttachedRolePoliciesAsync(
            new ListAttachedRolePoliciesRequest() { RoleName = roleName });
        foreach (var policy in attachedPolicies.AttachedPolicies)
        {
            await _amazonIam.DetachRolePolicyAsync(
                new DetachRolePolicyRequest()
                {
                    RoleName = roleName,
                    PolicyArn = policy.PolicyArn
                });
            // Delete the custom policies only.
            if (!policy.PolicyArn.StartsWith("arn:aws:iam::aws"))
            {
                await _amazonIam.DeletePolicyAsync(
                    new Amazon.IdentityManagement.Model.DeletePolicyRequest()
                    {
                        PolicyArn = policy.PolicyArn
                    });
            }
        }

        await _amazonIam.DeleteRoleAsync(
            new DeleteRoleRequest() { RoleName = roleName });
    }
    catch (NoSuchEntityException)
    {
        Console.WriteLine($"Instance profile {profileName} does not exist.");
    }
}
```

```

    /// <summary>
    /// Gets data about the instances in an EC2 Auto Scaling group by its group
    name.
    /// </summary>
    /// <param name="group">The name of the auto scaling group.</param>
    /// <returns>A collection of instance Ids.</returns>
    public async Task<IEnumerable<string>> GetInstancesByGroupName(string group)
    {
        var instanceResponse = await
        _amazonAutoScaling.DescribeAutoScalingGroupsAsync(
            new DescribeAutoScalingGroupsRequest()
            {
                AutoScalingGroupNames = new List<string>() { group }
            });
        var instanceIds = instanceResponse.AutoScalingGroups.SelectMany(
            g => g.Instances.Select(i => i.InstanceId));
        return instanceIds;
    }

    /// <summary>
    /// Get the instance profile association data for an instance.
    /// </summary>
    /// <param name="instanceId">The Id of the instance.</param>
    /// <returns>Instance profile associations data.</returns>
    public async Task<IamInstanceProfileAssociation> GetInstanceProfile(string
    instanceId)
    {
        try
        {
            var response = await
            _amazonEc2.DescribeIamInstanceProfileAssociationsAsync(
                new DescribeIamInstanceProfileAssociationsRequest()
                {
                    Filters = new List<Amazon.EC2.Model.Filter>()
                    {
                        new("instance-id", new List<string>() { instanceId })
                    },
                });
            return response.IamInstanceProfileAssociations[0];
        }
        catch (AmazonEC2Exception ec2Exception)
        {
            if (ec2Exception.ErrorCode == "InvalidInstanceID.NotFound")
            {

```

```

        _logger.LogError(ec2Exception, $"Instance {instanceId} not found");
    }

    throw;
}
catch (Exception ex)
{
    _logger.LogError(ex, $"An error occurred while creating the template.: {ex.Message}");
    throw;
}
}

/// <summary>
/// Replace the profile associated with a running instance. After the profile is
replaced, the instance
/// is rebooted to ensure that it uses the new profile. When the instance is
ready, Systems Manager is
/// used to restart the Python web server.
/// </summary>
/// <param name="instanceId">The Id of the instance to update.</param>
/// <param name="credsProfileName">The name of the new profile to associate with
the specified instance.</param>
/// <param name="associationId">The Id of the existing profile association for
the instance.</param>
/// <returns>Async task.</returns>
public async Task ReplaceInstanceProfile(string instanceId, string
credsProfileName, string associationId)
{
    try
    {
        await _amazonEc2.ReplaceIamInstanceProfileAssociationAsync(
            new ReplaceIamInstanceProfileAssociationRequest()
            {
                AssociationId = associationId,
                IamInstanceProfile = new IamInstanceProfileSpecification()
                {
                    Name = credsProfileName
                }
            });
        // Allow time before resetting.
        Thread.Sleep(25000);

        await _amazonEc2.RebootInstancesAsync(

```



```

        new RebootInstancesRequest(new List<string>() { instanceId }));
Thread.Sleep(25000);
var instanceReady = false;
var retries = 5;
while (retries-- > 0 && !instanceReady)
{
    var instancesPaginator =
        _amazonSsm.Paginators.DescribeInstanceInformation(
            new DescribeInstanceInformationRequest());
    // Get the entire list using the paginator.
    await foreach (var instance in
instancesPaginator.InstanceInformationList)
    {
        instanceReady = instance.InstanceId == instanceId;
        if (instanceReady)
        {
            break;
        }
    }
}
Console.WriteLine("Waiting for instance to be running.");
await WaitForInstanceState(instanceId, InstanceStateName.Running);
Console.WriteLine("Instance ready.");
Console.WriteLine($"Sending restart command to instance {instanceId}");
await _amazonSsm.SendCommandAsync(
    new SendCommandRequest()
    {
        InstanceIds = new List<string>() { instanceId },
        DocumentName = "AWS-RunShellScript",
        Parameters = new Dictionary<string, List<string>>()
        {
            {
                "commands",
                new List<string>() { "cd / && sudo python3 server.py
80" }
            }
        }
    });
Console.WriteLine($"Restarted the web server on instance {instanceId}");
}
catch (AmazonEC2Exception ec2Exception)
{
    if (ec2Exception.ErrorCode == "InvalidInstanceID.NotFound")
    {

```

```

        _logger.LogError(ec2Exception, $"Instance {instanceId} not found");
    }

    throw;
}
catch (Exception ex)
{
    _logger.LogError(ex, $"An error occurred while replacing the template.:
{ex.Message}");
    throw;
}
}

/// <summary>
/// Try to terminate an instance by its Id.
/// </summary>
/// <param name="instanceId">The Id of the instance to terminate.</param>
/// <returns>Async task.</returns>
public async Task TryTerminateInstanceById(string instanceId)
{
    var stopping = false;
    Console.WriteLine($"Stopping {instanceId}...");
    while (!stopping)
    {
        try
        {
            await _amazonAutoScaling.TerminateInstanceInAutoScalingGroupAsync(
                new TerminateInstanceInAutoScalingGroupRequest()
                {
                    InstanceId = instanceId,
                    ShouldDecrementDesiredCapacity = false
                });
            stopping = true;
        }
        catch (ScalingActivityInProgressException)
        {
            Console.WriteLine($"Scaling activity in progress for {instanceId}.
Waiting...");
            Thread.Sleep(10000);
        }
    }
}

/// <summary>

```

```

    /// Tries to delete the EC2 Auto Scaling group. If the group is in use or in
    progress,
    /// waits and retries until the group is successfully deleted.
    /// </summary>
    /// <param name="groupName">The name of the group to try to delete.</param>
    /// <returns>Async task.</returns>
    public async Task TryDeleteGroupByName(string groupName)
    {
        var stopped = false;
        while (!stopped)
        {
            try
            {
                await _amazonAutoScaling.DeleteAutoScalingGroupAsync(
                    new DeleteAutoScalingGroupRequest()
                    {
                        AutoScalingGroupName = groupName
                    });
                stopped = true;
            }
            catch (Exception e)
            when ((e is ScalingActivityInProgressException)
                || (e is Amazon.AutoScaling.Model.ResourceInUseException))
            {
                Console.WriteLine($"Some instances are still running. Waiting...");
                Thread.Sleep(10000);
            }
        }
    }

    /// <summary>
    /// Terminate instances and delete the Auto Scaling group by name.
    /// </summary>
    /// <param name="groupName">The name of the group to delete.</param>
    /// <returns>Async task.</returns>
    public async Task TerminateAndDeleteAutoScalingGroupWithName(string groupName)
    {
        var describeGroupsResponse = await
        _amazonAutoScaling.DescribeAutoScalingGroupsAsync(
            new DescribeAutoScalingGroupsRequest()
            {
                AutoScalingGroupNames = new List<string>() { groupName }
            });
        if (describeGroupsResponse.AutoScalingGroups.Any())

```

```

    {
        // Update the size to 0.
        await _amazonAutoScaling.UpdateAutoScalingGroupAsync(
            new UpdateAutoScalingGroupRequest()
            {
                AutoScalingGroupName = groupName,
                MinSize = 0
            });
        var group = describeGroupsResponse.AutoScalingGroups[0];
        foreach (var instance in group.Instances)
        {
            await TryTerminateInstanceById(instance.InstanceId);
        }

        await TryDeleteGroupByName(groupName);
    }
    else
    {
        Console.WriteLine($"No groups found with name {groupName}.");
    }
}

/// <summary>
/// Get the default security group for a specified Vpc.
/// </summary>
/// <param name="vpc">The Vpc to search.</param>
/// <returns>The default security group.</returns>
public async Task<SecurityGroup> GetDefaultSecurityGroupForVpc(Vpc vpc)
{
    var groupResponse = await _amazonEc2.DescribeSecurityGroupsAsync(
        new DescribeSecurityGroupsRequest()
        {
            Filters = new List<Amazon.EC2.Model.Filter>()
            {
                new ("group-name", new List<string>() { "default" }),
                new ("vpc-id", new List<string>() { vpc.VpcId })
            }
        });
    return groupResponse.SecurityGroups[0];
}

/// <summary>

```

```

    /// Verify the default security group of a Vpc allows ingress from the calling
    computer.
    /// This can be done by allowing ingress from this computer's IP address.
    /// In some situations, such as connecting from a corporate network, you must
    instead specify
    /// a prefix list Id. You can also temporarily open the port to any IP address
    while running this example.
    /// If you do, be sure to remove public access when you're done.
    /// </summary>
    /// <param name="vpc">The group to check.</param>
    /// <param name="port">The port to verify.</param>
    /// <param name="ipAddress">This computer's IP address.</param>
    /// <returns>True if the ip address is allowed on the group.</returns>
    public bool VerifyInboundPortForGroup(SecurityGroup group, int port, string
ipAddress)
    {
        var portIsOpen = false;
        foreach (var ipPermission in group.IpPermissions)
        {
            if (ipPermission.FromPort == port)
            {
                foreach (var ipRange in ipPermission.Ipv4Ranges)
                {
                    var cidr = ipRange.CidrIp;
                    if (cidr.StartsWith(ipAddress) || cidr == "0.0.0.0/0")
                    {
                        portIsOpen = true;
                    }
                }

                if (ipPermission.PrefixListIds.Any())
                {
                    portIsOpen = true;
                }

                if (!portIsOpen)
                {
                    Console.WriteLine("The inbound rule does not appear to be open
to either this computer's IP\n" +
                                     "address, to all IP addresses (0.0.0.0/0), or
to a prefix list ID.");
                }
            }
            else
            {

```

```

        break;
    }
}

return portIsOpen;
}

/// <summary>
/// Add an ingress rule to the specified security group that allows access on
the
/// specified port from the specified IP address.
/// </summary>
/// <param name="groupId">The Id of the security group to modify.</param>
/// <param name="port">The port to open.</param>
/// <param name="ipAddress">The IP address to allow access.</param>
/// <returns>Async task.</returns>
public async Task OpenInboundPort(string groupId, int port, string ipAddress)
{
    await _amazonEc2.AuthorizeSecurityGroupIngressAsync(
        new AuthorizeSecurityGroupIngressRequest()
        {
            GroupId = groupId,
            IpPermissions = new List<IpPermission>()
            {
                new IpPermission()
                {
                    FromPort = port,
                    ToPort = port,
                    IpProtocol = "tcp",
                    Ipv4Ranges = new List<IpRange>()
                    {
                        new IpRange() { CidrIp = $"{ipAddress}/32" }
                    }
                }
            }
        });
}

/// <summary>
/// Attaches an Elastic Load Balancing (ELB) target group to this EC2 Auto
Scaling group.
/// The
/// </summary>

```

```

    /// <param name="autoScalingGroupName">The name of the Auto Scaling group.</param>
    /// <param name="targetGroupArn">The Arn for the target group.</param>
    /// <returns>Async task.</returns>
    public async Task AttachLoadBalancerToGroup(string autoScalingGroupName, string
targetGroupArn)
    {
        await _amazonAutoScaling.AttachLoadBalancerTargetGroupsAsync(
            new AttachLoadBalancerTargetGroupsRequest()
            {
                AutoScalingGroupName = autoScalingGroupName,
                TargetGroupARNs = new List<string>() { targetGroupArn }
            });
    }

    /// <summary>
    /// Wait until an EC2 instance is in a specified state.
    /// </summary>
    /// <param name="instanceId">The instance Id.</param>
    /// <param name="stateName">The state to wait for.</param>
    /// <returns>A Boolean value indicating the success of the action.</returns>
    public async Task<bool> WaitForInstanceState(string instanceId,
InstanceStateName stateName)
    {
        var request = new DescribeInstancesRequest
        {
            InstanceIds = new List<string> { instanceId }
        };

        // Wait until the instance is in the specified state.
        var hasState = false;
        do
        {
            // Wait 5 seconds.
            Thread.Sleep(5000);

            // Check for the desired state.
            var response = await _amazonEc2.DescribeInstancesAsync(request);
            var instance = response.Reservations[0].Instances[0];
            hasState = instance.State.Name == stateName;
            Console.WriteLine(". ");
        } while (!hasState);

        return hasState;
    }

```

```
    }
}
```

建立包裝 Elastic Load Balancing 動作的類別。

```
/// <summary>
/// Encapsulates Elastic Load Balancer actions.
/// </summary>
public class ElasticLoadBalancerWrapper
{
    private readonly IAmazonElasticLoadBalancingV2 _amazonElasticLoadBalancingV2;
    private string? _endpoint = null;
    private readonly string _targetGroupName = "";
    private readonly string _loadBalancerName = "";
    HttpClient _httpClient = new();

    public string TargetGroupName => _targetGroupName;
    public string LoadBalancerName => _loadBalancerName;

    /// <summary>
    /// Constructor for the Elastic Load Balancer wrapper.
    /// </summary>
    /// <param name="amazonElasticLoadBalancingV2">The injected load balancing v2
client.</param>
    /// <param name="configuration">The injected configuration.</param>
    public ElasticLoadBalancerWrapper(
        IAmazonElasticLoadBalancingV2 amazonElasticLoadBalancingV2,
        IConfiguration configuration)
    {
        _amazonElasticLoadBalancingV2 = amazonElasticLoadBalancingV2;
        var prefix = configuration["resourcePrefix"];
        _targetGroupName = prefix + "-tg";
        _loadBalancerName = prefix + "-lb";
    }

    /// <summary>
    /// Get the HTTP Endpoint of a load balancer by its name.
    /// </summary>
    /// <param name="loadBalancerName">The name of the load balancer.</param>
    /// <returns>The HTTP endpoint.</returns>
```



```

    public async Task<string> GetEndpointForLoadBalancerByName(string
loadBalancerName)
    {
        if (_endpoint == null)
        {
            var endpointResponse =
                await _amazonElasticLoadBalancingV2.DescribeLoadBalancersAsync(
                    new DescribeLoadBalancersRequest()
                    {
                        Names = new List<string>() { loadBalancerName }
                    });
            _endpoint = endpointResponse.LoadBalancers[0].DNSName;
        }

        return _endpoint;
    }

    /// <summary>
    /// Return the GET response for an endpoint as text.
    /// </summary>
    /// <param name="endpoint">The endpoint for the request.</param>
    /// <returns>The request response.</returns>
    public async Task<string> GetEndPointResponse(string endpoint)
    {
        var endpointResponse = await _httpClient.GetAsync($"http://{endpoint}");
        var textResponse = await endpointResponse.Content.ReadAsStringAsync();
        return textResponse!;
    }

    /// <summary>
    /// Get the target health for a group by name.
    /// </summary>
    /// <param name="groupName">The name of the group.</param>
    /// <returns>The collection of health descriptions.</returns>
    public async Task<List<TargetHealthDescription>>
CheckTargetHealthForGroup(string groupName)
    {
        List<TargetHealthDescription> result = null!;
        try
        {
            var groupResponse =
                await _amazonElasticLoadBalancingV2.DescribeTargetGroupsAsync(
                    new DescribeTargetGroupsRequest()
                    {

```

```

        Names = new List<string>() { groupName }
    });
    var healthResponse =
        await _amazonElasticLoadBalancingV2.DescribeTargetHealthAsync(
            new DescribeTargetHealthRequest()
            {
                TargetGroupArn =
groupResponse.TargetGroups[0].TargetGroupArn
            });
    ;
    result = healthResponse.TargetHealthDescriptions;
}
catch (TargetGroupNotFoundException)
{
    Console.WriteLine($"Target group {groupName} not found.");
}
return result;
}

/// <summary>
/// Create an Elastic Load Balancing target group. The target group specifies
how the load balancer forwards
/// requests to instances in the group and how instance health is checked.
///
/// To speed up this demo, the health check is configured with shortened times
and lower thresholds. In production,
/// you might want to decrease the sensitivity of your health checks to avoid
unwanted failures.
/// </summary>
/// <param name="groupName">The name for the group.</param>
/// <param name="protocol">The protocol, such as HTTP.</param>
/// <param name="port">The port to use to forward requests, such as 80.</param>
/// <param name="vpcId">The Id of the Vpc in which the load balancer exists.</
param>
/// <returns>The new TargetGroup object.</returns>
public async Task<TargetGroup> CreateTargetGroupOnVpc(string groupName,
ProtocolEnum protocol, int port, string vpcId)
{
    var createResponse = await
_amazonElasticLoadBalancingV2.CreateTargetGroupAsync(
        new CreateTargetGroupRequest()
        {
            Name = groupName,
            Protocol = protocol,

```

```

        Port = port,
        HealthCheckPath = "/healthcheck",
        HealthCheckIntervalSeconds = 10,
        HealthCheckTimeoutSeconds = 5,
        HealthyThresholdCount = 2,
        UnhealthyThresholdCount = 2,
        VpcId = vpcId
    });
    var targetGroup = createResponse.TargetGroups[0];
    return targetGroup;
}

/// <summary>
/// Create an Elastic Load Balancing load balancer that uses the specified
subnets
/// and forwards requests to the specified target group.
/// </summary>
/// <param name="name">The name for the new load balancer.</param>
/// <param name="subnetIds">Subnets for the load balancer.</param>
/// <param name="targetGroup">Target group for forwarded requests.</param>
/// <returns>The new LoadBalancer object.</returns>
public async Task<LoadBalancer> CreateLoadBalancerAndListener(string name,
List<string> subnetIds, TargetGroup targetGroup)
{
    var createLbResponse = await
    _amazonElasticLoadBalancingV2.CreateLoadBalancerAsync(
        new CreateLoadBalancerRequest()
        {
            Name = name,
            Subnets = subnetIds
        });
    var loadBalancerArn = createLbResponse.LoadBalancers[0].LoadBalancerArn;

    // Wait for load balancer to be available.
    var loadBalancerReady = false;
    while (!loadBalancerReady)
    {
        try
        {
            var describeResponse =
                await _amazonElasticLoadBalancingV2.DescribeLoadBalancersAsync(
                    new DescribeLoadBalancersRequest()
                    {
                        Names = new List<string>() { name }
                    }
                );
        }
        catch { }
    }
}

```

```

        });

        var loadBalancerState =
describeResponse.LoadBalancers[0].State.Code;

        loadBalancerReady = loadBalancerState ==
LoadBalancerStateEnum.Active;
    }
    catch (LoadBalancerNotFoundException)
    {
        loadBalancerReady = false;
    }
    Thread.Sleep(10000);
}
// Create the listener.
await _amazonElasticLoadBalancingV2.CreateListenerAsync(
    new CreateListenerRequest()
    {
        LoadBalancerArn = loadBalancerArn,
        Protocol = targetGroup.Protocol,
        Port = targetGroup.Port,
        DefaultActions = new List<Action>()
        {
            new Action()
            {
                Type = ActionTypeEnum.Forward,
                TargetGroupArn = targetGroup.TargetGroupArn
            }
        }
    });
return createLbResponse.LoadBalancers[0];
}

/// <summary>
/// Verify this computer can successfully send a GET request to the
/// load balancer endpoint.
/// </summary>
/// <param name="endpoint">The endpoint to check.</param>
/// <returns>True if successful.</returns>
public async Task<bool> VerifyLoadBalancerEndpoint(string endpoint)
{
    var success = false;
    var retries = 3;
    while (!success && retries > 0)

```

```

        {
            try
            {
                var endpointResponse = await _httpClient.GetAsync($"http://{
{endpoint}}");
                Console.WriteLine($"Response: {endpointResponse.StatusCode}.");

                if (endpointResponse.IsSuccessStatusCode)
                {
                    success = true;
                }
                else
                {
                    retries = 0;
                }
            }
            catch (HttpRequestException)
            {
                Console.WriteLine("Connection error, retrying...");
                retries--;
                Thread.Sleep(10000);
            }
        }

        return success;
    }

    /// <summary>
    /// Delete a load balancer by its specified name.
    /// </summary>
    /// <param name="name">The name of the load balancer to delete.</param>
    /// <returns>Async task.</returns>
    public async Task DeleteLoadBalancerByName(string name)
    {
        try
        {
            var describeLoadBalancerResponse =
                await _amazonElasticLoadBalancingV2.DescribeLoadBalancersAsync(
                    new DescribeLoadBalancersRequest()
                    {
                        Names = new List<string>() { name }
                    });
            var lbArn =
                describeLoadBalancerResponse.LoadBalancers[0].LoadBalancerArn;

```

```

        await _amazonElasticLoadBalancingV2.DeleteLoadBalancerAsync(
            new DeleteLoadBalancerRequest()
            {
                LoadBalancerArn = lbArn
            }
        );
    }
    catch (LoadBalancerNotFoundException)
    {
        Console.WriteLine($"Load balancer {name} not found.");
    }
}

/// <summary>
/// Delete a TargetGroup by its specified name.
/// </summary>
/// <param name="groupName">Name of the group to delete.</param>
/// <returns>Async task.</returns>
public async Task DeleteTargetGroupByName(string groupName)
{
    var done = false;
    while (!done)
    {
        try
        {
            var groupResponse =
                await _amazonElasticLoadBalancingV2.DescribeTargetGroupsAsync(
                    new DescribeTargetGroupsRequest()
                    {
                        Names = new List<string>() { groupName }
                    });

            var targetArn = groupResponse.TargetGroups[0].TargetGroupArn;
            await _amazonElasticLoadBalancingV2.DeleteTargetGroupAsync(
                new DeleteTargetGroupRequest() { TargetGroupArn = targetArn });
            Console.WriteLine($"Deleted load balancing target group
{groupName}.");
            done = true;
        }
        catch (TargetGroupNotFoundException)
        {
            Console.WriteLine(
                $"Target group {groupName} not found, could not delete.");
            done = true;
        }
    }
}

```

```

        }
        catch (ResourceInUseException)
        {
            Console.WriteLine("Target group not yet released, waiting...");
            Thread.Sleep(10000);
        }
    }
}
}
}

```

建立使用 DynamoDB 模擬建議服務的類別。

```

/// <summary>
/// Encapsulates a DynamoDB table to use as a service that recommends books, movies,
/// and songs.
/// </summary>
public class Recommendations
{
    private readonly IAmazonDynamoDB _amazonDynamoDb;
    private readonly DynamoDBContext _context;
    private readonly string _tableName;

    public string TableName => _tableName;

    /// <summary>
    /// Constructor for the Recommendations service.
    /// </summary>
    /// <param name="amazonDynamoDb">The injected DynamoDb client.</param>
    /// <param name="configuration">The injected configuration.</param>
    public Recommendations(IAmazonDynamoDB amazonDynamoDb, IConfiguration
configuration)
    {
        _amazonDynamoDb = amazonDynamoDb;
        _context = new DynamoDBContext(_amazonDynamoDb);
        _tableName = configuration["databaseName"]!;
    }

    /// <summary>
    /// Create the DynamoDb table with a specified name.
    /// </summary>
    /// <param name="tableName">The name for the table.</param>
    /// <returns>True when ready.</returns>

```

```
public async Task<bool> CreateDatabaseWithName(string tableName)
{
    try
    {
        Console.WriteLine($"Creating table {tableName}...");
        var createRequest = new CreateTableRequest()
        {
            TableName = tableName,
            AttributeDefinitions = new List<AttributeDefinition>()
            {
                new AttributeDefinition()
                {
                    AttributeName = "MediaType",
                    AttributeType = ScalarAttributeType.S
                },
                new AttributeDefinition()
                {
                    AttributeName = "ItemId",
                    AttributeType = ScalarAttributeType.N
                }
            },
            KeySchema = new List<KeySchemaElement>()
            {
                new KeySchemaElement()
                {
                    AttributeName = "MediaType",
                    KeyType = KeyType.HASH
                },
                new KeySchemaElement()
                {
                    AttributeName = "ItemId",
                    KeyType = KeyType.RANGE
                }
            },
            ProvisionedThroughput = new ProvisionedThroughput()
            {
                ReadCapacityUnits = 5,
                WriteCapacityUnits = 5
            }
        };
        await _amazonDynamoDb.CreateTableAsync(createRequest);

        // Wait until the table is ACTIVE and then report success.
        Console.WriteLine("\nWaiting for table to become active...");
    }
}
```



```

        var request = new DescribeTableRequest
        {
            TableName = tableName
        };

        TableStatus status;
        do
        {
            Thread.Sleep(2000);

            var describeTableResponse = await
                _amazonDynamoDb.DescribeTableAsync(request);
            status = describeTableResponse.Table.TableStatus;

            Console.WriteLine(".");
        }
        while (status != "ACTIVE");

        return status == TableStatus.ACTIVE;
    }
    catch (ResourceInUseException)
    {
        Console.WriteLine($"Table {tableName} already exists.");
        return false;
    }
}

/// <summary>
/// Populate the database table with data from a specified path.
/// </summary>
/// <param name="databaseTableName">The name of the table.</param>
/// <param name="recommendationsPath">The path of the recommendations data.</
param>
/// <returns>Async task.</returns>
public async Task PopulateDatabase(string databaseTableName, string
recommendationsPath)
{
    var recommendationsText = await File.ReadAllTextAsync(recommendationsPath);
    var records =
        JsonSerializer.Deserialize<RecommendationModel[]>(recommendationsText);
    var batchWrite = _context.CreateBatchWrite<RecommendationModel>();

    foreach (var record in records!)

```

```

        {
            batchWrite.AddPutItem(record);
        }

        await batchWrite.ExecuteAsync();
    }

    /// <summary>
    /// Delete the recommendation table by name.
    /// </summary>
    /// <param name="tableName">The name of the recommendation table.</param>
    /// <returns>Async task.</returns>
    public async Task DestroyDatabaseByName(string tableName)
    {
        try
        {
            await _amazonDynamoDb.DeleteTableAsync(
                new DeleteTableRequest() { TableName = tableName });
            Console.WriteLine($"Table {tableName} was deleted.");
        }
        catch (ResourceNotFoundException)
        {
            Console.WriteLine($"Table {tableName} not found");
        }
    }
}

```

建立包裝 Systems Manager 動作的類別。

```

    /// <summary>
    /// Encapsulates Systems Manager parameter operations. This example uses these
    /// parameters
    /// to drive the demonstration of resilient architecture, such as failure of a
    /// dependency or
    /// how the service responds to a health check.
    /// </summary>
    public class SmParameterWrapper
    {
        private readonly IAmazonSimpleSystemsManagement _amazonSimpleSystemsManagement;

        private readonly string _tableParameter = "doc-example-resilient-architecture-
        table";
    }

```

```

    private readonly string _failureResponseParameter = "doc-example-resilient-
architecture-failure-response";
    private readonly string _healthCheckParameter = "doc-example-resilient-
architecture-health-check";
    private readonly string _tableName = "";

    public string TableParameter => _tableParameter;
    public string TableName => _tableName;
    public string HealthCheckParameter => _healthCheckParameter;
    public string FailureResponseParameter => _failureResponseParameter;

    /// <summary>
    /// Constructor for the SmParameterWrapper.
    /// </summary>
    /// <param name="amazonSimpleSystemsManagement">The injected Simple Systems
Management client.</param>
    /// <param name="configuration">The injected configuration.</param>
    public SmParameterWrapper(IAmazonSimpleSystemsManagement
amazonSimpleSystemsManagement, IConfiguration configuration)
    {
        _amazonSimpleSystemsManagement = amazonSimpleSystemsManagement;
        _tableName = configuration["databaseName"]!;
    }

    /// <summary>
    /// Reset the Systems Manager parameters to starting values for the demo.
    /// </summary>
    /// <returns>Async task.</returns>
    public async Task Reset()
    {
        await this.PutParameterByName(_tableParameter, _tableName);
        await this.PutParameterByName(_failureResponseParameter, "none");
        await this.PutParameterByName(_healthCheckParameter, "shallow");
    }

    /// <summary>
    /// Set the value of a named Systems Manager parameter.
    /// </summary>
    /// <param name="name">The name of the parameter.</param>
    /// <param name="value">The value to set.</param>
    /// <returns>Async task.</returns>
    public async Task PutParameterByName(string name, string value)
    {
        await _amazonSimpleSystemsManagement.PutParameterAsync(

```

```
        new PutParameterRequest() { Name = name, Value = value, Overwrite =  
true });  
    }  
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的下列主題。

- [AttachLoadBalancerTargetGroups](#)
- [CreateAutoScalingGroup](#)
- [CreateInstanceProfile](#)
- [CreateLaunchTemplate](#)
- [CreateListener](#)
- [CreateLoadBalancer](#)
- [CreateTargetGroup](#)
- [DeleteAutoScalingGroup](#)
- [DeleteInstanceProfile](#)
- [DeleteLaunchTemplate](#)
- [DeleteLoadBalancer](#)
- [DeleteTargetGroup](#)
- [DescribeAutoScalingGroups](#)
- [DescribeAvailabilityZones](#)
- [DescribeIamInstanceProfileAssociations](#)
- [DescribeInstances](#)
- [DescribeLoadBalancers](#)
- [DescribeSubnets](#)
- [DescribeTargetGroups](#)
- [DescribeTargetHealth](#)
- [DescribeVpcs](#)
- [RebootInstances](#)
- [ReplaceIamInstanceProfileAssociation](#)
- [TerminateInstanceInAutoScalingGroup](#)
- [UpdateAutoScalingGroup](#)

使用的 EventBridge 範例 適用於 .NET 的 SDK

下列程式碼範例示範如何使用 適用於 .NET 的 AWS SDK 搭配 EventBridge 執行動作和實作常見案例。

基本概念是程式碼範例，這些範例說明如何在服務內執行基本操作。

Actions 是大型程式的程式碼摘錄，必須在內容中執行。雖然動作會告訴您如何呼叫個別服務函數，但您可以在其相關情境中查看內容中的動作。

每個範例均包含完整原始碼的連結，您可在連結中找到如何設定和執行內容中程式碼的相關指示。

主題

- [開始使用](#)
- [基本概念](#)
- [動作](#)

開始使用

您好 EventBridge

下列程式碼範例說明如何開始使用 EventBridge。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
using Amazon.EventBridge;
using Amazon.EventBridge.Model;

namespace EventBridgeActions;

public static class HelloEventBridge
```

```
{
    static async Task Main(string[] args)
    {
        var eventBridgeClient = new AmazonEventBridgeClient();

        Console.WriteLine($"Hello Amazon EventBridge! Following are some of your
EventBuses:");
        Console.WriteLine();

        // You can use await and any of the async methods to get a response.
        // Let's get the first five event buses.
        var response = await eventBridgeClient.ListEventBusesAsync(
            new ListEventBusesRequest()
            {
                Limit = 5
            });

        foreach (var eventBus in response.EventBuses)
        {
            Console.WriteLine($"\\tEventBus: {eventBus.Name}");
            Console.WriteLine($"\\tArn: {eventBus.Arn}");
            Console.WriteLine($"\\tPolicy: {eventBus.Policy}");
            Console.WriteLine();
        }
    }
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [ListEventBuses](#)。

基本概念

了解基本概念

以下程式碼範例顯示做法：

- 建立規則並在其中新增目標。
- 啟用和停用規則。
- 列出並更新規則和目標。
- 發送事件，然後清理資源。

適用於 .NET 的 SDK

 Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

在命令提示中執行互動式案例。

```
public class EventBridgeScenario
{
    /*
        Before running this .NET code example, set up your development environment,
        including your credentials.

        This .NET example performs the following tasks with Amazon EventBridge:
        - Create a rule.
        - Add a target to a rule.
        - Enable and disable rules.
        - List rules and targets.
        - Update rules and targets.
        - Send events.
        - Delete the rule.
    */

    private static ILogger logger = null!;
    private static EventBridgeWrapper _eventBridgeWrapper = null!;
    private static IConfiguration _configuration = null!;

    private static IAMIdentityManagementService? _iamClient = null!;
    private static IAmazonSimpleNotificationService? _snsClient = null!;
    private static IAmazonS3 _s3Client = null!;

    static async Task Main(string[] args)
    {
        // Set up dependency injection for Amazon EventBridge.
        using var host = Host.CreateDefaultBuilder(args)
            .ConfigureLogging(logging =>
                logging.AddFilter("System", LogLevel.Debug)
                    .AddFilter<DebugLoggerProvider>("Microsoft",
                        LogLevel.Information)
                    .AddFilter<ConsoleLoggerProvider>("Microsoft", LogLevel.Trace))
```

```
.ConfigureServices(_ , services) =>
services.AddAWSService<IAmazonEventBridge>()
.AddAWSService<IAmazonIdentityManagementService>()
.AddAWSService<IAmazonS3>()
.AddAWSService<IAmazonSimpleNotificationService>()
.AddTransient<EventBridgeWrapper>()
)
.Build();

_configuration = new ConfigurationBuilder()
.SetBasePath(Directory.GetCurrentDirectory())
.AddJsonFile("settings.json") // Load settings from .json file.
.AddJsonFile("settings.local.json",
    true) // Optionally, load local settings.
.Build();

logger = LoggerFactory.Create(builder => { builder.AddConsole(); })
.CreateLogger<EventBridgeScenario>();

ServicesSetup(host);

string topicArn = "";
string roleArn = "";

Console.WriteLine(new string('-', 80));
Console.WriteLine("Welcome to the Amazon EventBridge example scenario.");
Console.WriteLine(new string('-', 80));

try
{
    roleArn = await CreateRole();

    await CreateBucketWithEventBridgeEvents();

    await AddEventRule(roleArn);

    await ListEventRules();

    topicArn = await CreateSnsTopic();

    var email = await SubscribeToSnsTopic(topicArn);

    await AddSnsTarget(topicArn);
```



```

        await ListTargets();

        await ListRulesForTarget(topicArn);

        await UploadS3File(_s3Client);

        await ChangeRuleState(false);

        await GetRuleState();

        await UpdateSnsEventRule(topicArn);

        await ChangeRuleState(true);

        await UploadS3File(_s3Client);

        await UpdateToCustomRule(topicArn);

        await TriggerCustomRule(email);

        await CleanupResources(topicArn);
    }
    catch (Exception ex)
    {
        logger.LogError(ex, "There was a problem executing the scenario.");
        await CleanupResources(topicArn);
    }
    Console.WriteLine(new string('-', 80));
    Console.WriteLine("The Amazon EventBridge example scenario is complete.");
    Console.WriteLine(new string('-', 80));
}

/// <summary>
/// Populate the services for use within the console application.
/// </summary>
/// <param name="host">The services host.</param>
private static void ServicesSetup(IHost host)
{
    _eventBridgeWrapper =
host.Services.GetRequiredService<EventBridgeWrapper>();
    _snsClient =
host.Services.GetRequiredService<IAmazonSimpleNotificationService>();
    _s3Client = host.Services.GetRequiredService<IAmazonS3>();
}

```

```

        _iamClient =
host.Services.GetRequiredService<IAmazonIdentityManagementService>();
    }

    /// <summary>
    /// Create a role to be used by EventBridge.
    /// </summary>
    /// <returns>The role Amazon Resource Name (ARN).</returns>
    public static async Task<string> CreateRole()
    {
        Console.WriteLine(new string('-', 80));
        Console.WriteLine("Creating a role to use with EventBridge and attaching
managed policy AmazonEventBridgeFullAccess.");
        Console.WriteLine(new string('-', 80));

        var roleName = _configuration["roleName"];

        var assumeRolePolicy = "{" +
                                "\"Version\": \"2012-10-17\", \" +
                                "\"Statement\": [{\" +
                                "\"Effect\": \"Allow\", \" +
                                "\"Principal\": {\" +
                                \"$\"\"Service\": \"events.amazonaws.com\"\" +
                                \"},\" +
                                "\"Action\": \"sts:AssumeRole\"\" +
                                \"}]\" +
                                "}";

        var roleResult = await _iamClient!.CreateRoleAsync(
            new CreateRoleRequest()
            {
                AssumeRolePolicyDocument = assumeRolePolicy,
                Path = "/",
                RoleName = roleName
            });

        await _iamClient.AttachRolePolicyAsync(
            new AttachRolePolicyRequest()
            {
                PolicyArn = "arn:aws:iam::aws:policy/AmazonEventBridgeFullAccess",
                RoleName = roleName
            });

        // Allow time for the role to be ready.
        Thread.Sleep(10000);
    }

```

```

        return roleResult.Role.Arn;
    }

    /// <summary>
    /// Create an Amazon Simple Storage Service (Amazon S3) bucket with EventBridge
events enabled.
    /// </summary>
    /// <returns>Async task.</returns>
    private static async Task CreateBucketWithEventBridgeEvents()
    {
        Console.WriteLine(new string('-', 80));
        Console.WriteLine("Creating an S3 bucket with EventBridge events enabled.");

        var testBucketName = _configuration["testBucketName"];

        var bucketExists = await
Amazon.S3.Util.AmazonS3Util.DoesS3BucketExistV2Async(_s3Client,
            testBucketName);

        if (!bucketExists)
        {
            await _s3Client.PutBucketAsync(new PutBucketRequest()
            {
                BucketName = testBucketName,
                UseClientRegion = true
            });
        }

        await _s3Client.PutBucketNotificationAsync(new
PutBucketNotificationRequest()
        {
            BucketName = testBucketName,
            EventBridgeConfiguration = new EventBridgeConfiguration()
        });

        Console.WriteLine($"\\tAdded bucket {testBucketName} with EventBridge events
enabled.");

        Console.WriteLine(new string('-', 80));
    }

    /// <summary>
    /// Create and upload a file to an S3 bucket to trigger an event.
    /// </summary>

```

```

/// <returns>Async task.</returns>
private static async Task UploadS3File(IAmazonS3 s3Client)
{
    Console.WriteLine(new string('-', 80));
    Console.WriteLine("Uploading a file to the test bucket. This will trigger a
subscription email.");

    var testBucketName = _configuration["testBucketName"];

    var fileName = $"example_upload_{DateTime.UtcNow.Ticks}.txt";

    // Create the file if it does not already exist.
    if (!File.Exists(fileName))
    {
        await using StreamWriter sw = File.CreateText(fileName);
        await sw.WriteLineAsync(
            "This is a sample file for testing uploads.");
    }

    await s3Client.PutObjectAsync(new PutObjectRequest()
    {
        FilePath = fileName,
        BucketName = testBucketName
    });

    Console.WriteLine($"\\tPress Enter to continue.");
    Console.ReadLine();

    Console.WriteLine(new string('-', 80));
}

/// <summary>
/// Create an Amazon Simple Notification Service (Amazon SNS) topic to use as an
EventBridge target.
/// </summary>
/// <returns>Async task.</returns>
private static async Task<string> CreateSnsTopic()
{
    Console.WriteLine(new string('-', 80));
    Console.WriteLine(
        "Creating an Amazon Simple Notification Service (Amazon SNS) topic for
email subscriptions.");

    var topicName = _configuration["topicName"];

```

```

        string topicPolicy = "{" +
            "\"Version\": \"2012-10-17\"," +
            "\"Statement\": [{" +
            "\"Sid\": \"EventBridgePublishTopic\"," +
            "\"Effect\": \"Allow\"," +
            "\"Principal\": {" +
            $"\"Service\": \"events.amazonaws.com\"" +
            "}," +
            "\"Resource\": \"*\"," +
            "\"Action\": \"sns:Publish\"" +
            "}]}" +
            "}";

        var topicAttributes = new Dictionary<string, string>()
        {
            { "Policy", topicPolicy }
        };

        var topicResponse = await _snsClient!.CreateTopicAsync(new
CreateTopicRequest()
        {
            Name = topicName,
            Attributes = topicAttributes
        });

        Console.WriteLine($"Added topic {topicName} for email subscriptions.");

        Console.WriteLine(new string('-', 80));

        return topicResponse.TopicArn;
    }

    /// <summary>
    /// Subscribe a user email to an SNS topic.
    /// </summary>
    /// <param name="topicArn">The ARN of the SNS topic.</param>
    /// <returns>The user's email.</returns>
    private static async Task<string> SubscribeToSnsTopic(string topicArn)
    {
        Console.WriteLine(new string('-', 80));
    }

```

```
string email = "";
while (string.IsNullOrEmpty(email))
{
    Console.WriteLine("Enter your email to subscribe to the Amazon SNS
topic:");
    email = Console.ReadLine()!;
}

var subscriptions = new List<string>();
var paginatedSubscriptions =
_snsClient!.Paginators.ListSubscriptionsByTopic(
    new ListSubscriptionsByTopicRequest()
    {
        TopicArn = topicArn
    });

// Get the entire list using the paginator.
await foreach (var subscription in paginatedSubscriptions.Subscriptions)
{
    subscriptions.Add(subscription.Endpoint);
}

if (subscriptions.Contains(email))
{
    Console.WriteLine($"\\tYour email is already subscribed.");
    Console.WriteLine(new string('-', 80));
    return email;
}

await _snsClient.SubscribeAsync(new SubscribeRequest()
{
    TopicArn = topicArn,
    Protocol = "email",
    Endpoint = email
});

Console.WriteLine($"Use the link in the email you received to confirm your
subscription, then press Enter to continue.");

Console.ReadLine();

Console.WriteLine(new string('-', 80));
return email;
}
```

```

    /// <summary>
    /// Add a rule which triggers when a file is uploaded to an S3 bucket.
    /// </summary>
    /// <param name="roleArn">The ARN of the role used by EventBridge.</param>
    /// <returns>Async task.</returns>
    private static async Task AddEventRule(string roleArn)
    {
        Console.WriteLine(new string('-', 80));
        Console.WriteLine("Creating an EventBridge event that sends an email when an
Amazon S3 object is created.");

        var eventRuleName = _configuration["eventRuleName"];
        var testBucketName = _configuration["testBucketName"];

        await _eventBridgeWrapper.PutS3UploadRule(roleArn, eventRuleName,
testBucketName);
        Console.WriteLine($"\\tAdded event rule {eventRuleName} for bucket
{testBucketName}.");

        Console.WriteLine(new string('-', 80));
    }

    /// <summary>
    /// Add an SNS target to the rule.
    /// </summary>
    /// <param name="topicArn">The ARN of the SNS topic.</param>
    /// <returns>Async task.</returns>
    private static async Task AddSnsTarget(string topicArn)
    {
        Console.WriteLine(new string('-', 80));
        Console.WriteLine("Adding a target to the rule to that sends an email when
the rule is triggered.");

        var eventRuleName = _configuration["eventRuleName"];
        var testBucketName = _configuration["testBucketName"];
        var topicName = _configuration["topicName"];
        await _eventBridgeWrapper.AddSnsTargetToRule(eventRuleName, topicArn);
        Console.WriteLine($"\\tAdded event rule {eventRuleName} with Amazon SNS
target {topicName} for bucket {testBucketName}.");

        Console.WriteLine(new string('-', 80));
    }

```

```

    /// <summary>
    /// List the event rules on the default event bus.
    /// </summary>
    /// <returns>Async task.</returns>
    private static async Task ListEventRules()
    {
        Console.WriteLine(new string('-', 80));
        Console.WriteLine("Current event rules:");

        var rules = await _eventBridgeWrapper.ListAllRulesForEventBus();
        rules.ForEach(r => Console.WriteLine($"{r.Name} Description:
{r.Description} State: {r.State}"));

        Console.WriteLine(new string('-', 80));
    }

    /// <summary>
    /// Update the event target to use a transform.
    /// </summary>
    /// <param name="topicArn">The SNS topic ARN target to update.</param>
    /// <returns>Async task.</returns>
    private static async Task UpdateSnsEventRule(string topicArn)
    {
        Console.WriteLine(new string('-', 80));
        Console.WriteLine("Let's update the event target with a transform.");

        var eventRuleName = _configuration["eventRuleName"];
        var testBucketName = _configuration["testBucketName"];

        await
_eventBridgeWrapper.UpdateS3UploadRuleTargetWithTransform(eventRuleName, topicArn);
        Console.WriteLine($"{eventRuleName} Updated event rule {eventRuleName} with Amazon SNS
target {topicArn} for bucket {testBucketName}.");

        Console.WriteLine(new string('-', 80));
    }

    /// <summary>
    /// Update the rule to use a custom event pattern.
    /// </summary>
    /// <returns>Async task.</returns>
    private static async Task UpdateToCustomRule(string topicArn)
    {
        Console.WriteLine(new string('-', 80));
    }

```



```

        Console.WriteLine("Updating the event pattern to be triggered by a custom
event instead.");

        var eventRuleName = _configuration["eventRuleName"];

        await _eventBridgeWrapper.UpdateCustomEventPattern(eventRuleName);

        Console.WriteLine($"\\tUpdated event rule {eventRuleName} to custom
pattern.");
        await _eventBridgeWrapper.UpdateCustomRuleTargetWithTransform(eventRuleName,
            topicArn);

        Console.WriteLine($"\\tUpdated event target {topicArn}.");

        Console.WriteLine(new string('-', 80));
    }

    /// <summary>
    /// Send rule events for a custom rule using the user's email address.
    /// </summary>
    /// <param name="email">The email address to include.</param>
    /// <returns>Async task.</returns>
    private static async Task TriggerCustomRule(string email)
    {
        Console.WriteLine(new string('-', 80));
        Console.WriteLine("Sending an event to trigger the rule. This will trigger a
subscription email.");

        await _eventBridgeWrapper.PutCustomEmailEvent(email);

        Console.WriteLine($"\\tEvents have been sent. Press Enter to continue.");
        Console.ReadLine();

        Console.WriteLine(new string('-', 80));
    }

    /// <summary>
    /// List all of the targets for a rule.
    /// </summary>
    /// <returns>Async task.</returns>
    private static async Task ListTargets()
    {
        Console.WriteLine(new string('-', 80));
        Console.WriteLine("List all of the targets for a particular rule.");
    }

```

```

        var eventRuleName = _configuration["eventRuleName"];
        var targets = await _eventBridgeWrapper.ListAllTargetsOnRule(eventRuleName);
        targets.ForEach(t => Console.WriteLine($"\\tTarget: {t.Arn} Id: {t.Id} Input:
{t.Input}"));

        Console.WriteLine(new string('-', 80));
    }

    /// <summary>
    /// List all of the rules for a particular target.
    /// </summary>
    /// <param name="topicArn">The ARN of the SNS topic.</param>
    /// <returns>Async task.</returns>
    private static async Task ListRulesForTarget(string topicArn)
    {
        Console.WriteLine(new string('-', 80));
        Console.WriteLine("List all of the rules for a particular target.");

        var rules = await _eventBridgeWrapper.ListAllRuleNamesByTarget(topicArn);
        rules.ForEach(r => Console.WriteLine($"\\tRule: {r}"));

        Console.WriteLine(new string('-', 80));
    }

    /// <summary>
    /// Enable or disable a particular rule.
    /// </summary>
    /// <param name="isEnabled">True to enable the rule, otherwise false.</param>
    /// <returns>Async task.</returns>
    private static async Task ChangeRuleState(bool isEnabled)
    {
        Console.WriteLine(new string('-', 80));
        var eventRuleName = _configuration["eventRuleName"];

        if (!isEnabled)
        {
            Console.WriteLine($"Disabling the rule: {eventRuleName}");
            await _eventBridgeWrapper.DisableRuleByName(eventRuleName);
        }
        else
        {
            Console.WriteLine($"Enabling the rule: {eventRuleName}");
            await _eventBridgeWrapper.EnableRuleByName(eventRuleName);
        }
    }

```

```

    }

    Console.WriteLine(new string('-', 80));
}

/// <summary>
/// Get the current state of the rule.
/// </summary>
/// <returns>Async task.</returns>
private static async Task GetRuleState()
{
    Console.WriteLine(new string('-', 80));
    var eventRuleName = _configuration["eventRuleName"];

    var state = await _eventBridgeWrapper.GetRuleStateByRuleName(eventRuleName);
    Console.WriteLine($"Rule {eventRuleName} is in current state {state}.");

    Console.WriteLine(new string('-', 80));
}

/// <summary>
/// Clean up the resources from the scenario.
/// </summary>
/// <param name="topicArn">The ARN of the SNS topic to clean up.</param>
/// <returns>Async task.</returns>
private static async Task CleanupResources(string topicArn)
{
    Console.WriteLine(new string('-', 80));
    Console.WriteLine($"Clean up resources.");

    var eventRuleName = _configuration["eventRuleName"];
    if (GetYesNoResponse($"\\tDelete all targets and event rule {eventRuleName}?
(y/n)"))
    {
        Console.WriteLine($"\\tRemoving all targets from the event rule.");
        await _eventBridgeWrapper.RemoveAllTargetsFromRule(eventRuleName);

        Console.WriteLine($"\\tDeleting event rule.");
        await _eventBridgeWrapper.DeleteRuleByName(eventRuleName);
    }

    var topicName = _configuration["topicName"];
    if (GetYesNoResponse($"\\tDelete Amazon SNS subscription topic {topicName}?
(y/n)"))

```

```

    {
        Console.WriteLine($"\\tDeleting topic.");
        await _snsClient!.DeleteTopicAsync(new DeleteTopicRequest()
        {
            TopicArn = topicArn
        });
    }

    var bucketName = _configuration["testBucketName"];
    if (GetYesNoResponse($"\\tDelete Amazon S3 bucket {bucketName}? (y/n)"))
    {
        Console.WriteLine($"\\tDeleting bucket.");
        // Delete all objects in the bucket.
        var deleteList = await _s3Client.ListObjectsV2Async(new
ListObjectsV2Request()
        {
            BucketName = bucketName
        });
        await _s3Client.DeleteObjectsAsync(new DeleteObjectsRequest()
        {
            BucketName = bucketName,
            Objects = deleteList.S3Objects
                .Select(o => new KeyVersion { Key = o.Key }).ToList()
        });
        // Now delete the bucket.
        await _s3Client.DeleteBucketAsync(new DeleteBucketRequest()
        {
            BucketName = bucketName
        });
    }

    var roleName = _configuration["roleName"];
    if (GetYesNoResponse($"\\tDelete role {roleName}? (y/n)"))
    {
        Console.WriteLine($"\\tDetaching policy and deleting role.");

        await _iamClient!.DetachRolePolicyAsync(new DetachRolePolicyRequest()
        {
            RoleName = roleName,
            PolicyArn = "arn:aws:iam::aws:policy/AmazonEventBridgeFullAccess",
        });

        await _iamClient!.DeleteRoleAsync(new DeleteRoleRequest()
        {

```

```

        RoleName = roleName
    });
}

Console.WriteLine(new string('-', 80));
}

/// <summary>
/// Helper method to get a yes or no response from the user.
/// </summary>
/// <param name="question">The question string to print on the console.</param>
/// <returns>True if the user responds with a yes.</returns>
private static bool GetYesNoResponse(string question)
{
    Console.WriteLine(question);
    var ynResponse = Console.ReadLine();
    var response = ynResponse != null &&
        ynResponse.Equals("y",
            StringComparison.InvariantCultureIgnoreCase);

    return response;
}
}

```

建立包裝 EventBridge 操作的類別。

```

/// <summary>
/// Wrapper for Amazon EventBridge operations.
/// </summary>
public class EventBridgeWrapper
{
    private readonly IAmazonEventBridge _amazonEventBridge;
    private readonly ILogger<EventBridgeWrapper> _logger;

    /// <summary>
    /// Constructor for the EventBridge wrapper.
    /// </summary>
    /// <param name="amazonEventBridge">The injected EventBridge client.</param>
    /// <param name="logger">The injected logger for the wrapper.</param>
    public EventBridgeWrapper(IAmazonEventBridge amazonEventBridge,
        ILogger<EventBridgeWrapper> logger)

```

```

{
    _amazonEventBridge = amazonEventBridge;
    _logger = logger;
}

/// <summary>
/// Get the state for a rule by the rule name.
/// </summary>
/// <param name="ruleName">The name of the rule.</param>
/// <param name="eventBusName">The optional name of the event bus. If empty,
uses the default event bus.</param>
/// <returns>The state of the rule.</returns>
public async Task<RuleState> GetRuleStateByRuleName(string ruleName, string?
eventBusName = null)
{
    var ruleResponse = await _amazonEventBridge.DescribeRuleAsync(
        new DescribeRuleRequest()
        {
            Name = ruleName,
            EventBusName = eventBusName
        });
    return ruleResponse.State;
}

/// <summary>
/// Enable a particular rule on an event bus.
/// </summary>
/// <param name="ruleName">The name of the rule.</param>
/// <returns>True if successful.</returns>
public async Task<bool> EnableRuleByName(string ruleName)
{
    var ruleResponse = await _amazonEventBridge.EnableRuleAsync(
        new EnableRuleRequest()
        {
            Name = ruleName
        });
    return ruleResponse.HttpStatusCode == HttpStatusCode.OK;
}

/// <summary>
/// Disable a particular rule on an event bus.
/// </summary>
/// <param name="ruleName">The name of the rule.</param>
/// <returns>True if successful.</returns>

```

```

public async Task<bool> DisableRuleByName(string ruleName)
{
    var ruleResponse = await _amazonEventBridge.DisableRuleAsync(
        new DisableRuleRequest()
        {
            Name = ruleName
        });
    return ruleResponse.HttpStatusCode == HttpStatusCode.OK;
}

/// <summary>
/// List the rules on an event bus.
/// </summary>
/// <param name="eventBusArn">The optional ARN of the event bus. If empty, uses
the default event bus.</param>
/// <returns>The list of rules.</returns>
public async Task<List<Rule>> ListAllRulesForEventBus(string? eventBusArn =
null)
{
    var results = new List<Rule>();
    var request = new ListRulesRequest()
    {
        EventBusName = eventBusArn
    };
    // Get all of the pages of rules.
    ListRulesResponse response;
    do
    {
        response = await _amazonEventBridge.ListRulesAsync(request);
        results.AddRange(response.Rules);
        request.NextToken = response.NextToken;

    } while (response.NextToken is not null);

    return results;
}

/// <summary>
/// List all of the targets matching a rule by name.
/// </summary>
/// <param name="ruleName">The name of the rule.</param>
/// <returns>The list of targets.</returns>
public async Task<List<Target>> ListAllTargetsOnRule(string ruleName)
{

```

```

        var results = new List<Target>();
        var request = new ListTargetsByRuleRequest()
        {
            Rule = ruleName
        };
        ListTargetsByRuleResponse response;
        do
        {
            response = await _amazonEventBridge.ListTargetsByRuleAsync(request);
            results.AddRange(response.Targets);
            request.NextToken = response.NextToken;

        } while (response.NextToken is not null);

        return results;
    }

    /// <summary>
    /// List names of all rules matching a target.
    /// </summary>
    /// <param name="targetArn">The ARN of the target.</param>
    /// <returns>The list of rule names.</returns>
    public async Task<List<string>> ListAllRuleNamesByTarget(string targetArn)
    {
        var results = new List<string>();
        var request = new ListRuleNamesByTargetRequest()
        {
            TargetArn = targetArn
        };
        ListRuleNamesByTargetResponse response;
        do
        {
            response = await _amazonEventBridge.ListRuleNamesByTargetAsync(request);
            results.AddRange(response.RuleNames);
            request.NextToken = response.NextToken;

        } while (response.NextToken is not null);

        return results;
    }

    /// <summary>
    /// Create a new event rule that triggers when an Amazon S3 object is created in
    a bucket.

```



```

    /// </summary>
    /// <param name="roleArn">The ARN of the role.</param>
    /// <param name="ruleName">The name to give the rule.</param>
    /// <param name="bucketName">The name of the bucket to trigger the event.</
param>
    /// <returns>The ARN of the new rule.</returns>
    public async Task<string> PutS3UploadRule(string roleArn, string ruleName,
string bucketName)
    {
        string eventPattern = "{" +
                                "\"source\": [\"aws.s3\"],\" +
                                "\"detail-type\": [\"Object Created\"],\" +
                                "\"detail\": {\" +
                                    "\"bucket\": {\" +
                                        \"name\": [\"" + bucketName + "\"]\" +
                                    }\" +
                                }\" +
                                "\"";

        var response = await _amazonEventBridge.PutRuleAsync(
            new PutRuleRequest()
            {
                Name = ruleName,
                Description = "Example S3 upload rule for EventBridge",
                RoleArn = roleArn,
                EventPattern = eventPattern
            });

        return response.RuleArn;
    }

    /// <summary>
    /// Update an Amazon S3 object created rule with a transform on the target.
    /// </summary>
    /// <param name="ruleName">The name of the rule.</param>
    /// <param name="targetArn">The ARN of the target.</param>
    /// <param name="eventBusArn">Optional event bus ARN. If empty, uses the default
event bus.</param>
    /// <returns>The ID of the target.</returns>
    public async Task<string> UpdateS3UploadRuleTargetWithTransform(string ruleName,
string targetArn, string? eventBusArn = null)
    {
        var targetID = Guid.NewGuid().ToString();

```

```

        var targets = new List<Target>
        {
            new Target()
            {
                Id = targetID,
                Arn = targetArn,
                InputTransformer = new InputTransformer()
                {
                    InputPathsMap = new Dictionary<string, string>()
                    {
                        {"bucket", "$.detail.bucket.name"},
                        {"time", "$.time"}
                    },
                    InputTemplate = "\"Notification: an object was uploaded to
bucket <bucket> at <time>.\\""
                }
            }
        };
        var response = await _amazonEventBridge.PutTargetsAsync(
            new PutTargetsRequest()
            {
                EventBusName = eventBusArn,
                Rule = ruleName,
                Targets = targets,
            });
        if (response.FailedEntryCount > 0)
        {
            response.FailedEntries.ForEach(e =>
            {
                _logger.LogError(
                    $"Failed to add target {e.TargetId}: {e.ErrorMessage}, code
{e.ErrorCode}");
            });
        }
        return targetID;
    }

    /// <summary>
    /// Update a custom rule with a transform on the target.
    /// </summary>
    /// <param name="ruleName">The name of the rule.</param>
    /// <param name="targetArn">The ARN of the target.</param>
    /// <param name="eventBusArn">Optional event bus ARN. If empty, uses the default
    event bus.</param>

```

```

    /// <returns>The ID of the target.</returns>
    public async Task<string> UpdateCustomRuleTargetWithTransform(string ruleName,
string targetArn, string? eventBusArn = null)
    {
        var targetID = Guid.NewGuid().ToString();

        var targets = new List<Target>
        {
            new Target()
            {
                Id = targetID,
                Arn = targetArn,
                InputTransformer = new InputTransformer()
                {
                    InputTemplate = "\"Notification: sample event was received.\""
                }
            }
        };
        var response = await _amazonEventBridge.PutTargetsAsync(
            new PutTargetsRequest()
            {
                EventBusName = eventBusArn,
                Rule = ruleName,
                Targets = targets,
            });
        if (response.FailedEntryCount > 0)
        {
            response.FailedEntries.ForEach(e =>
            {
                _logger.LogError(
                    $"Failed to add target {e.TargetId}: {e.ErrorMessage}, code
{e.ErrorCode}");
            });
        }
        return targetID;
    }

    /// <summary>
    /// Add an event to the event bus that includes an email, message, and time.
    /// </summary>
    /// <param name="email">The email to use in the event detail of the custom
event.</param>
    /// <returns>True if successful.</returns>
    public async Task<bool> PutCustomEmailEvent(string email)

```

```

{
    var eventDetail = new
    {
        UserEmail = email,
        Message = "This event was generated by example code.",
        UtcTime = DateTime.UtcNow.ToString("g")
    };
    var response = await _amazonEventBridge.PutEventsAsync(
        new PutEventsRequest()
        {
            Entries = new List<PutEventsRequestEntry>()
            {
                new PutEventsRequestEntry()
                {
                    Source = "ExampleSource",
                    Detail = JsonSerializer.Serialize(eventDetail),
                    DetailType = "ExampleType"
                }
            }
        });

    return response.FailedEntryCount == 0;
}

/// <summary>
/// Update a rule to use a custom defined event pattern.
/// </summary>
/// <param name="ruleName">The name of the rule to update.</param>
/// <returns>The ARN of the updated rule.</returns>
public async Task<string> UpdateCustomEventPattern(string ruleName)
{
    string customEventsPattern = "{" +
        "\"source\": [\"ExampleSource\"],\" +
        "\"detail-type\": [\"ExampleType\"]\" +
        "}";

    var response = await _amazonEventBridge.PutRuleAsync(
        new PutRuleRequest()
        {
            Name = ruleName,
            Description = "Custom test rule",
            EventPattern = customEventsPattern
        });
}

```

```

        return response.RuleArn;
    }

    /// <summary>
    /// Add an Amazon SNS target topic to a rule.
    /// </summary>
    /// <param name="ruleName">The name of the rule to update.</param>
    /// <param name="targetArn">The ARN of the Amazon SNS target.</param>
    /// <param name="eventBusArn">The optional event bus name, uses default if
empty.</param>
    /// <returns>The ID of the target.</returns>
    public async Task<string> AddSnsTargetToRule(string ruleName, string targetArn,
string? eventBusArn = null)
    {
        var targetID = Guid.NewGuid().ToString();

        // Create the list of targets and add a new target.
        var targets = new List<Target>
        {
            new Target()
            {
                Arn = targetArn,
                Id = targetID
            }
        };

        // Add the targets to the rule.
        var response = await _amazonEventBridge.PutTargetsAsync(
            new PutTargetsRequest()
            {
                EventBusName = eventBusArn,
                Rule = ruleName,
                Targets = targets,
            });

        if (response.FailedEntryCount > 0)
        {
            response.FailedEntries.ForEach(e =>
            {
                _logger.LogError(
                    $"Failed to add target {e.TargetId}: {e.ErrorMessage}, code
{e.ErrorCode}");
            });
        }
    }

```

```
        return targetID;
    }

    /// <summary>
    /// Delete an event rule by name.
    /// </summary>
    /// <param name="ruleName">The name of the event rule.</param>
    /// <returns>True if successful.</returns>
    public async Task<bool> RemoveAllTargetsFromRule(string ruleName)
    {
        var targetIds = new List<string>();
        var request = new ListTargetsByRuleRequest()
        {
            Rule = ruleName
        };
        ListTargetsByRuleResponse targetsResponse;
        do
        {
            targetsResponse = await
                _amazonEventBridge.ListTargetsByRuleAsync(request);
            targetIds.AddRange(targetsResponse.Targets.Select(t => t.Id));
            request.NextToken = targetsResponse.NextToken;
        } while (targetsResponse.NextToken is not null);

        var removeResponse = await _amazonEventBridge.RemoveTargetsAsync(
            new RemoveTargetsRequest()
            {
                Rule = ruleName,
                Ids = targetIds
            });

        if (removeResponse.FailedEntryCount > 0)
        {
            removeResponse.FailedEntries.ForEach(e =>
            {
                _logger.LogError(
                    $"Failed to remove target {e.TargetId}: {e.ErrorMessage}, code {e.ErrorCode}");
            });
        }

        return removeResponse.HttpStatusCode == HttpStatusCode.OK;
    }
}
```

```
}

/// <summary>
/// Delete an event rule by name.
/// </summary>
/// <param name="ruleName">The name of the event rule.</param>
/// <returns>True if successful.</returns>
public async Task<bool> DeleteRuleByName(string ruleName)
{
    var response = await _amazonEventBridge.DeleteRuleAsync(
        new DeleteRuleRequest()
        {
            Name = ruleName
        });

    return response.HttpStatusCode == HttpStatusCode.OK;
}
}
```

• 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的下列主題。

- [DeleteRule](#)
- [DescribeRule](#)
- [DisableRule](#)
- [EnableRule](#)
- [ListRuleNamesByTarget](#)
- [ListRules](#)
- [ListTargetsByRule](#)
- [PutEvents](#)
- [PutRule](#)
- [PutTargets](#)

動作

DeleteRule

以下程式碼範例顯示如何使用 DeleteRule。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

根據其名稱刪除規則。

```
/// <summary>
/// Delete an event rule by name.
/// </summary>
/// <param name="ruleName">The name of the event rule.</param>
/// <returns>True if successful.</returns>
public async Task<bool> DeleteRuleByName(string ruleName)
{
    var response = await _amazonEventBridge.DeleteRuleAsync(
        new DeleteRuleRequest()
        {
            Name = ruleName
        });

    return response.HttpStatusCode == HttpStatusCode.OK;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [DeleteRule](#)。

DescribeRule

以下程式碼範例顯示如何使用 DescribeRule。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

使用規則描述取得規則的狀態。

```
/// <summary>
/// Get the state for a rule by the rule name.
/// </summary>
/// <param name="ruleName">The name of the rule.</param>
/// <param name="eventBusName">The optional name of the event bus. If empty,
uses the default event bus.</param>
/// <returns>The state of the rule.</returns>
public async Task<RuleState> GetRuleStateByRuleName(string ruleName, string?
eventBusName = null)
{
    var ruleResponse = await _amazonEventBridge.DescribeRuleAsync(
        new DescribeRuleRequest()
        {
            Name = ruleName,
            EventBusName = eventBusName
        });
    return ruleResponse.State;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [DescribeRule](#)。

DisableRule

以下程式碼範例顯示如何使用 DisableRule。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

根據其規則名稱停用規則。

```
/// <summary>
/// Disable a particular rule on an event bus.
/// </summary>
```

```
/// <param name="ruleName">The name of the rule.</param>
/// <returns>True if successful.</returns>
public async Task<bool> DisableRuleByName(string ruleName)
{
    var ruleResponse = await _amazonEventBridge.DisableRuleAsync(
        new DisableRuleRequest()
        {
            Name = ruleName
        });
    return ruleResponse.HttpStatusCode == HttpStatusCode.OK;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [DisableRule](#)。

EnableRule

以下程式碼範例顯示如何使用 EnableRule。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

根據其規則名稱啟用規則。

```
/// <summary>
/// Enable a particular rule on an event bus.
/// </summary>
/// <param name="ruleName">The name of the rule.</param>
/// <returns>True if successful.</returns>
public async Task<bool> EnableRuleByName(string ruleName)
{
    var ruleResponse = await _amazonEventBridge.EnableRuleAsync(
        new EnableRuleRequest()
        {
            Name = ruleName
        });
    return ruleResponse.HttpStatusCode == HttpStatusCode.OK;
}
```

```
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [EnableRule](#)。

ListRuleNamesByTarget

以下程式碼範例顯示如何使用 ListRuleNamesByTarget。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

列出使用目標的所有規則名稱。

```
/// <summary>
/// List names of all rules matching a target.
/// </summary>
/// <param name="targetArn">The ARN of the target.</param>
/// <returns>The list of rule names.</returns>
public async Task<List<string>> ListAllRuleNamesByTarget(string targetArn)
{
    var results = new List<string>();
    var request = new ListRuleNamesByTargetRequest()
    {
        TargetArn = targetArn
    };
    ListRuleNamesByTargetResponse response;
    do
    {
        response = await _amazonEventBridge.ListRuleNamesByTargetAsync(request);
        results.AddRange(response.RuleNames);
        request.NextToken = response.NextToken;
    } while (response.NextToken is not null);

    return results;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [ListRuleNamesByTarget](#)。

ListRules

以下程式碼範例顯示如何使用 ListRules。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

列出事件匯流排的所有規則。

```
/// <summary>
/// List the rules on an event bus.
/// </summary>
/// <param name="eventBusArn">The optional ARN of the event bus. If empty, uses
the default event bus.</param>
/// <returns>The list of rules.</returns>
public async Task<List<Rule>> ListAllRulesForEventBus(string? eventBusArn =
null)
{
    var results = new List<Rule>();
    var request = new ListRulesRequest()
    {
        EventBusName = eventBusArn
    };
    // Get all of the pages of rules.
    ListRulesResponse response;
    do
    {
        response = await _amazonEventBridge.ListRulesAsync(request);
        results.AddRange(response.Rules);
        request.NextToken = response.NextToken;
    } while (response.NextToken is not null);
```

```
        return results;
    }
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [ListRules](#)。

ListTargetsByRule

以下程式碼範例顯示如何使用 ListTargetsByRule。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

使用規則名稱列出規則的所有目標。

```
/// <summary>
/// List all of the targets matching a rule by name.
/// </summary>
/// <param name="ruleName">The name of the rule.</param>
/// <returns>The list of targets.</returns>
public async Task<List<Target>> ListAllTargetsOnRule(string ruleName)
{
    var results = new List<Target>();
    var request = new ListTargetsByRuleRequest()
    {
        Rule = ruleName
    };
    ListTargetsByRuleResponse response;
    do
    {
        response = await _amazonEventBridge.ListTargetsByRuleAsync(request);
        results.AddRange(response.Targets);
        request.NextToken = response.NextToken;
    } while (response.NextToken is not null);
}
```

```
        return results;
    }
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [ListTargetsByRule](#)。

PutEvents

以下程式碼範例顯示如何使用 PutEvents。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

傳送符合規則之自訂模式的事件。

```
/// <summary>
/// Add an event to the event bus that includes an email, message, and time.
/// </summary>
/// <param name="email">The email to use in the event detail of the custom
event.</param>
/// <returns>True if successful.</returns>
public async Task<bool> PutCustomEmailEvent(string email)
{
    var eventDetail = new
    {
        UserEmail = email,
        Message = "This event was generated by example code.",
        UtcTime = DateTime.UtcNow.ToString("g")
    };
    var response = await _amazonEventBridge.PutEventsAsync(
        new PutEventsRequest()
        {
            Entries = new List<PutEventsRequestEntry>()
            {
                new PutEventsRequestEntry()
                {
                    Source = "ExampleSource",
```

```

        Detail = JsonSerializer.Serialize(eventDetail),
        DetailType = "ExampleType"
    }
}
});

return response.FailedEntryCount == 0;
}

```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [PutEvents](#)。

PutRule

以下程式碼範例顯示如何使用 PutRule。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

建立在物件新增至 Amazon Simple Storage Service 儲存貯體時觸發的規則。

```

/// <summary>
/// Create a new event rule that triggers when an Amazon S3 object is created in
a bucket.
/// </summary>
/// <param name="roleArn">The ARN of the role.</param>
/// <param name="ruleName">The name to give the rule.</param>
/// <param name="bucketName">The name of the bucket to trigger the event.</
param>
/// <returns>The ARN of the new rule.</returns>
public async Task<string> PutS3UploadRule(string roleArn, string ruleName,
string bucketName)
{
    string eventPattern = "{" +
        "\"source\": [\"aws.s3\"],\" +
        "\"detail-type\": [\"Object Created\"],\" +
        "\"detail\": {" +

```

```

        "\"bucket\": {" +
            "\"name\": [" + bucketName + "]" +
        "}" +
    "}" +
    "};

var response = await _amazonEventBridge.PutRuleAsync(
    new PutRuleRequest()
    {
        Name = ruleName,
        Description = "Example S3 upload rule for EventBridge",
        RoleArn = roleArn,
        EventPattern = eventPattern
    });

return response.RuleArn;
}

```

建立使用自訂模式的規則。

```

/// <summary>
/// Update a rule to use a custom defined event pattern.
/// </summary>
/// <param name="ruleName">The name of the rule to update.</param>
/// <returns>The ARN of the updated rule.</returns>
public async Task<string> UpdateCustomEventPattern(string ruleName)
{
    string customEventsPattern = "{" +
        "\"source\": [\"ExampleSource\"],\" +
        "\"detail-type\": [\"ExampleType\"]\" +
        "};

    var response = await _amazonEventBridge.PutRuleAsync(
        new PutRuleRequest()
        {
            Name = ruleName,
            Description = "Custom test rule",
            EventPattern = customEventsPattern
        });

    return response.RuleArn;
}

```


- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [PutRule](#)。

PutTargets

以下程式碼範例顯示如何使用 PutTargets。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

新增作為某個規則目標的 Amazon SNS 主題。

```
/// <summary>
/// Add an Amazon SNS target topic to a rule.
/// </summary>
/// <param name="ruleName">The name of the rule to update.</param>
/// <param name="targetArn">The ARN of the Amazon SNS target.</param>
/// <param name="eventBusArn">The optional event bus name, uses default if
empty.</param>
/// <returns>The ID of the target.</returns>
public async Task<string> AddSnsTargetToRule(string ruleName, string targetArn,
string? eventBusArn = null)
{
    var targetID = Guid.NewGuid().ToString();

    // Create the list of targets and add a new target.
    var targets = new List<Target>
    {
        new Target()
        {
            Arn = targetArn,
            Id = targetID
        }
    };

    // Add the targets to the rule.
```

```

        var response = await _amazonEventBridge.PutTargetsAsync(
            new PutTargetsRequest()
            {
                EventBusName = eventBusArn,
                Rule = ruleName,
                Targets = targets,
            });

        if (response.FailedEntryCount > 0)
        {
            response.FailedEntries.ForEach(e =>
            {
                _logger.LogError(
                    $"Failed to add target {e.TargetId}: {e.ErrorMessage}, code {e.ErrorCode}");
            });
        }

        return targetID;
    }

```

將輸入轉換器新增至某個規則的目標。

```

    /// <summary>
    /// Update an Amazon S3 object created rule with a transform on the target.
    /// </summary>
    /// <param name="ruleName">The name of the rule.</param>
    /// <param name="targetArn">The ARN of the target.</param>
    /// <param name="eventBusArn">Optional event bus ARN. If empty, uses the default
    event bus.</param>
    /// <returns>The ID of the target.</returns>
    public async Task<string> UpdateS3UploadRuleTargetWithTransform(string ruleName,
        string targetArn, string? eventBusArn = null)
    {
        var targetID = Guid.NewGuid().ToString();

        var targets = new List<Target>
        {
            new Target()
            {
                Id = targetID,
                Arn = targetArn,
            }
        }
    }

```

```

        InputTransformer = new InputTransformer()
        {
            InputPathsMap = new Dictionary<string, string>()
            {
                {"bucket", "$.detail.bucket.name"},
                {"time", "$.time"}
            },
            InputTemplate = "\"Notification: an object was uploaded to
bucket <bucket> at <time>.\\""
        }
    };
    var response = await _amazonEventBridge.PutTargetsAsync(
        new PutTargetsRequest()
        {
            EventBusName = eventBusArn,
            Rule = ruleName,
            Targets = targets,
        });
    if (response.FailedEntryCount > 0)
    {
        response.FailedEntries.ForEach(e =>
        {
            _logger.LogError(
                $"Failed to add target {e.TargetId}: {e.ErrorMessage}, code
{e.ErrorCode}");
        });
    }
    return targetID;
}

```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [PutTargets](#)。

RemoveTargets

以下程式碼範例顯示如何使用 RemoveTargets。

適用於 .NET 的 SDK

 Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

使用規則名稱移除規則的所有目標。

```
/// <summary>
/// Delete an event rule by name.
/// </summary>
/// <param name="ruleName">The name of the event rule.</param>
/// <returns>True if successful.</returns>
public async Task<bool> RemoveAllTargetsFromRule(string ruleName)
{
    var targetIds = new List<string>();
    var request = new ListTargetsByRuleRequest()
    {
        Rule = ruleName
    };
    ListTargetsByRuleResponse targetsResponse;
    do
    {
        targetsResponse = await
            _amazonEventBridge.ListTargetsByRuleAsync(request);
        targetIds.AddRange(targetsResponse.Targets.Select(t => t.Id));
        request.NextToken = targetsResponse.NextToken;
    } while (targetsResponse.NextToken is not null);

    var removeResponse = await _amazonEventBridge.RemoveTargetsAsync(
        new RemoveTargetsRequest()
        {
            Rule = ruleName,
            Ids = targetIds
        });

    if (removeResponse.FailedEntryCount > 0)
    {
        removeResponse.FailedEntries.ForEach(e =>
        {
```

```
        _logger.LogError(  
            $"Failed to remove target {e.TargetId}: {e.ErrorMessage}, code  
            {e.ErrorCode}");  
        });  
    }  
  
    return removeResponse.HttpStatusCode == HttpStatusCode.OK;  
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [RemoveTargets](#)。

使用的 EventBridge 排程器範例 適用於 .NET 的 SDK

下列程式碼範例示範如何使用 適用於 .NET 的 AWS SDK 搭配 EventBridge 排程器來執行動作和實作常見案例。

Actions 是大型程式的程式碼摘錄，必須在內容中執行。雖然動作會告訴您如何呼叫個別服務函數，但您可以在其相關情境中查看內容中的動作。

案例是向您展示如何呼叫服務中的多個函數或與其他 AWS 服務組合來完成特定任務的程式碼範例。

每個範例均包含完整原始碼的連結，您可在連結中找到如何設定和執行內容中程式碼的相關指示。

主題

- [開始使用](#)
- [動作](#)
- [案例](#)

開始使用

Hello EventBridge 排程器

下列程式碼範例示範如何使用 EventBridge 排程器。

適用於 .NET 的 SDK

 Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
public static class HelloScheduler
{
    static async Task Main(string[] args)
    {
        // Use the AWS .NET Core Setup package to set up dependency injection for
        the EventBridge Scheduler service.
        // Use your AWS profile name, or leave it blank to use the default profile.
        using var host = Host.CreateDefaultBuilder(args)
            .ConfigureServices((_, services) =>
                services.AddAWSService<IAmazonScheduler>()
            ).Build();

        // Now the client is available for injection.
        var schedulerClient = host.Services.GetRequiredService<IAmazonScheduler>();

        // You can use await and any of the async methods to get a response, or a
        paginator to list schedules or groups.
        var results = new List<ScheduleSummary>();
        var paginateSchedules = schedulerClient.Paginators.ListSchedules(
            new ListSchedulesRequest());
        Console.WriteLine(
            $"Hello AWS Scheduler! Let's list schedules in your account.");
        // Get the entire list using the paginator.
        await foreach (var schedule in paginateSchedules.Schedules)
        {
            results.Add(schedule);
        }
        Console.WriteLine($"\\tTotal of {results.Count} schedule(s) available.");
        results.ForEach(s => Console.WriteLine($"\\tSchedule: {s.Name}"));
    }
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [ListSchedules](#)。

動作

CreateSchedule

以下程式碼範例顯示如何使用 CreateSchedule。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Creates a new schedule in Amazon EventBridge Scheduler.
/// </summary>
/// <param name="name">The name of the schedule.</param>
/// <param name="scheduleExpression">The schedule expression that defines when
the schedule should run.</param>
/// <param name="scheduleGroupName">The name of the schedule group to which the
schedule should be added.</param>
/// <param name="deleteAfterCompletion">Indicates whether to delete the schedule
after completion.</param>
/// <param name="useFlexibleTimeWindow">Indicates whether to use a flexible time
window for the schedule.</param>
/// <param name="targetArn">ARN of the event target.</param>
/// <param name="roleArn">Execution Role ARN.</param>
/// <returns>True if the schedule was created successfully, false otherwise.</
returns>
public async Task<bool> CreateScheduleAsync(
    string name,
    string scheduleExpression,
    string scheduleGroupName,
    string targetArn,
    string roleArn,
    string input,
    bool deleteAfterCompletion = false,
    bool useFlexibleTimeWindow = false)
{
    try
    {
```

```

        int hoursToRun = 1;
        int flexibleTimeWindowMinutes = 10;

        var request = new CreateScheduleRequest
        {
            Name = name,
            ScheduleExpression = scheduleExpression,
            GroupName = scheduleGroupName,
            Target = new Target { Arn = targetArn, RoleArn = roleArn, Input =
input },
            ActionAfterCompletion = deleteAfterCompletion
                ? ActionAfterCompletion.DELETE
                : ActionAfterCompletion.NONE,
            StartDate = DateTime.UtcNow, // Ignored for one-time schedules.
            EndDate =
                DateTime.UtcNow
                    .AddHours(hoursToRun) // Ignored for one-time schedules.
        };
        // Allow a flexible time window if the caller specifies it.
        request.FlexibleTimeWindow = new FlexibleTimeWindow
        {
            Mode = useFlexibleTimeWindow
                ? FlexibleTimeWindowMode.FLEXIBLE
                : FlexibleTimeWindowMode.OFF,
            MaximumWindowInMinutes = useFlexibleTimeWindow
                ? flexibleTimeWindowMinutes
                : null
        };

        var response = await _amazonScheduler.CreateScheduleAsync(request);

        Console.WriteLine($"Successfully created schedule '{name}' " +
            $"in schedule group '{scheduleGroupName}':
{response.ScheduleArn}.");
        return true;
    }
    catch (ConflictException ex)
    {
        // If the name is not unique, a ConflictException will be thrown.
        _logger.LogError($"Failed to create schedule '{name}' due to a conflict.
{ex.Message}");
        return false;
    }
    catch (Exception ex)

```



```

        {
            _logger.LogError($"An error occurred while creating schedule '{name}' "
+
                                $"in schedule group '{scheduleGroupName}':
{ex.Message}");
            return false;
        }
    }
}

```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [CreateSchedule](#)。

CreateScheduleGroup

以下程式碼範例顯示如何使用 CreateScheduleGroup。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```

/// <summary>
/// Creates a new schedule group in Amazon EventBridge Scheduler.
/// </summary>
/// <param name="name">The name of the schedule group.</param>
/// <returns>True if the schedule group was created successfully, false
otherwise.</returns>
public async Task<bool> CreateScheduleGroupAsync(string name)
{
    try
    {
        var request = new CreateScheduleGroupRequest { Name = name };

        var response = await _amazonScheduler.CreateScheduleGroupAsync(request);

        Console.WriteLine($"Successfully created schedule group '{name}':
{response.ScheduleGroupArn}.");
        return true;
    }
}

```

```

    }
    catch (ConflictException ex)
    {
        // If the name is not unique, a ConflictException will be thrown.
        _logger.LogError($"Failed to create schedule group '{name}' due to a
conflict. {ex.Message}");
        return false;
    }
    catch (Exception ex)
    {
        _logger.LogError(
            $"An error occurred while creating schedule group '{name}':
{ex.Message}");
        return false;
    }
}

```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [CreateScheduleGroup](#)。

DeleteSchedule

以下程式碼範例顯示如何使用 DeleteSchedule。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```

/// <summary>
/// Deletes an existing schedule from Amazon EventBridge Scheduler.
/// </summary>
/// <param name="name">The name of the schedule to delete.</param>
/// <param name="groupName">The group name of the schedule to delete.</param>
/// <returns>True if the schedule was deleted successfully, false otherwise.</
returns>
public async Task<bool> DeleteScheduleAsync(string name, string groupName)

```

```
{
    try
    {
        var request = new DeleteScheduleRequest
        {
            Name = name,
            GroupName = groupName
        };

        await _amazonScheduler.DeleteScheduleAsync(request);

        Console.WriteLine($"Successfully deleted schedule with name '{name}'.");
        return true;
    }
    catch (ResourceNotFoundException ex)
    {
        _logger.LogError(
            $"Failed to delete schedule with ID '{name}' because the resource was not found: {ex.Message}");
        return true;
    }
    catch (Exception ex)
    {
        _logger.LogError(
            $"An error occurred while deleting schedule with ID '{name}': {ex.Message}");
        return false;
    }
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [DeleteSchedule](#)。

DeleteScheduleGroup

以下程式碼範例顯示如何使用 DeleteScheduleGroup。

適用於 .NET 的 SDK

 Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Deletes an existing schedule group from Amazon EventBridge Scheduler.
/// </summary>
/// <param name="name">The name of the schedule group to delete.</param>
/// <returns>True if the schedule group was deleted successfully, false
otherwise.</returns>
public async Task<bool> DeleteScheduleGroupAsync(string name)
{
    try
    {
        var request = new DeleteScheduleGroupRequest { Name = name };

        await _amazonScheduler.DeleteScheduleGroupAsync(request);

        Console.WriteLine($"Successfully deleted schedule group '{name}'.");
        return true;
    }
    catch (ResourceNotFoundException ex)
    {
        _logger.LogError(
            $"Failed to delete schedule group '{name}' because the resource was
not found: {ex.Message}");
        return true;
    }
    catch (Exception ex)
    {
        _logger.LogError(
            $"An error occurred while deleting schedule group '{name}':
{ex.Message}");
        return false;
    }
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [DeleteScheduleGroup](#)。

案例

排程事件

以下程式碼範例顯示做法：

- 部署具有所需資源的 CloudFormation 堆疊。
- 建立 EventBridge 排程器排程群組。
- 建立具有彈性時段的一次性 EventBridge 排程器排程。
- 建立具有指定速率的週期性 EventBridge 排程器排程。
- 刪除 EventBridge 排程器排程和排程群組。
- 清除資源及刪除堆疊。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

執行案例。

```
using System.Text.RegularExpressions;
using Amazon.CloudFormation;
using Amazon.CloudFormation.Model;
using Amazon.Scheduler;
using Amazon.Scheduler.Model;
using Microsoft.Extensions.DependencyInjection;
using Microsoft.Extensions.Hosting;
using Microsoft.Extensions.Logging;
using Microsoft.Extensions.Logging.Console;
using Microsoft.Extensions.Logging.Debug;
using SchedulerActions;
using Exception = System.Exception;
```

```

namespace SchedulerScenario;

public class SchedulerWorkflow
{
    /*
        Before running this .NET code example, set up your development environment,
        including your credentials.

        This .NET code example performs the following tasks for the Amazon EventBridge
        Scheduler workflow:

        1. Prepare the Application:
            - Prompt the user for an email address to use for the subscription for the
            SNS topic subscription.
            - Prompt the user for a name for the Cloud Formation stack.
            - Deploy the Cloud Formation template in resources/cfn_template.yaml for
            resource creation.
            - Store the outputs of the stack into variables for use in the scenario.
            - Create a schedule group for all schedules.

        2. Create one-time Schedule:
            - Create a one-time schedule to send an initial event.
            - Use a Flexible Time Window and set the schedule to delete after completion.
            - Wait for the user to receive the event email from SNS.

        3. Create a time-based schedule:
            - Prompt the user for how many X times per Y hours a recurring event should
            be scheduled.
            - Create the scheduled event for X times per hour for Y hours.
            - Wait for the user to receive the event email from SNS.
            - Delete the schedule when the user is finished.

        4. Clean up:
            - Prompt the user for y/n answer if they want to destroy the stack and clean
            up all resources.
            - Delete the schedule group.
            - Destroy the Cloud Formation stack and wait until the stack has been
            removed.
    */

    public static ILogger<SchedulerWorkflow> _logger = null!;
    public static SchedulerWrapper _schedulerWrapper = null!;
    public static IAmazonCloudFormation _amazonCloudFormation = null!;

    private static string _roleArn = null!;

```

```

private static string _snsTopicArn = null!;

public static bool _interactive = true;
private static string _stackName = "default-scheduler-scenario-stack-name";
private static string _scheduleGroupName = "scenario-schedules-group";
private static string _stackResourcePath = "../..../..../scenarios/
features/eventbridge_scheduler/resources/cfn_template.yaml";

public static async Task Main(string[] args)
{
    using var host = Host.CreateDefaultBuilder(args)
        .ConfigureLogging(logging =>
            logging.AddFilter("System", LogLevel.Debug)
                .AddFilter<DebugLoggerProvider>("Microsoft",
LogLevel.Information)
                .AddFilter<ConsoleLoggerProvider>("Microsoft", LogLevel.Trace))
        .ConfigureServices((_, services) =>
            services.AddAWSService<IAmazonScheduler>()
                .AddAWSService<IAmazonCloudFormation>()
                .AddTransient<SchedulerWrapper>()
            )
        .Build();

    if (_interactive)
    {
        _logger = LoggerFactory.Create(builder => { builder.AddConsole(); })
            .CreateLogger<SchedulerWorkflow>();

        _schedulerWrapper =
host.Services.GetRequiredService<SchedulerWrapper>();
        _amazonCloudFormation =
host.Services.GetRequiredService<IAmazonCloudFormation>();
    }

    Console.WriteLine(new string('-', 80));
    Console.WriteLine("Welcome to the Amazon EventBridge Scheduler Scenario.");
    Console.WriteLine(new string('-', 80));

    try
    {
        Console.WriteLine(new string('-', 80));
        var prepareSuccess = await PrepareApplication();
        Console.WriteLine(new string('-', 80));
    }
}

```

```

        if (prepareSuccess)
        {
            Console.WriteLine(new string('-', 80));
            await CreateOneTimeSchedule();
            Console.WriteLine(new string('-', 80));

            Console.WriteLine(new string('-', 80));
            await CreateRecurringSchedule();
            Console.WriteLine(new string('-', 80));
        }

        Console.WriteLine(new string('-', 80));
        await Cleanup();
        Console.WriteLine(new string('-', 80));
    }
    catch (Exception ex)
    {
        _logger.LogError(ex, "There was a problem with the scenario, initiating cleanup...");
        _interactive = false;
        await Cleanup();
    }

    Console.WriteLine("Amazon EventBridge Scheduler scenario completed.");
}

/// <summary>
/// Prepares the application by creating the necessary resources.
/// </summary>
/// <returns>True if the application was prepared successfully.</returns>
public static async Task<bool> PrepareApplication()
{
    Console.WriteLine("Preparing the application...");
    try
    {
        // Prompt the user for an email address to use for the subscription.
        Console.WriteLine("\nThis example creates resources in a CloudFormation
stack, including an SNS topic" +
            "\nthat will be subscribed to the EventBridge Scheduler
events. " +
            "\n\nYou will need to confirm the subscription in order to
receive event emails. ");

        var emailAddress = PromptUserForEmail();
    }
    catch (Exception ex)
    {
        _logger.LogError(ex, "There was a problem with the scenario, initiating cleanup...");
        _interactive = false;
        await Cleanup();
    }
}

```



```

        // Prompt the user for a name for the CloudFormation stack
        _stackName = PromptUserForStackName();

        // Deploy the CloudFormation stack
        var deploySuccess = await DeployCloudFormationStack(_stackName,
emailAddress);

        if (deploySuccess)
        {
            // Create a schedule group for all schedules
            await
_schedulerWrapper.CreateScheduleGroupAsync(_scheduleGroupName);

            Console.WriteLine("Application preparation complete.");
            return true;
        }
        catch (Exception ex)
        {
            _logger.LogError(ex, "An error occurred while preparing the
application.");
        }
        Console.WriteLine("Application preparation failed.");
        return false;
    }

    /// <summary>
    /// Deploys the CloudFormation stack with the necessary resources.
    /// </summary>
    /// <param name="stackName">The name of the CloudFormation stack.</param>
    /// <param name="email">The email to use for the subscription.</param>
    /// <returns>True if the stack was deployed successfully.</returns>
    private static async Task<bool> DeployCloudFormationStack(string stackName,
string email)
    {
        Console.WriteLine($"\\nDeploying CloudFormation stack: {stackName}");

        try
        {
            var request = new CreateStackRequest
            {
                StackName = stackName,
                TemplateBody = await File.ReadAllTextAsync(_stackResourcePath),

```

```
        Capabilities = { Capability.CAPABILITY_NAMED_IAM }
    };

    // If an email is provided, set the parameter.
    if (!string.IsNullOrEmpty(email))
    {
        request.Parameters = new List<Parameter>()
        {
            new() { ParameterKey = "email", ParameterValue = email }
        };
    }

    var response = await _amazonCloudFormation.CreateStackAsync(request);

    if (response.HttpStatusCode == System.Net.HttpStatusCode.OK)
    {
        Console.WriteLine($"CloudFormation stack creation started:
{stackName}");

        // Wait for the stack to be in CREATE_COMPLETE state
        bool stackCreated = await WaitForStackCompletion(response.StackId);

        if (stackCreated)
        {
            // Retrieve the output values
            var success = await GetStackOutputs(response.StackId);
            return success;
        }
        else
        {
            _logger.LogError($"CloudFormation stack creation failed:
{stackName}");
            return false;
        }
    }
    else
    {
        _logger.LogError($"Failed to create CloudFormation stack:
{stackName}");
        return false;
    }
}
catch (AlreadyExistsException)
{

```

```

        _logger.LogWarning($"CloudFormation stack '{stackName}' already exists.
Please provide a unique name.");
        var newStackName = PromptUserForStackName();
        return await DeployCloudFormationStack(newStackName, email);
    }
    catch (Exception ex)
    {
        _logger.LogError(ex, $"An error occurred while deploying the
CloudFormation stack: {stackName}");
        return false;
    }
}

/// <summary>
/// Waits for the CloudFormation stack to be in the CREATE_COMPLETE state.
/// </summary>
/// <param name="client">The CloudFormation client.</param>
/// <param name="stackId">The ID of the CloudFormation stack.</param>
/// <returns>True if the stack was created successfully.</returns>
private static async Task<bool> WaitForStackCompletion(string stackId)
{
    int retryCount = 0;
    const int maxRetries = 10;
    const int retryDelay = 30000; // 30 seconds.

    while (retryCount < maxRetries)
    {
        var describeStacksRequest = new DescribeStacksRequest
        {
            StackName = stackId
        };

        var describeStacksResponse = await
_amazonCloudFormation.DescribeStacksAsync(describeStacksRequest);

        if (describeStacksResponse.Stacks.Count > 0)
        {
            if (describeStacksResponse.Stacks[0].StackStatus ==
StackStatus.CREATE_COMPLETE)
            {
                Console.WriteLine("CloudFormation stack creation complete.");
                return true;
            }
        }
    }
}

```

```

        if (describeStacksResponse.Stacks[0].StackStatus ==
StackStatus.CREATE_FAILED ||
            describeStacksResponse.Stacks[0].StackStatus ==
StackStatus.ROLLBACK_COMPLETE)
        {
            Console.WriteLine("CloudFormation stack creation failed.");
            return false;
        }

        Console.WriteLine("Waiting for CloudFormation stack creation to
complete...");
        await Task.Delay(retryDelay);
        retryCount++;
    }

    _logger.LogError("Timed out waiting for CloudFormation stack creation to
complete.");
    return false;
}

/// <summary>
/// Retrieves the output values from the CloudFormation stack.
/// </summary>
/// <param name="stackId">The ID of the CloudFormation stack.</param>
private static async Task<bool> GetStackOutputs(string stackId)
{
    try
    {
        var describeStacksRequest = new DescribeStacksRequest { StackName =
stackId };

        var describeStacksResponse =
            await
_amazonCloudFormation.DescribeStacksAsync(describeStacksRequest);

        if (describeStacksResponse.Stacks.Count > 0)
        {
            var stack = describeStacksResponse.Stacks[0];
            _roleArn = GetStackOutputValue(stack, "RoleARN");
            _snsTopicArn = GetStackOutputValue(stack, "SNSStopicARN");
            return true;
        }
        else

```

```

        {
            _logger.LogError($"No stack found for stack outputs: {stackId}");
            return false;
        }
    }
    catch (Exception ex)
    {
        _logger.LogError(
            ex, $"Failed to retrieve CloudFormation stack outputs: {stackId}");
        return false;
    }
}

/// <summary>
/// Get an output value by key from a CloudFormation stack.
/// </summary>
/// <param name="stack">The CloudFormation stack.</param>
/// <param name="outputKey">The key of the output.</param>
/// <returns>The value as a string.</returns>
private static string GetStackOutputValue(Stack stack, string outputKey)
{
    var output = stack.Outputs.First(o => o.OutputKey == outputKey);
    var outputValue = output.OutputValue;
    Console.WriteLine($"Stack output {outputKey}: {outputValue}");
    return outputValue;
}

/// <summary>
/// Creates a one-time schedule to send an initial event.
/// </summary>
/// <returns>True if the one-time schedule was created successfully.</returns>
public static async Task<bool> CreateOneTimeSchedule()
{
    var scheduleName =
        PromptUserForResourceName("Enter a name for the one-time schedule:");

    Console.WriteLine($"Creating a one-time schedule named '{scheduleName}' " +
        $"\\nto send an initial event in 1 minute with a flexible
time window...");
    try
    {
        // Create a one-time schedule with a flexible time
        // window set to delete after completion.
        // You may also set a timezone instead of using UTC.
    }
}

```

```

        var scheduledTime = DateTime.UtcNow.AddMinutes(1).ToString("s");

        var createSuccess = await _schedulerWrapper.CreateScheduleAsync(
            scheduleName,
            $"at({scheduledTime})",
            _scheduleGroupName,
            _snsTopicArn,
            _roleArn,
            $"One time scheduled event test from schedule {scheduleName}.",
            true,
            useFlexibleTimeWindow: true);

        Console.WriteLine($"Subscription email will receive an email from this
event.");
        Console.WriteLine($"You must confirm your subscription to receive event
emails.");

        Console.WriteLine($"One-time schedule '{scheduleName}' created
successfully.");
        return createSuccess;
    }
    catch (ResourceNotFoundException ex)
    {
        _logger.LogError(ex, $"The target with ARN '{_snsTopicArn}' was not
found.");
        return false;
    }
    catch (Exception ex)
    {
        _logger.LogError(ex, $"An error occurred while creating the one-time
schedule '{scheduleName}'.");
        return false;
    }
}

/// <summary>
/// Create a recurring schedule to send events at a specified rate in minutes.
/// </summary>
/// <returns>True if the recurring schedule was created successfully.</returns>
public static async Task<bool> CreateRecurringSchedule()
{
    Console.WriteLine("Creating a recurring schedule to send events for one
hour...");

```

```

    try
    {
        // Prompt the user for a schedule name.
        var scheduleName =
            PromptUserForResourceName("Enter a name for the recurring schedule:
");

        // Prompt the user for the schedule rate (in minutes).
        var scheduleRateInMinutes =
            PromptUserForInteger("Enter the desired schedule rate (in minutes):
");

        // Create the recurring schedule.
        var createSuccess = await _schedulerWrapper.CreateScheduleAsync(
            scheduleName,
            $"rate({scheduleRateInMinutes} minutes)",
            _scheduleGroupName,
            _snsTopicArn,
            _roleArn,
            $"Recurrent event test from schedule {scheduleName}.");

        Console.WriteLine($"Subscription email will receive an email from this
event.");
        Console.WriteLine($"You must confirm your subscription to receive event
emails.");

        // Delete the schedule when the user is finished.
        if (!_interactive || GetYesNoResponse($"Are you ready to delete the
'{scheduleName}' schedule? (y/n)"))
        {
            await _schedulerWrapper.DeleteScheduleAsync(scheduleName,
            _scheduleGroupName);
        }

        return createSuccess;
    }
    catch (ResourceNotFoundException ex)
    {
        _logger.LogError(ex, $"The target with ARN '{_snsTopicArn}' was not
found.");
        return false;
    }
    catch (Exception ex)
    {

```

```

        _logger.LogError(ex, "An error occurred while creating the recurring
schedule.");
        return false;
    }
}

/// <summary>
/// Cleans up the resources created during the scenario.
/// </summary>
/// <returns>True if the cleanup was successful.</returns>
public static async Task<bool> Cleanup()
{
    // Prompt the user to confirm cleanup.
    var cleanup = !_interactive || GetYesNoResponse(
        "Do you want to delete all resources created by this scenario? (y/n) ");
    if (cleanup)
    {
        try
        {
            // Delete the schedule group.
            var groupDeleteSuccess = await
_schedulerWrapper.DeleteScheduleGroupAsync(_scheduleGroupName);

            // Destroy the CloudFormation stack and wait for it to be removed.
            var stackDeleteSuccess = await DeleteCloudFormationStack(_stackName,
false);

            return groupDeleteSuccess && stackDeleteSuccess;
        }
        catch (Exception ex)
        {
            _logger.LogError(ex,
                "An error occurred while cleaning up the resources.");
            return false;
        }
    }
    _logger.LogInformation("EventBridge Scheduler scenario is complete.");
    return true;
}

/// <summary>
/// Delete the resources in the stack and wait for confirmation.
/// </summary>
/// <param name="stackName">The name of the stack.</param>

```



```

    /// <param name="forceDelete">True to force delete the stack.</param>
    /// <returns>True if successful.</returns>
    private static async Task<bool> DeleteCloudFormationStack(string stackName, bool
forceDelete)
    {
        var request = new DeleteStackRequest
        {
            StackName = stackName,
        };

        if (forceDelete)
        {
            request.DeletionMode = DeletionMode.FORCE_DELETE_STACK;
        }

        await _amazonCloudFormation.DeleteStackAsync(request);
        Console.WriteLine($"CloudFormation stack '{_stackName}' is being deleted.
This may take a few minutes.");

        bool stackDeleted = await WaitForStackDeletion(_stackName, forceDelete);

        if (stackDeleted)
        {
            Console.WriteLine($"CloudFormation stack '{_stackName}' has been
deleted.");
            return true;
        }
        else
        {
            _logger.LogError($"Failed to delete CloudFormation stack
'{_stackName}'.");
            return false;
        }
    }

    /// <summary>
    /// Wait for the stack to be deleted.
    /// </summary>
    /// <param name="stackName">The name of the stack.</param>
    /// <param name="forceDelete">True to force delete the stack.</param>
    /// <returns>True if successful.</returns>
    private static async Task<bool> WaitForStackDeletion(string stackName, bool
forceDelete)
    {

```

```
int retryCount = 0;
const int maxRetries = 10;
const int retryDelay = 30000; // 30 seconds

while (retryCount < maxRetries)
{
    var describeStacksRequest = new DescribeStacksRequest
    {
        StackName = stackName
    };

    try
    {
        var describeStacksResponse = await
        _amazonCloudFormation.DescribeStacksAsync(describeStacksRequest);

        if (describeStacksResponse.Stacks.Count == 0 ||
        describeStacksResponse.Stacks[0].StackStatus == StackStatus.DELETE_COMPLETE)
        {
            return true;
        }
        if (!forceDelete && describeStacksResponse.Stacks[0].StackStatus ==
        StackStatus.DELETE_FAILED)
        {
            // Try one time to force delete.
            return await DeleteCloudFormationStack(stackName, true);
        }
    }
    catch (AmazonCloudFormationException ex) when (ex.ErrorCode ==
    "ValidationError")
    {
        // Stack does not exist, so it has been successfully deleted.
        return true;
    }

    Console.WriteLine($"Waiting for CloudFormation stack '{stackName}' to be
    deleted...");
    await Task.Delay(retryDelay);
    retryCount++;
}

_logger.LogError($"Timed out waiting for CloudFormation stack '{stackName}'
to be deleted.");
return false;
```

```

    }

    /// <summary>
    /// Helper method to get a yes or no response from the user.
    /// </summary>
    /// <param name="question">The question string to print on the console.</param>
    /// <returns>True if the user responds with a yes.</returns>
    private static bool GetYesNoResponse(string question)
    {
        Console.WriteLine(question);
        var ynResponse = Console.ReadLine();
        var response = ynResponse != null && ynResponse.Equals("y",
StringComparison.InvariantCultureIgnoreCase);
        return response;
    }

    /// <summary>
    /// Prompt the user for a valid email address.
    /// </summary>
    /// <returns>The valid email address.</returns>
    private static string PromptUserForEmail()
    {
        if (_interactive)
        {
            Console.WriteLine("Enter an email address to use for event
subscriptions: ");

            string email = Console.ReadLine!();

            if (!IsValidEmail(email))
            {
                Console.WriteLine("Invalid email address. Please try again.");
                return PromptUserForEmail();
            }
            return email;
        }
        // Used when running without user prompts.
        return "";
    }

    /// <summary>
    /// Prompt the user for a non-empty stack name.
    /// </summary>
    /// <returns>The valid stack name</returns>

```

```

private static string PromptUserForStackName()
{
    Console.WriteLine("Enter a name for the AWS Cloud Formation Stack: ");
    if (_interactive)
    {
        string stackName = Console.ReadLine();
        var regex = "[a-zA-Z][-a-zA-Z0-9]|arn:[-a-zA-Z0-9:/._+]";
        if (!Regex.IsMatch(stackName, regex))
        {
            Console.WriteLine(
                $"Invalid stack name. Please use a name that matches the pattern
{regex}.");
            return PromptUserForStackName();
        }

        return stackName;
    }
    // Used when running without user prompts.
    return _stackName;
}

/// <summary>
/// Prompt the user for a non-empty resource name.
/// </summary>
/// <returns>The valid stack name</returns>
private static string PromptUserForResourceName(string prompt)
{
    if (_interactive)
    {
        Console.WriteLine(prompt);
        string resourceName = Console.ReadLine();
        var regex = "[0-9a-zA-Z-_.]+";
        if (!Regex.IsMatch(resourceName, regex))
        {
            Console.WriteLine($"Invalid resource name. Please use a name that
matches the pattern {regex}.");
            return PromptUserForResourceName(prompt);
        }
        return resourceName!;
    }
    // Used when running without user prompts.
    return "resource-" + Guid.NewGuid();
}

```

```
/// <summary>
/// Prompt the user for a non-empty resource name.
/// </summary>
/// <returns>The valid stack name</returns>
private static int PromptUserForInteger(string prompt)
{
    if (_interactive)
    {
        Console.WriteLine(prompt);
        string stringResponse = Console.ReadLine();
        if (string.IsNullOrEmpty(stringResponse) ||
            !Int32.TryParse(stringResponse, out var intResponse))
        {
            Console.WriteLine($"Invalid integer. ");
            return PromptUserForInteger(prompt);
        }
        return intResponse!;
    }
    // Used when running without user prompts.
    return 1;
}

/// <summary>
/// Use System Mail to check for a valid email address.
/// </summary>
/// <param name="email">The string to verify.</param>
/// <returns>True if a valid email address.</returns>
private static bool IsValidEmail(string email)
{
    try
    {
        var mailAddress = new System.Net.Mail.MailAddress(email);
        return mailAddress.Address == email;
    }
    catch
    {
        // Invalid emails will cause an exception, return false.
        return false;
    }
}
}
```

服務作業的包裝函式。

```
using Amazon.Scheduler;
using Amazon.Scheduler.Model;
using Microsoft.Extensions.Logging;

namespace SchedulerActions;

/// <summary>
/// Wrapper class for Amazon EventBridge Scheduler operations.
/// </summary>
public class SchedulerWrapper
{
    private readonly IAmazonScheduler _amazonScheduler;
    private readonly ILogger<SchedulerWrapper> _logger;

    /// <summary>
    /// Constructor for the SchedulerWrapper class.
    /// </summary>
    /// <param name="amazonScheduler">The injected EventBridge Scheduler client.</
param>
    /// <param name="logger">The injected logger.</param>
    public SchedulerWrapper(IAmazonScheduler amazonScheduler,
        ILogger<SchedulerWrapper> logger)
    {
        _amazonScheduler = amazonScheduler;
        _logger = logger;
    }

    /// <summary>
    /// Creates a new schedule in Amazon EventBridge Scheduler.
    /// </summary>
    /// <param name="name">The name of the schedule.</param>
    /// <param name="scheduleExpression">The schedule expression that defines when
the schedule should run.</param>
    /// <param name="scheduleGroupName">The name of the schedule group to which the
schedule should be added.</param>
    /// <param name="deleteAfterCompletion">Indicates whether to delete the schedule
after completion.</param>
    /// <param name="useFlexibleTimeWindow">Indicates whether to use a flexible time
window for the schedule.</param>
    /// <param name="targetArn">ARN of the event target.</param>
    /// <param name="roleArn">Execution Role ARN.</param>
```

```

    /// <returns>True if the schedule was created successfully, false otherwise.</
returns>
    public async Task<bool> CreateScheduleAsync(
        string name,
        string scheduleExpression,
        string scheduleGroupName,
        string targetArn,
        string roleArn,
        string input,
        bool deleteAfterCompletion = false,
        bool useFlexibleTimeWindow = false)
    {
        try
        {
            int hoursToRun = 1;
            int flexibleTimeWindowMinutes = 10;

            var request = new CreateScheduleRequest
            {
                Name = name,
                ScheduleExpression = scheduleExpression,
                GroupName = scheduleGroupName,
                Target = new Target { Arn = targetArn, RoleArn = roleArn, Input =
input },
                ActionAfterCompletion = deleteAfterCompletion
                    ? ActionAfterCompletion.DELETE
                    : ActionAfterCompletion.NONE,
                StartDate = DateTime.UtcNow, // Ignored for one-time schedules.
                EndDate =
                    DateTime.UtcNow
                        .AddHours(hoursToRun) // Ignored for one-time schedules.
            };
            // Allow a flexible time window if the caller specifies it.
            request.FlexibleTimeWindow = new FlexibleTimeWindow
            {
                Mode = useFlexibleTimeWindow
                    ? FlexibleTimeWindowMode.FLEXIBLE
                    : FlexibleTimeWindowMode.OFF,
                MaximumWindowInMinutes = useFlexibleTimeWindow
                    ? flexibleTimeWindowMinutes
                    : null
            };

            var response = await _amazonScheduler.CreateScheduleAsync(request);

```

```

        Console.WriteLine($"Successfully created schedule '{name}' " +
                           $"in schedule group '{scheduleGroupName}':
{response.ScheduleArn}.");
        return true;
    }
    catch (ConflictException ex)
    {
        // If the name is not unique, a ConflictException will be thrown.
        _logger.LogError($"Failed to create schedule '{name}' due to a conflict.
{ex.Message}");
        return false;
    }
    catch (Exception ex)
    {
        _logger.LogError($"An error occurred while creating schedule '{name}' "
+
                           $"in schedule group '{scheduleGroupName}':
{ex.Message}");
        return false;
    }
}

/// <summary>
/// Creates a new schedule group in Amazon EventBridge Scheduler.
/// </summary>
/// <param name="name">The name of the schedule group.</param>
/// <returns>True if the schedule group was created successfully, false
otherwise.</returns>
public async Task<bool> CreateScheduleGroupAsync(string name)
{
    try
    {
        var request = new CreateScheduleGroupRequest { Name = name };

        var response = await _amazonScheduler.CreateScheduleGroupAsync(request);

        Console.WriteLine($"Successfully created schedule group '{name}':
{response.ScheduleGroupArn}.");
        return true;
    }
    catch (ConflictException ex)
    {

```



```

        // If the name is not unique, a ConflictException will be thrown.
        _logger.LogError($"Failed to create schedule group '{name}' due to a
conflict. {ex.Message}");
        return false;
    }
    catch (Exception ex)
    {
        _logger.LogError(
            $"An error occurred while creating schedule group '{name}':
{ex.Message}");
        return false;
    }
}

/// <summary>
/// Deletes an existing schedule from Amazon EventBridge Scheduler.
/// </summary>
/// <param name="name">The name of the schedule to delete.</param>
/// <param name="groupName">The group name of the schedule to delete.</param>
/// <returns>True if the schedule was deleted successfully, false otherwise.</
returns>
public async Task<bool> DeleteScheduleAsync(string name, string groupName)
{
    try
    {
        var request = new DeleteScheduleRequest
        {
            Name = name,
            GroupName = groupName
        };

        await _amazonScheduler.DeleteScheduleAsync(request);

        Console.WriteLine($"Successfully deleted schedule with name '{name}'.");
        return true;
    }
    catch (ResourceNotFoundException ex)
    {
        _logger.LogError(
            $"Failed to delete schedule with ID '{name}' because the resource
was not found: {ex.Message}");
        return true;
    }
}

```

```

        catch (Exception ex)
        {
            _logger.LogError(
                $"An error occurred while deleting schedule with ID '{name}':
{ex.Message}");
            return false;
        }
    }

    /// <summary>
    /// Deletes an existing schedule group from Amazon EventBridge Scheduler.
    /// </summary>
    /// <param name="name">The name of the schedule group to delete.</param>
    /// <returns>True if the schedule group was deleted successfully, false
otherwise.</returns>
    public async Task<bool> DeleteScheduleGroupAsync(string name)
    {
        try
        {
            var request = new DeleteScheduleGroupRequest { Name = name };

            await _amazonScheduler.DeleteScheduleGroupAsync(request);

            Console.WriteLine($"Successfully deleted schedule group '{name}'.");
            return true;
        }
        catch (ResourceNotFoundException ex)
        {
            _logger.LogError(
                $"Failed to delete schedule group '{name}' because the resource was
not found: {ex.Message}");
            return true;
        }
        catch (Exception ex)
        {
            _logger.LogError(
                $"An error occurred while deleting schedule group '{name}':
{ex.Message}");
            return false;
        }
    }
}

```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的下列主題。
 - [CreateSchedule](#)
 - [CreateScheduleGroup](#)
 - [DeleteSchedule](#)
 - [DeleteScheduleGroups](#)

使用的 Amazon Glacier 範例 適用於 .NET 的 SDK

下列程式碼範例示範如何使用 適用於 .NET 的 AWS SDK 搭配 Amazon Glacier 執行動作和實作常見案例。

Actions 是大型程式的程式碼摘錄，必須在內容中執行。雖然動作會告訴您如何呼叫個別服務函數，但您可以在其相關情境中查看內容中的動作。

每個範例均包含完整原始碼的連結，您可在連結中找到如何設定和執行內容中程式碼的相關指示。

主題

- [開始使用](#)
- [動作](#)

開始使用

您好，Amazon Glacier

下列程式碼範例示範如何開始使用 Amazon Glacier。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
using Amazon.Glacier;
```

```
using Amazon.Glacier.Model;

namespace GlacierActions;

public static class HelloGlacier
{
    static async Task Main()
    {
        var glacierService = new AmazonGlacierClient();

        Console.WriteLine("Hello Amazon Glacier!");
        Console.WriteLine("Let's list your Glacier vaults:");

        // You can use await and any of the async methods to get a response.
        // Let's get the vaults using a paginator.
        var glacierVaultPaginator = glacierService.Paginators.ListVaults(
            new ListVaultsRequest { AccountId = "-" });

        await foreach (var vault in glacierVaultPaginator.VaultList)
        {
            Console.WriteLine($"{vault.CreationDate}:{vault.VaultName}, ARN:
{vault.VaultARN}");
        }
    }
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [ListVaults](#)。

動作

AddTagsToVault

以下程式碼範例顯示如何使用 AddTagsToVault。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```

    /// <summary>
    /// Add tags to the items in an Amazon S3 Glacier vault.
    /// </summary>
    /// <param name="vaultName">The name of the vault to add tags to.</param>
    /// <param name="key">The name of the object to tag.</param>
    /// <param name="value">The tag value to add.</param>
    /// <returns>A Boolean value indicating the success of the action.</returns>
    public async Task<bool> AddTagsToVaultAsync(string vaultName, string key, string
value)
    {
        var request = new AddTagsToVaultRequest
        {
            Tags = new Dictionary<string, string>
            {
                { key, value },
            },
            AccountId = "-",
            VaultName = vaultName,
        };

        var response = await _glacierService.AddTagsToVaultAsync(request);
        return response.HttpStatusCode == HttpStatusCode.NoContent;
    }

```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [AddTagsToVault](#)。

CreateVault

以下程式碼範例顯示如何使用 CreateVault。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```

    /// <summary>
    /// Create an Amazon S3 Glacier vault.

```

```

/// </summary>
/// <param name="vaultName">The name of the vault to create.</param>
/// <returns>A Boolean value indicating the success of the action.</returns>
public async Task<bool> CreateVaultAsync(string vaultName)
{
    var request = new CreateVaultRequest
    {
        // Setting the AccountId to "-" means that
        // the account associated with the current
        // account will be used.
        AccountId = "-",
        VaultName = vaultName,
    };

    var response = await _glacierService.CreateVaultAsync(request);

    Console.WriteLine($"Created {vaultName} at: {response.Location}");

    return response.HttpStatusCode == HttpStatusCode.Created;
}

```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [CreateVault](#)。

DescribeVault

以下程式碼範例顯示如何使用 DescribeVault。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```

/// <summary>
/// Describe an Amazon S3 Glacier vault.
/// </summary>
/// <param name="vaultName">The name of the vault to describe.</param>
/// <returns>The Amazon Resource Name (ARN) of the vault.</returns>
public async Task<string> DescribeVaultAsync(string vaultName)

```

```
{
    var request = new DescribeVaultRequest
    {
        AccountId = "-",
        VaultName = vaultName,
    };

    var response = await _glacierService.DescribeVaultAsync(request);

    // Display the information about the vault.
    Console.WriteLine($"{response.VaultName}\tARN: {response.VaultARN}");
    Console.WriteLine($"Created on: {response.CreationDate}\tNumber of Archives: {response.NumberOfArchives}\tSize (in bytes): {response.SizeInBytes}");
    if (response.LastInventoryDate != DateTime.MinValue)
    {
        Console.WriteLine($"Last inventory: {response.LastInventoryDate}");
    }

    return response.VaultARN;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [DescribeVault](#)。

InitiateJob

以下程式碼範例顯示如何使用 InitiateJob。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

從保存庫擷取封存。此範例使用 ArchiveTransferManager 類別。如需 API 詳細資訊，請參閱 [ArchiveTransferManager](#)。

```
/// <summary>
/// Download an archive from an Amazon S3 Glacier vault using the Archive
```

```

    /// Transfer Manager.
    /// </summary>
    /// <param name="vaultName">The name of the vault containing the object.</param>
    /// <param name="archiveId">The Id of the archive to download.</param>
    /// <param name="localFilePath">The local directory where the file will
    /// be stored after download.</param>
    /// <returns>Async Task.</returns>
    public async Task<bool> DownloadArchiveWithArchiveManagerAsync(string vaultName,
string archiveId, string localFilePath)
    {
        try
        {
            var manager = new ArchiveTransferManager(_glacierService);

            var options = new DownloadOptions
            {
                StreamTransferProgress = Progress!,
            };

            // Download an archive.
            Console.WriteLine("Initiating the archive retrieval job and then polling
SQS queue for the archive to be available.");
            Console.WriteLine("When the archive is available, downloading will
begin.");
            await manager.DownloadAsync(vaultName, archiveId, localFilePath,
options);

            return true;
        }
        catch (AmazonGlacierException ex)
        {
            Console.WriteLine(ex.Message);
            return false;
        }
    }

    /// <summary>
    /// Event handler to track the progress of the Archive Transfer Manager.
    /// </summary>
    /// <param name="sender">The object that raised the event.</param>
    /// <param name="args">The argument values from the object that raised the
    /// event.</param>
    static void Progress(object sender, StreamTransferProgressArgs args)
    {

```



```
        if (args.PercentDone != _currentPercentage)
        {
            _currentPercentage = args.PercentDone;
            Console.WriteLine($"Downloaded {_currentPercentage}%");
        }
    }
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [InitiateJob](#)。

ListJobs

以下程式碼範例顯示如何使用 ListJobs。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// List Amazon S3 Glacier jobs.
/// </summary>
/// <param name="vaultName">The name of the vault to list jobs for.</param>
/// <returns>A list of Amazon S3 Glacier jobs.</returns>
public async Task<List<GlacierJobDescription>> ListJobsAsync(string vaultName)
{
    var request = new ListJobsRequest
    {
        // Using a hyphen "-" for the Account Id will
        // cause the SDK to use the Account Id associated
        // with the current account.
        AccountId = "-",
        VaultName = vaultName,
    };

    var response = await _glacierService.ListJobsAsync(request);
}
```

```
        return response.JobList;
    }
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [ListJobs](#)。

ListTagsForVault

以下程式碼範例顯示如何使用 ListTagsForVault。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// List tags for an Amazon S3 Glacier vault.
/// </summary>
/// <param name="vaultName">The name of the vault to list tags for.</param>
/// <returns>A dictionary listing the tags attached to each object in the
/// vault and its tags.</returns>
public async Task<Dictionary<string, string>> ListTagsForVaultAsync(string
vaultName)
{
    var request = new ListTagsForVaultRequest
    {
        // Using a hyphen "-" for the Account Id will
        // cause the SDK to use the Account Id associated
        // with the default user.
        AccountId = "-",
        VaultName = vaultName,
    };

    var response = await _glacierService.ListTagsForVaultAsync(request);

    return response.Tags;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [ListTagsForVault](#)。

ListVaults

以下程式碼範例顯示如何使用 ListVaults。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// List the Amazon S3 Glacier vaults associated with the current account.
/// </summary>
/// <returns>A list containing information about each vault.</returns>
public async Task<List<DescribeVaultOutput>> ListVaultsAsync()
{
    var glacierVaultPaginator = _glacierService.Paginators.ListVaults(
        new ListVaultsRequest { AccountId = "-" });
    var vaultList = new List<DescribeVaultOutput>();

    await foreach (var vault in glacierVaultPaginator.VaultList)
    {
        vaultList.Add(vault);
    }

    return vaultList;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [ListVaults](#)。

UploadArchive

以下程式碼範例顯示如何使用 UploadArchive。

適用於 .NET 的 SDK

 Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Upload an object to an Amazon S3 Glacier vault.
/// </summary>
/// <param name="vaultName">The name of the Amazon S3 Glacier vault to upload
/// the archive to.</param>
/// <param name="archiveFilePath">The file path of the archive to upload to the
vault.</param>
/// <returns>A Boolean value indicating the success of the action.</returns>
public async Task<string> UploadArchiveWithArchiveManager(string vaultName,
string archiveFilePath)
{
    try
    {
        var manager = new ArchiveTransferManager(_glacierService);

        // Upload an archive.
        var response = await manager.UploadAsync(vaultName, "upload archive
test", archiveFilePath);
        return response.ArchiveId;
    }
    catch (AmazonGlacierException ex)
    {
        Console.WriteLine(ex.Message);
        return string.Empty;
    }
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》的 [UploadArchive](#)。

AWS Glue 使用的範例 適用於 .NET 的 SDK

下列程式碼範例示範如何使用 適用於 .NET 的 AWS SDK 搭配 來執行動作和實作常見案例 AWS Glue。

基本概念是程式碼範例，這些範例說明如何在服務內執行基本操作。

Actions 是大型程式的程式碼摘錄，必須在內容中執行。雖然動作會告訴您如何呼叫個別服務函數，但您可以在其相關情境中查看內容中的動作。

每個範例均包含完整原始碼的連結，您可在連結中找到如何設定和執行內容中程式碼的相關指示。

主題

- [開始使用](#)
- [基本概念](#)
- [動作](#)

開始使用

您好 AWS Glue

下列程式碼範例示範如何開始使用 AWS Glue。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
namespace GlueActions;

public class HelloGlue
{
    private static ILogger logger = null!;

    static async Task Main(string[] args)
    {
        // Set up dependency injection for AWS Glue.
```

```

        using var host = Host.CreateDefaultBuilder(args)
            .ConfigureLogging(logging =>
                logging.AddFilter("System", LogLevel.Debug)
                    .AddFilter<DebugLoggerProvider>("Microsoft",
LogLevel.Information)
                    .AddFilter<ConsoleLoggerProvider>("Microsoft", LogLevel.Trace))
            .ConfigureServices((_, services) =>
                services.AddAWSService<IAmazonGlue>()
                    .AddTransient<GlueWrapper>()
            )
            .Build();

        logger = LoggerFactory.Create(builder => { builder.AddConsole(); })
            .CreateLogger<HelloGlue>();
        var glueClient = host.Services.GetRequiredService<IAmazonGlue>();

        var request = new ListJobsRequest();

        var jobNames = new List<string>();

        do
        {
            var response = await glueClient.ListJobsAsync(request);
            jobNames.AddRange(response.JobNames);
            request.NextToken = response.NextToken;
        }
        while (request.NextToken is not null);

        Console.Clear();
        Console.WriteLine("Hello, Glue. Let's list your existing Glue Jobs:");
        if (jobNames.Count == 0)
        {
            Console.WriteLine("You don't have any AWS Glue jobs.");
        }
        else
        {
            jobNames.ForEach(Console.WriteLine);
        }
    }
}

```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [ListJobs](#)。

基本概念

了解基本概念

以下程式碼範例顯示做法：

- 建立網路爬取公有 Amazon S3 儲存貯體的爬蟲程式，以及產生 CSV 格式中繼資料的資料庫。
- 列出 中資料庫和資料表的相關資訊 AWS Glue Data Catalog。
- 建立從 S3 儲存貯體中擷取 CSV 資料的任務、轉換資料，以及將 JSON 格式的輸出載入至另一個 S3 儲存貯體。
- 列出任務執行的相關資訊、檢視已轉換的資料以及清除資源。

如需詳細資訊，請參閱[教學課程：AWS Glue Studio 入門](#)。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

建立可包裝案例中所用 AWS Glue 函數的類別。

```
using System.Net;

namespace GlueActions;

public class GlueWrapper
{
    private readonly IAmazonGlue _amazonGlue;

    /// <summary>
    /// Constructor for the AWS Glue actions wrapper.
    /// </summary>
    /// <param name="amazonGlue"></param>
    public GlueWrapper(IAmazonGlue amazonGlue)
    {
        _amazonGlue = amazonGlue;
    }
}
```

```

    }

    /// <summary>
    /// Create an AWS Glue crawler.
    /// </summary>
    /// <param name="crawlerName">The name for the crawler.</param>
    /// <param name="crawlerDescription">A description of the crawler.</param>
    /// <param name="role">The AWS Identity and Access Management (IAM) role to
    /// be assumed by the crawler.</param>
    /// <param name="schedule">The schedule on which the crawler will be executed.</
param>
    /// <param name="s3Path">The path to the Amazon Simple Storage Service (Amazon
S3)
    /// bucket where the Python script has been stored.</param>
    /// <param name="dbName">The name to use for the database that will be
    /// created by the crawler.</param>
    /// <returns>A Boolean value indicating the success of the action.</returns>
    public async Task<bool> CreateCrawlerAsync(
        string crawlerName,
        string crawlerDescription,
        string role,
        string schedule,
        string s3Path,
        string dbName)
    {
        var s3Target = new S3Target
        {
            Path = s3Path,
        };

        var targetList = new List<S3Target>
        {
            s3Target,
        };

        var targets = new CrawlerTargets
        {
            S3Targets = targetList,
        };

        var crawlerRequest = new CreateCrawlerRequest
        {
            DatabaseName = dbName,
            Name = crawlerName,

```



```

        Description = crawlerDescription,
        Targets = targets,
        Role = role,
        Schedule = schedule,
    };

    var response = await _amazonGlue.CreateCrawlerAsync(crawlerRequest);
    return response.HttpStatusCode == System.Net.HttpStatusCode.OK;
}

/// <summary>
/// Create an AWS Glue job.
/// </summary>
/// <param name="jobName">The name of the job.</param>
/// <param name="roleName">The name of the IAM role to be assumed by
/// the job.</param>
/// <param name="description">A description of the job.</param>
/// <param name="scriptUrl">The URL to the script.</param>
/// <returns>A Boolean value indicating the success of the action.</returns>
public async Task<bool> CreateJobAsync(string dbName, string tableName, string
bucketUrl, string jobName, string roleName, string description, string scriptUrl)
{
    var command = new JobCommand
    {
        PythonVersion = "3",
        Name = "glueetl",
        ScriptLocation = scriptUrl,
    };

    var arguments = new Dictionary<string, string>
    {
        { "--input_database", dbName },
        { "--input_table", tableName },
        { "--output_bucket_url", bucketUrl }
    };

    var request = new CreateJobRequest
    {
        Command = command,
        DefaultArguments = arguments,
        Description = description,
        GlueVersion = "3.0",
        Name = jobName,
    };
}

```

```

        NumberOfWorkers = 10,
        Role = roleName,
        WorkerType = "G.1X"
    };

    var response = await _amazonGlue.CreateJobAsync(request);
    return response.HttpStatusCode == HttpStatusCode.OK;
}

/// <summary>
/// Delete an AWS Glue crawler.
/// </summary>
/// <param name="crawlerName">The name of the crawler.</param>
/// <returns>A Boolean value indicating the success of the action.</returns>
public async Task<bool> DeleteCrawlerAsync(string crawlerName)
{
    var response = await _amazonGlue.DeleteCrawlerAsync(new DeleteCrawlerRequest
{ Name = crawlerName });
    return response.HttpStatusCode == HttpStatusCode.OK;
}

/// <summary>
/// Delete the AWS Glue database.
/// </summary>
/// <param name="dbName">The name of the database.</param>
/// <returns>A Boolean value indicating the success of the action.</returns>
public async Task<bool> DeleteDatabaseAsync(string dbName)
{
    var response = await _amazonGlue.DeleteDatabaseAsync(new
DeleteDatabaseRequest { Name = dbName });
    return response.HttpStatusCode == HttpStatusCode.OK;
}

/// <summary>
/// Delete an AWS Glue job.
/// </summary>
/// <param name="jobName">The name of the job.</param>
/// <returns>A Boolean value indicating the success of the action.</returns>
public async Task<bool> DeleteJobAsync(string jobName)
{

```

```

        var response = await _amazonGlue.DeleteJobAsync(new DeleteJobRequest
{ JobName = jobName });
        return response.HttpStatusCode == HttpStatusCode.OK;
    }

    /// <summary>
    /// Delete a table from an AWS Glue database.
    /// </summary>
    /// <param name="tableName">The table to delete.</param>
    /// <returns>A Boolean value indicating the success of the action.</returns>
    public async Task<bool> DeleteTableAsync(string dbName, string tableName)
    {
        var response = await _amazonGlue.DeleteTableAsync(new DeleteTableRequest
{ Name = tableName, DatabaseName = dbName });
        return response.HttpStatusCode == HttpStatusCode.OK;
    }

    /// <summary>
    /// Get information about an AWS Glue crawler.
    /// </summary>
    /// <param name="crawlerName">The name of the crawler.</param>
    /// <returns>A Crawler object describing the crawler.</returns>
    public async Task<Crawler?> GetCrawlerAsync(string crawlerName)
    {
        var crawlerRequest = new GetCrawlerRequest
        {
            Name = crawlerName,
        };

        var response = await _amazonGlue.GetCrawlerAsync(crawlerRequest);
        if (response.HttpStatusCode == System.Net.HttpStatusCode.OK)
        {
            var databaseName = response.Crawler.DatabaseName;
            Console.WriteLine($"{crawlerName} has the database {databaseName}");
            return response.Crawler;
        }

        Console.WriteLine($"No information regarding {crawlerName} could be
found.");
        return null;
    }

```

```
/// <summary>
/// Get information about the state of an AWS Glue crawler.
/// </summary>
/// <param name="crawlerName">The name of the crawler.</param>
/// <returns>A value describing the state of the crawler.</returns>
public async Task<CrawlerState> GetCrawlerStateAsync(string crawlerName)
{
    var response = await _amazonGlue.GetCrawlerAsync(
        new GetCrawlerRequest { Name = crawlerName });
    return response.Crawler.State;
}

/// <summary>
/// Get information about an AWS Glue database.
/// </summary>
/// <param name="dbName">The name of the database.</param>
/// <returns>A Database object containing information about the database.</
returns>
public async Task<Database> GetDatabaseAsync(string dbName)
{
    var databasesRequest = new GetDatabaseRequest
    {
        Name = dbName,
    };

    var response = await _amazonGlue.GetDatabaseAsync(databasesRequest);
    return response.Database;
}

/// <summary>
/// Get information about a specific AWS Glue job run.
/// </summary>
/// <param name="jobName">The name of the job.</param>
/// <param name="jobRunId">The Id of the job run.</param>
/// <returns>A JobRun object with information about the job run.</returns>
public async Task<JobRun> GetJobRunAsync(string jobName, string jobRunId)
{
    var response = await _amazonGlue.GetJobRunAsync(new GetJobRunRequest
{ JobName = jobName, RunId = jobRunId });
    return response.JobRun;
}
```

```
/// <summary>
/// Get information about all AWS Glue runs of a specific job.
/// </summary>
/// <param name="jobName">The name of the job.</param>
/// <returns>A list of JobRun objects.</returns>
public async Task<List<JobRun>> GetJobRunsAsync(string jobName)
{
    var jobRuns = new List<JobRun>();

    var request = new GetJobRunsRequest
    {
        JobName = jobName,
    };

    // No need to loop to get all the log groups--the SDK does it for us behind
the scenes
    var paginatorForJobRuns =
        _amazonGlue.Paginators.GetJobRuns(request);

    await foreach (var response in paginatorForJobRuns.Responses)
    {
        response.JobRuns.ForEach(jobRun =>
        {
            jobRuns.Add(jobRun);
        });
    }

    return jobRuns;
}

/// <summary>
/// Get a list of tables for an AWS Glue database.
/// </summary>
/// <param name="dbName">The name of the database.</param>
/// <returns>A list of Table objects.</returns>
public async Task<List<Table>> GetTablesAsync(string dbName)
{
    var request = new GetTablesRequest { DatabaseName = dbName };
    var tables = new List<Table>();

    // Get a paginator for listing the tables.
```

```
        var tablePaginator = _amazonGlue.Paginators.GetTables(request);

        await foreach (var response in tablePaginator.Responses)
        {
            tables.AddRange(response.TableList);
        }

        return tables;
    }

    /// <summary>
    /// List AWS Glue jobs using a paginator.
    /// </summary>
    /// <returns>A list of AWS Glue job names.</returns>
    public async Task<List<string>> ListJobsAsync()
    {
        var jobNames = new List<string>();

        var listJobsPaginator = _amazonGlue.Paginators.ListJobs(new ListJobsRequest
        { MaxResults = 10 });
        await foreach (var response in listJobsPaginator.Responses)
        {
            jobNames.AddRange(response.JobNames);
        }

        return jobNames;
    }

    /// <summary>
    /// Start an AWS Glue crawler.
    /// </summary>
    /// <param name="crawlerName">The name of the crawler.</param>
    /// <returns>A Boolean value indicating the success of the action.</returns>
    public async Task<bool> StartCrawlerAsync(string crawlerName)
    {
        var crawlerRequest = new StartCrawlerRequest
        {
            Name = crawlerName,
        };

        var response = await _amazonGlue.StartCrawlerAsync(crawlerRequest);
    }
}
```

```

        return response.HttpStatusCode == System.Net.HttpStatusCode.OK;
    }

    /// <summary>
    /// Start an AWS Glue job run.
    /// </summary>
    /// <param name="jobName">The name of the job.</param>
    /// <returns>A string representing the job run Id.</returns>
    public async Task<string> StartJobRunAsync(
        string jobName,
        string inputDatabase,
        string inputTable,
        string bucketName)
    {
        var request = new StartJobRunRequest
        {
            JobName = jobName,
            Arguments = new Dictionary<string, string>
            {
                {"--input_database", inputDatabase},
                {"--input_table", inputTable},
                {"--output_bucket_url", $"s3://{bucketName}/"}
            }
        };

        var response = await _amazonGlue.StartJobRunAsync(request);
        return response.JobRunId;
    }
}

```

建立可執行案例的類別。

```

global using Amazon.Glue;
global using GlueActions;
global using Microsoft.Extensions.Configuration;
global using Microsoft.Extensions.DependencyInjection;
global using Microsoft.Extensions.Hosting;
global using Microsoft.Extensions.Logging;
global using Microsoft.Extensions.Logging.Console;

```

```
global using Microsoft.Extensions.Logging.Debug;

using Amazon.Glue.Model;
using Amazon.S3;
using Amazon.S3.Model;

namespace GlueBasics;

public class GlueBasics
{
    private static ILogger logger = null!;
    private static IConfiguration _configuration = null!;

    static async Task Main(string[] args)
    {
        // Set up dependency injection for AWS Glue.
        using var host = Host.CreateDefaultBuilder(args)
            .ConfigureLogging(logging =>
                logging.AddFilter("System", LogLevel.Debug)
                    .AddFilter<DebugLoggerProvider>("Microsoft",
                        LogLevel.Information)
                    .AddFilter<ConsoleLoggerProvider>("Microsoft", LogLevel.Trace))
            .ConfigureServices((_, services) =>
                services.AddAWSService<IAmazonGlue>()
                    .AddTransient<GlueWrapper>()
                    .AddTransient<UiWrapper>()
                )
            .Build();

        logger = LoggerFactory.Create(builder => { builder.AddConsole(); })
            .CreateLogger<GlueBasics>();

        _configuration = new ConfigurationBuilder()
            .SetBasePath(Directory.GetCurrentDirectory())
            .AddJsonFile("settings.json") // Load settings from .json file.
            .AddJsonFile("settings.local.json",
                true) // Optionally load local settings.
            .Build();

        // These values are stored in settings.json
        // Once you have run the CDK script to deploy the resources,
        // edit the file to set "BucketName", "RoleName", and "ScriptURL"
```



```
// to the appropriate values. Also set "CrawlerName" to the name
// you want to give the crawler when it is created.
string bucketName = _configuration["BucketName"]!;
string bucketUrl = _configuration["BucketUrl"]!;
string crawlerName = _configuration["CrawlerName"]!;
string roleName = _configuration["RoleName"]!;
string sourceData = _configuration["SourceData"]!;
string dbName = _configuration["DbName"]!;
string cron = _configuration["Cron"]!;
string scriptUrl = _configuration["ScriptURL"]!;
string jobName = _configuration["JobName"]!;

var wrapper = host.Services.GetRequiredService<GlueWrapper>();
var uiWrapper = host.Services.GetRequiredService<UiWrapper>();

uiWrapper.DisplayOverview();
uiWrapper.PressEnter();

// Create the crawler and wait for it to be ready.
uiWrapper.DisplayTitle("Create AWS Glue crawler");
Console.WriteLine("Let's begin by creating the AWS Glue crawler.");

var crawlerDescription = "Crawler created for the AWS Glue Basics
scenario.";
var crawlerCreated = await wrapper.CreateCrawlerAsync(crawlerName,
crawlerDescription, roleName, cron, sourceData, dbName);
if (crawlerCreated)
{
    Console.WriteLine($"The crawler: {crawlerName} has been created. Now
let's wait until it's ready.");
    CrawlerState crawlerState;
    do
    {
        crawlerState = await wrapper.GetCrawlerStateAsync(crawlerName);
    }
    while (crawlerState != "READY");
    Console.WriteLine($"The crawler {crawlerName} is now ready for use.");
}
else
{
    Console.WriteLine($"Couldn't create crawler {crawlerName}.");
    return; // Exit the application.
}
```

```
        uiWrapper.DisplayTitle("Start AWS Glue crawler");
        Console.WriteLine("Now let's wait until the crawler has successfully
started.");
        var crawlerStarted = await wrapper.StartCrawlerAsync(crawlerName);
        if (crawlerStarted)
        {
            CrawlerState crawlerState;
            do
            {
                crawlerState = await wrapper.GetCrawlerStateAsync(crawlerName);
            }
            while (crawlerState != "READY");
            Console.WriteLine($"The crawler {crawlerName} is now ready for use.");
        }
        else
        {
            Console.WriteLine($"Couldn't start the crawler {crawlerName}.");
            return; // Exit the application.
        }

        uiWrapper.PressEnter();

        Console.WriteLine($"\\nLet's take a look at the database: {dbName}");
        var database = await wrapper.GetDatabaseAsync(dbName);

        if (database != null)
        {
            uiWrapper.DisplayTitle($"{database.Name} Details");
            Console.WriteLine($"{database.Name} created on {database.CreateTime}");
            Console.WriteLine(database.Description);
        }

        uiWrapper.PressEnter();

        var tables = await wrapper.GetTablesAsync(dbName);
        if (tables.Count > 0)
        {
            tables.ForEach(table =>
            {
                Console.WriteLine($"{table.Name}\\tCreated:
{table.CreateTime}\\tUpdated: {table.UpdateTime}");
            });
        }
    }
```

```

        uiWrapper.PressEnter();

        uiWrapper.DisplayTitle("Create AWS Glue job");
        Console.WriteLine("Creating a new AWS Glue job.");
        var description = "An AWS Glue job created using the AWS SDK for .NET";
        await wrapper.CreateJobAsync(dbName, tables[0].Name, bucketUrl, jobName,
roleName, description, scriptUrl);

        uiWrapper.PressEnter();

        uiWrapper.DisplayTitle("Starting AWS Glue job");
        Console.WriteLine("Starting the new AWS Glue job...");
        var jobRunId = await wrapper.StartJobRunAsync(jobName, dbName,
tables[0].Name, bucketName);
        var jobRunComplete = false;
        var jobRun = new JobRun();
        do
        {
            jobRun = await wrapper.GetJobRunAsync(jobName, jobRunId);
            if (jobRun.JobRunState == "SUCCEEDED" || jobRun.JobRunState == "STOPPED"
||
                jobRun.JobRunState == "FAILED" || jobRun.JobRunState == "TIMEOUT")
            {
                jobRunComplete = true;
            }
        } while (!jobRunComplete);

        uiWrapper.DisplayTitle($"Data in {bucketName}");

        // Get the list of data stored in the S3 bucket.
        var s3Client = new AmazonS3Client();

        var response = await s3Client.ListObjectsAsync(new ListObjectsRequest
{ BucketName = bucketName });
        response.S3Objects.ForEach(s3Object =>
        {
            Console.WriteLine(s3Object.Key);
        });

        uiWrapper.DisplayTitle("AWS Glue jobs");
        var jobNames = await wrapper.ListJobsAsync();
        jobNames.ForEach(jobName =>
        {
            Console.WriteLine(jobName);
        });
    }
}

```

```

    });

    uiWrapper.PressEnter();

    uiWrapper.DisplayTitle("Get AWS Glue job run information");
    Console.WriteLine("Getting information about the AWS Glue job.");
    var jobRuns = await wrapper.GetJobRunsAsync(jobName);

    jobRuns.ForEach(jobRun =>
    {
        Console.WriteLine($"{jobRun.JobName}\t{jobRun.JobRunState}\t{jobRun.CompletedOn}");
    });

    uiWrapper.PressEnter();

    uiWrapper.DisplayTitle("Deleting resources");
    Console.WriteLine("Deleting the AWS Glue job used by the example.");
    await wrapper.DeleteJobAsync(jobName);

    Console.WriteLine("Deleting the tables from the database.");
    tables.ForEach(async table =>
    {
        await wrapper.DeleteTableAsync(dbName, table.Name);
    });

    Console.WriteLine("Deleting the database.");
    await wrapper.DeleteDatabaseAsync(dbName);

    Console.WriteLine("Deleting the AWS Glue crawler.");
    await wrapper.DeleteCrawlerAsync(crawlerName);

    Console.WriteLine("The AWS Glue scenario has completed.");
    uiWrapper.PressEnter();
}
}

namespace GlueBasics;

public class UiWrapper
{
    public readonly string SepBar = new string('-', Console.WindowWidth);

```

```

/// <summary>
/// Show information about the scenario.
/// </summary>
public void DisplayOverview()
{
    Console.Clear();
    DisplayTitle("Amazon Glue: get started with crawlers and jobs");

    Console.WriteLine("This example application does the following:");
    Console.WriteLine("\t 1. Create a crawler, pass it the IAM role and the URL
to the public S3 bucket that contains the source data");
    Console.WriteLine("\t 2. Start the crawler.");
    Console.WriteLine("\t 3. Get the database created by the crawler and the
tables in the database.");
    Console.WriteLine("\t 4. Create a job.");
    Console.WriteLine("\t 5. Start a job run.");
    Console.WriteLine("\t 6. Wait for the job run to complete.");
    Console.WriteLine("\t 7. Show the data stored in the bucket.");
    Console.WriteLine("\t 8. List jobs for the account.");
    Console.WriteLine("\t 9. Get job run details for the job that was run.");
    Console.WriteLine("\t10. Delete the demo job.");
    Console.WriteLine("\t11. Delete the database and tables created for the
demo.");
    Console.WriteLine("\t12. Delete the crawler.");
}

/// <summary>
/// Display a message and wait until the user presses enter.
/// </summary>
public void PressEnter()
{
    Console.Write("\nPlease press <Enter> to continue. ");
    _ = Console.ReadLine();
}

/// <summary>
/// Pad a string with spaces to center it on the console display.
/// </summary>
/// <param name="strToCenter">The string to center on the screen.</param>
/// <returns>The string padded to make it center on the screen.</returns>
public string CenterString(string strToCenter)
{
    var padAmount = (Console.WindowWidth - strToCenter.Length) / 2;
    var leftPad = new string(' ', padAmount);

```

```
        return $"{leftPad}{strToCenter}";
    }

    /// <summary>
    /// Display a line of hyphens, the centered text of the title and another
    /// line of hyphens.
    /// </summary>
    /// <param name="strTitle">The string to be displayed.</param>
    public void DisplayTitle(string strTitle)
    {
        Console.WriteLine(SepBar);
        Console.WriteLine(CenterString(strTitle));
        Console.WriteLine(SepBar);
    }
}
```

• 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的下列主題。

- [CreateCrawler](#)
- [CreateJob](#)
- [DeleteCrawler](#)
- [DeleteDatabase](#)
- [DeleteJob](#)
- [DeleteTable](#)
- [GetCrawler](#)
- [GetDatabase](#)
- [GetDatabases](#)
- [GetJob](#)
- [GetJobRun](#)
- [GetJobRuns](#)
- [GetTables](#)
- [ListJobs](#)
- [StartCrawler](#)
- [StartJobRun](#)

動作

CreateCrawler

以下程式碼範例顯示如何使用 CreateCrawler。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Create an AWS Glue crawler.
/// </summary>
/// <param name="crawlerName">The name for the crawler.</param>
/// <param name="crawlerDescription">A description of the crawler.</param>
/// <param name="role">The AWS Identity and Access Management (IAM) role to
/// be assumed by the crawler.</param>
/// <param name="schedule">The schedule on which the crawler will be executed.</
param>
/// <param name="s3Path">The path to the Amazon Simple Storage Service (Amazon
S3)
/// bucket where the Python script has been stored.</param>
/// <param name="dbName">The name to use for the database that will be
/// created by the crawler.</param>
/// <returns>A Boolean value indicating the success of the action.</returns>
public async Task<bool> CreateCrawlerAsync(
    string crawlerName,
    string crawlerDescription,
    string role,
    string schedule,
    string s3Path,
    string dbName)
{
    var s3Target = new S3Target
    {
        Path = s3Path,
    };
}
```

```
var targetList = new List<S3Target>
{
    s3Target,
};

var targets = new CrawlerTargets
{
    S3Targets = targetList,
};

var crawlerRequest = new CreateCrawlerRequest
{
    DatabaseName = dbName,
    Name = crawlerName,
    Description = crawlerDescription,
    Targets = targets,
    Role = role,
    Schedule = schedule,
};

var response = await _amazonGlue.CreateCrawlerAsync(crawlerRequest);
return response.HttpStatusCode == System.Net.HttpStatusCode.OK;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [CreateCrawler](#)。

CreateJob

以下程式碼範例顯示如何使用 CreateJob。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
```



```
/// Create an AWS Glue job.
/// </summary>
/// <param name="jobName">The name of the job.</param>
/// <param name="roleName">The name of the IAM role to be assumed by
/// the job.</param>
/// <param name="description">A description of the job.</param>
/// <param name="scriptUrl">The URL to the script.</param>
/// <returns>A Boolean value indicating the success of the action.</returns>
public async Task<bool> CreateJobAsync(string dbName, string tableName, string
bucketUrl, string jobName, string roleName, string description, string scriptUrl)
{
    var command = new JobCommand
    {
        PythonVersion = "3",
        Name = "glueetl",
        ScriptLocation = scriptUrl,
    };

    var arguments = new Dictionary<string, string>
    {
        { "--input_database", dbName },
        { "--input_table", tableName },
        { "--output_bucket_url", bucketUrl }
    };

    var request = new CreateJobRequest
    {
        Command = command,
        DefaultArguments = arguments,
        Description = description,
        GlueVersion = "3.0",
        Name = jobName,
        NumberOfWorkers = 10,
        Role = roleName,
        WorkerType = "G.1X"
    };

    var response = await _amazonGlue.CreateJobAsync(request);
    return response.HttpStatusCode == HttpStatusCode.OK;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [CreateJob](#)。

DeleteCrawler

以下程式碼範例顯示如何使用 DeleteCrawler。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Delete an AWS Glue crawler.
/// </summary>
/// <param name="crawlerName">The name of the crawler.</param>
/// <returns>A Boolean value indicating the success of the action.</returns>
public async Task<bool> DeleteCrawlerAsync(string crawlerName)
{
    var response = await _amazonGlue.DeleteCrawlerAsync(new DeleteCrawlerRequest
    { Name = crawlerName });
    return response.HttpStatusCode == HttpStatusCode.OK;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [DeleteCrawler](#)。

DeleteDatabase

以下程式碼範例顯示如何使用 DeleteDatabase。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```

/// <summary>
/// Delete the AWS Glue database.
/// </summary>
/// <param name="dbName">The name of the database.</param>
/// <returns>A Boolean value indicating the success of the action.</returns>
public async Task<bool> DeleteDatabaseAsync(string dbName)
{
    var response = await _amazonGlue.DeleteDatabaseAsync(new
DeleteDatabaseRequest { Name = dbName });
    return response.HttpStatusCode == HttpStatusCode.OK;
}

```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [DeleteDatabase](#)。

DeleteJob

以下程式碼範例顯示如何使用 DeleteJob。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```

/// <summary>
/// Delete an AWS Glue job.
/// </summary>
/// <param name="jobName">The name of the job.</param>
/// <returns>A Boolean value indicating the success of the action.</returns>
public async Task<bool> DeleteJobAsync(string jobName)
{
    var response = await _amazonGlue.DeleteJobAsync(new DeleteJobRequest
{ JobName = jobName });
    return response.HttpStatusCode == HttpStatusCode.OK;
}

```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [DeleteJob](#)。

DeleteTable

以下程式碼範例顯示如何使用 DeleteTable。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Delete a table from an AWS Glue database.
/// </summary>
/// <param name="tableName">The table to delete.</param>
/// <returns>A Boolean value indicating the success of the action.</returns>
public async Task<bool> DeleteTableAsync(string dbName, string tableName)
{
    var response = await _amazonGlue.DeleteTableAsync(new DeleteTableRequest
    { Name = tableName, DatabaseName = dbName });
    return response.HttpStatusCode == HttpStatusCode.OK;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [DeleteTable](#)。

GetCrawler

以下程式碼範例顯示如何使用 GetCrawler。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Get information about an AWS Glue crawler.
/// </summary>
/// <param name="crawlerName">The name of the crawler.</param>
/// <returns>A Crawler object describing the crawler.</returns>
public async Task<Crawler?> GetCrawlerAsync(string crawlerName)
{
    var crawlerRequest = new GetCrawlerRequest
    {
        Name = crawlerName,
    };

    var response = await _amazonGlue.GetCrawlerAsync(crawlerRequest);
    if (response.HttpStatusCode == System.Net.HttpStatusCode.OK)
    {
        var databaseName = response.Crawler.DatabaseName;
        Console.WriteLine($"{crawlerName} has the database {databaseName}");
        return response.Crawler;
    }

    Console.WriteLine($"No information regarding {crawlerName} could be
found.");
    return null;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [GetCrawler](#)。

GetDatabase

以下程式碼範例顯示如何使用 GetDatabase。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```

    /// <summary>
    /// Get information about an AWS Glue database.
    /// </summary>
    /// <param name="dbName">The name of the database.</param>
    /// <returns>A Database object containing information about the database.</
returns>
    public async Task<Database> GetDatabaseAsync(string dbName)
    {
        var databasesRequest = new GetDatabaseRequest
        {
            Name = dbName,
        };

        var response = await _amazonGlue.GetDatabaseAsync(databasesRequest);
        return response.Database;
    }

```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [GetDatabase](#)。

GetJobRun

以下程式碼範例顯示如何使用 GetJobRun。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```

    /// <summary>
    /// Get information about a specific AWS Glue job run.
    /// </summary>
    /// <param name="jobName">The name of the job.</param>
    /// <param name="jobRunId">The Id of the job run.</param>
    /// <returns>A JobRun object with information about the job run.</returns>
    public async Task<JobRun> GetJobRunAsync(string jobName, string jobRunId)
    {

```

```
var response = await _amazonGlue.GetJobRunAsync(new GetJobRunRequest
{ JobName = jobName, RunId = jobRunId });
return response.JobRun;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [GetJobRun](#)。

GetJobRuns

以下程式碼範例顯示如何使用 GetJobRuns。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Get information about all AWS Glue runs of a specific job.
/// </summary>
/// <param name="jobName">The name of the job.</param>
/// <returns>A list of JobRun objects.</returns>
public async Task<List<JobRun>> GetJobRunsAsync(string jobName)
{
    var jobRuns = new List<JobRun>();

    var request = new GetJobRunsRequest
    {
        JobName = jobName,
    };

    // No need to loop to get all the log groups--the SDK does it for us behind
the scenes
    var paginatorForJobRuns =
        _amazonGlue.Paginators.GetJobRuns(request);

    await foreach (var response in paginatorForJobRuns.Responses)
    {
```

```
        response.JobRuns.ForEach(jobRun =>
        {
            jobRuns.Add(jobRun);
        });
    }

    return jobRuns;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [GetJobRuns](#)。

GetTables

以下程式碼範例顯示如何使用 GetTables。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Get a list of tables for an AWS Glue database.
/// </summary>
/// <param name="dbName">The name of the database.</param>
/// <returns>A list of Table objects.</returns>
public async Task<List<Table>> GetTablesAsync(string dbName)
{
    var request = new GetTablesRequest { DatabaseName = dbName };
    var tables = new List<Table>();

    // Get a paginator for listing the tables.
    var tablePaginator = _amazonGlue.Paginators.GetTables(request);

    await foreach (var response in tablePaginator.Responses)
    {
        tables.AddRange(response.TableList);
    }
}
```



```
        return tables;
    }
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [GetTables](#)。

ListJobs

以下程式碼範例顯示如何使用 ListJobs。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// List AWS Glue jobs using a paginator.
/// </summary>
/// <returns>A list of AWS Glue job names.</returns>
public async Task<List<string>> ListJobsAsync()
{
    var jobNames = new List<string>();

    var listJobsPaginator = _amazonGlue.Paginators.ListJobs(new ListJobsRequest
    { MaxResults = 10 });
    await foreach (var response in listJobsPaginator.Responses)
    {
        jobNames.AddRange(response.JobNames);
    }

    return jobNames;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [ListJobs](#)。

StartCrawler

以下程式碼範例顯示如何使用 StartCrawler。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Start an AWS Glue crawler.
/// </summary>
/// <param name="crawlerName">The name of the crawler.</param>
/// <returns>A Boolean value indicating the success of the action.</returns>
public async Task<bool> StartCrawlerAsync(string crawlerName)
{
    var crawlerRequest = new StartCrawlerRequest
    {
        Name = crawlerName,
    };

    var response = await _amazonGlue.StartCrawlerAsync(crawlerRequest);

    return response.HttpStatusCode == System.Net.HttpStatusCode.OK;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [StartCrawler](#)。

StartJobRun

以下程式碼範例顯示如何使用 StartJobRun。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Start an AWS Glue job run.
/// </summary>
/// <param name="jobName">The name of the job.</param>
/// <returns>A string representing the job run Id.</returns>
public async Task<string> StartJobRunAsync(
    string jobName,
    string inputDatabase,
    string inputTable,
    string bucketName)
{
    var request = new StartJobRunRequest
    {
        JobName = jobName,
        Arguments = new Dictionary<string, string>
        {
            {"--input_database", inputDatabase},
            {"--input_table", inputTable},
            {"--output_bucket_url", $"s3://{bucketName}/"}
        }
    };

    var response = await _amazonGlue.StartJobRunAsync(request);
    return response.JobRunId;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [StartJobRun](#)。

使用的 IAM 範例 適用於 .NET 的 SDK

下列程式碼範例示範如何使用 適用於 .NET 的 AWS SDK 搭配 IAM 執行動作和實作常見案例。

基本概念是程式碼範例，這些範例說明如何在服務內執行基本操作。

Actions 是大型程式的程式碼摘錄，必須在內容中執行。雖然動作會告訴您如何呼叫個別服務函數，但您可以在其相關情境中查看內容中的動作。

案例是向您展示如何呼叫服務中的多個函數或與其他 AWS 服務組合來完成特定任務的程式碼範例。

每個範例均包含完整原始碼的連結，您可在連結中找到如何設定和執行內容中程式碼的相關指示。

主題

- [開始使用](#)
- [基本概念](#)
- [動作](#)
- [案例](#)

開始使用

Hello IAM

下列程式碼範例說明如何開始使用 IAM。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
namespace IAMActions;

public class HelloIAM
{
    static async Task Main(string[] args)
    {
        // Getting started with AWS Identity and Access Management (IAM). List
        // the policies for the account.
        var iamClient = new AmazonIdentityManagementServiceClient();
```

```
var listPoliciesPaginator = iamClient.Paginators.ListPolicies(new
ListPoliciesRequest());
var policies = new List<ManagedPolicy>();

await foreach (var response in listPoliciesPaginator.Responses)
{
    policies.AddRange(response.Policies);
}

Console.WriteLine("Here are the policies defined for your account:\n");
policies.ForEach(policy =>
{
    Console.WriteLine($"Created:
{policy.CreateDate}\t{policy.PolicyName}\t{policy.Description}");
});
}
```

- 如需 API 詳細資訊，請參閱 適用於 .NET 的 AWS SDK API Reference 中的 [ListPolicies](#)。

基本概念

了解基本概念

下列程式碼範例示範如何建立使用者並擔任角色。

Warning

為避免安全風險，在開發專用軟體或使用真實資料時，請勿使用 IAM 使用者進行身分驗證。相反地，搭配使用聯合功能和身分提供者，例如 [AWS IAM Identity Center](#)。

- 建立沒有許可的使用者。
- 建立一個可授予許可的角色，以列出帳戶的 Amazon S3 儲存貯體。
- 新增政策，讓使用者擔任該角色。
- 使用暫時憑證，擔任角色並列出 S3 儲存貯體，然後清理資源。

適用於 .NET 的 SDK

 Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
global using Amazon.IdentityManagement;
global using Amazon.S3;
global using Amazon.SecurityToken;
global using IAMActions;
global using IamScenariosCommon;
global using Microsoft.Extensions.DependencyInjection;
global using Microsoft.Extensions.Hosting;
global using Microsoft.Extensions.Logging;
global using Microsoft.Extensions.Logging.Console;
global using Microsoft.Extensions.Logging.Debug;

namespace IAMActions;

public class IAMWrapper
{
    private readonly IAmazonIdentityManagementService _IAMService;

    /// <summary>
    /// Constructor for the IAMWrapper class.
    /// </summary>
    /// <param name="IAMService">An IAM client object.</param>
    public IAMWrapper(IAmazonIdentityManagementService IAMService)
    {
        _IAMService = IAMService;
    }

    /// <summary>
    /// Attach an IAM policy to a role.
    /// </summary>
    /// <param name="policyArn">The policy to attach.</param>
    /// <param name="roleName">The role that the policy will be attached to.</param>
    /// <returns>A Boolean value indicating the success of the action.</returns>
    public async Task<bool> AttachRolePolicyAsync(string policyArn, string roleName)
```

```
{
    var response = await _IAMService.AttachRolePolicyAsync(new
AttachRolePolicyRequest
    {
        PolicyArn = policyArn,
        RoleName = roleName,
    });

    return response.HttpStatusCode == System.Net.HttpStatusCode.OK;
}

/// <summary>
/// Create an IAM access key for a user.
/// </summary>
/// <param name="userName">The username for which to create the IAM access
/// key.</param>
/// <returns>The AccessKey.</returns>
public async Task<AccessKey> CreateAccessKeyAsync(string userName)
{
    var response = await _IAMService.CreateAccessKeyAsync(new
CreateAccessKeyRequest
    {
        UserName = userName,
    });

    return response.AccessKey;
}

/// <summary>
/// Create an IAM policy.
/// </summary>
/// <param name="policyName">The name to give the new IAM policy.</param>
/// <param name="policyDocument">The policy document for the new policy.</param>
/// <returns>The new IAM policy object.</returns>
public async Task<ManagedPolicy> CreatePolicyAsync(string policyName, string
policyDocument)
{
    var response = await _IAMService.CreatePolicyAsync(new CreatePolicyRequest
    {
        PolicyDocument = policyDocument,
        PolicyName = policyName,
```

```

    });

    return response.Policy;
}

/// <summary>
/// Create a new IAM role.
/// </summary>
/// <param name="roleName">The name of the IAM role.</param>
/// <param name="rolePolicyDocument">The name of the IAM policy document
/// for the new role.</param>
/// <returns>The Amazon Resource Name (ARN) of the role.</returns>
public async Task<string> CreateRoleAsync(string roleName, string
rolePolicyDocument)
{
    var request = new CreateRoleRequest
    {
        RoleName = roleName,
        AssumeRolePolicyDocument = rolePolicyDocument,
    };

    var response = await _IAMService.CreateRoleAsync(request);
    return response.Role.Arn;
}

/// <summary>
/// Create an IAM service-linked role.
/// </summary>
/// <param name="serviceName">The name of the AWS Service.</param>
/// <param name="description">A description of the IAM service-linked role.</
param>
/// <returns>The IAM role that was created.</returns>
public async Task<Role> CreateServiceLinkedRoleAsync(string serviceName, string
description)
{
    var request = new CreateServiceLinkedRoleRequest
    {
        AWSServiceName = serviceName,
        Description = description
    };

    var response = await _IAMService.CreateServiceLinkedRoleAsync(request);

```



```

        return response.Role;
    }

    /// <summary>
    /// Create an IAM user.
    /// </summary>
    /// <param name="userName">The username for the new IAM user.</param>
    /// <returns>The IAM user that was created.</returns>
    public async Task<User> CreateUserAsync(string userName)
    {
        var response = await _IAMService.CreateUserAsync(new CreateUserRequest
        { UserName = userName });
        return response.User;
    }

    /// <summary>
    /// Delete an IAM user's access key.
    /// </summary>
    /// <param name="accessKeyId">The Id for the IAM access key.</param>
    /// <param name="userName">The username of the user that owns the IAM
    /// access key.</param>
    /// <returns>A Boolean value indicating the success of the action.</returns>
    public async Task<bool> DeleteAccessKeyAsync(string accessKeyId, string
    userName)
    {
        var response = await _IAMService.DeleteAccessKeyAsync(new
        DeleteAccessKeyRequest
        {
            AccessKeyId = accessKeyId,
            UserName = userName,
        });

        return response.HttpStatusCode == System.Net.HttpStatusCode.OK;
    }

    /// <summary>
    /// Delete an IAM policy.
    /// </summary>
    /// <param name="policyArn">The Amazon Resource Name (ARN) of the policy to
    /// delete.</param>
    /// <returns>A Boolean value indicating the success of the action.</returns>

```

```
public async Task<bool> DeletePolicyAsync(string policyArn)
{
    var response = await _IAMService.DeletePolicyAsync(new DeletePolicyRequest
{ PolicyArn = policyArn });
    return response.HttpStatusCode == System.Net.HttpStatusCode.OK;
}

/// <summary>
/// Delete an IAM role.
/// </summary>
/// <param name="roleName">The name of the IAM role to delete.</param>
/// <returns>A Boolean value indicating the success of the action.</returns>
public async Task<bool> DeleteRoleAsync(string roleName)
{
    var response = await _IAMService.DeleteRoleAsync(new DeleteRoleRequest
{ RoleName = roleName });
    return response.HttpStatusCode == System.Net.HttpStatusCode.OK;
}

/// <summary>
/// Delete an IAM role policy.
/// </summary>
/// <param name="roleName">The name of the IAM role.</param>
/// <param name="policyName">The name of the IAM role policy to delete.</param>
/// <returns>A Boolean value indicating the success of the action.</returns>
public async Task<bool> DeleteRolePolicyAsync(string roleName, string
policyName)
{
    var response = await _IAMService.DeleteRolePolicyAsync(new
DeleteRolePolicyRequest
    {
        PolicyName = policyName,
        RoleName = roleName,
    });

    return response.HttpStatusCode == System.Net.HttpStatusCode.OK;
}

/// <summary>
/// Delete an IAM user.
/// </summary>
```

```

    /// <param name="userName">The username of the IAM user to delete.</param>
    /// <returns>A Boolean value indicating the success of the action.</returns>
    public async Task<bool> DeleteUserAsync(string userName)
    {
        var response = await _IAMService.DeleteUserAsync(new DeleteUserRequest
        { UserName = userName });

        return response.HttpStatusCode == System.Net.HttpStatusCode.OK;
    }

    /// <summary>
    /// Delete an IAM user policy.
    /// </summary>
    /// <param name="policyName">The name of the IAM policy to delete.</param>
    /// <param name="userName">The username of the IAM user.</param>
    /// <returns>A Boolean value indicating the success of the action.</returns>
    public async Task<bool> DeleteUserPolicyAsync(string policyName, string
    userName)
    {
        var response = await _IAMService.DeleteUserPolicyAsync(new
        DeleteUserPolicyRequest { PolicyName = policyName, UserName = userName });

        return response.HttpStatusCode == System.Net.HttpStatusCode.OK;
    }

    /// <summary>
    /// Detach an IAM policy from an IAM role.
    /// </summary>
    /// <param name="policyArn">The Amazon Resource Name (ARN) of the IAM policy.</
    param>
    /// <param name="roleName">The name of the IAM role.</param>
    /// <returns>A Boolean value indicating the success of the action.</returns>
    public async Task<bool> DetachRolePolicyAsync(string policyArn, string roleName)
    {
        var response = await _IAMService.DetachRolePolicyAsync(new
        DetachRolePolicyRequest
        {
            PolicyArn = policyArn,
            RoleName = roleName,
        });

        return response.HttpStatusCode == System.Net.HttpStatusCode.OK;
    }

```

```
}

/// <summary>
/// Gets the IAM password policy for an AWS account.
/// </summary>
/// <returns>The PasswordPolicy for the AWS account.</returns>
public async Task<PasswordPolicy> GetAccountPasswordPolicyAsync()
{
    var response = await _IAMService.GetAccountPasswordPolicyAsync(new
GetAccountPasswordPolicyRequest());
    return response.PasswordPolicy;
}

/// <summary>
/// Get information about an IAM policy.
/// </summary>
/// <param name="policyArn">The IAM policy to retrieve information for.</param>
/// <returns>The IAM policy.</returns>
public async Task<ManagedPolicy> GetPolicyAsync(string policyArn)
{
    var response = await _IAMService.GetPolicyAsync(new GetPolicyRequest
{ PolicyArn = policyArn });
    return response.Policy;
}

/// <summary>
/// Get information about an IAM role.
/// </summary>
/// <param name="roleName">The name of the IAM role to retrieve information
/// for.</param>
/// <returns>The IAM role that was retrieved.</returns>
public async Task<Role> GetRoleAsync(string roleName)
{
    var response = await _IAMService.GetRoleAsync(new GetRoleRequest
    {
        RoleName = roleName,
    });

    return response.Role;
}
```

```
/// <summary>
/// Get information about an IAM user.
/// </summary>
/// <param name="userName">The username of the user.</param>
/// <returns>An IAM user object.</returns>
public async Task<User> GetUserAsync(string userName)
{
    var response = await _IAMService.GetUserAsync(new GetUserRequest { UserName
= userName });
    return response.User;
}

/// <summary>
/// List the IAM role policies that are attached to an IAM role.
/// </summary>
/// <param name="roleName">The IAM role to list IAM policies for.</param>
/// <returns>A list of the IAM policies attached to the IAM role.</returns>
public async Task<List<AttachedPolicyType>> ListAttachedRolePoliciesAsync(string
roleName)
{
    var attachedPolicies = new List<AttachedPolicyType>();
    var attachedRolePoliciesPaginator =
_IAMService.Paginators.ListAttachedRolePolicies(new ListAttachedRolePoliciesRequest
{ RoleName = roleName });

    await foreach (var response in attachedRolePoliciesPaginator.Responses)
    {
        attachedPolicies.AddRange(response.AttachedPolicies);
    }

    return attachedPolicies;
}

/// <summary>
/// List IAM groups.
/// </summary>
/// <returns>A list of IAM groups.</returns>
public async Task<List<Group>> ListGroupsAsync()
{
```

```
        var groupsPaginator = _IAMService.Paginators.ListGroups(new
ListGroupsRequest());
        var groups = new List<Group>();

        await foreach (var response in groupsPaginator.Responses)
        {
            groups.AddRange(response.Groups);
        }

        return groups;
    }

    /// <summary>
    /// List IAM policies.
    /// </summary>
    /// <returns>A list of the IAM policies.</returns>
    public async Task<List<ManagedPolicy>> ListPoliciesAsync()
    {
        var listPoliciesPaginator = _IAMService.Paginators.ListPolicies(new
ListPoliciesRequest());
        var policies = new List<ManagedPolicy>();

        await foreach (var response in listPoliciesPaginator.Responses)
        {
            policies.AddRange(response.Policies);
        }

        return policies;
    }

    /// <summary>
    /// List IAM role policies.
    /// </summary>
    /// <param name="roleName">The IAM role for which to list IAM policies.</param>
    /// <returns>A list of IAM policy names.</returns>
    public async Task<List<string>> ListRolePoliciesAsync(string roleName)
    {
        var listRolePoliciesPaginator = _IAMService.Paginators.ListRolePolicies(new
ListRolePoliciesRequest { RoleName = roleName });
        var policyNames = new List<string>();

        await foreach (var response in listRolePoliciesPaginator.Responses)
```

```
        {
            policyNames.AddRange(response.PolicyNames);
        }

        return policyNames;
    }

    /// <summary>
    /// List IAM roles.
    /// </summary>
    /// <returns>A list of IAM roles.</returns>
    public async Task<List<Role>> ListRolesAsync()
    {
        var listRolesPaginator = _IAMService.Paginators.ListRoles(new
ListRolesRequest());
        var roles = new List<Role>();

        await foreach (var response in listRolesPaginator.Responses)
        {
            roles.AddRange(response.Roles);
        }

        return roles;
    }

    /// <summary>
    /// List SAML authentication providers.
    /// </summary>
    /// <returns>A list of SAML providers.</returns>
    public async Task<List<SAMLProviderListEntry>> ListSAMLProvidersAsync()
    {
        var response = await _IAMService.ListSAMLProvidersAsync(new
ListSAMLProvidersRequest());
        return response.SAMLProviderList;
    }

    /// <summary>
    /// List IAM users.
    /// </summary>
    /// <returns>A list of IAM users.</returns>
    public async Task<List<User>> ListUsersAsync()
```

```

    {
        var listUsersPaginator = _IAMService.Paginators.ListUsers(new
ListUsersRequest());
        var users = new List<User>();

        await foreach (var response in listUsersPaginator.Responses)
        {
            users.AddRange(response.Users);
        }

        return users;
    }

    /// <summary>
    /// Update the inline policy document embedded in a role.
    /// </summary>
    /// <param name="policyName">The name of the policy to embed.</param>
    /// <param name="roleName">The name of the role to update.</param>
    /// <param name="policyDocument">The policy document that defines the role.</
param>
    /// <returns>A Boolean value indicating the success of the action.</returns>
    public async Task<bool> PutRolePolicyAsync(string policyName, string roleName,
string policyDocument)
    {
        var request = new PutRolePolicyRequest
        {
            PolicyName = policyName,
            RoleName = roleName,
            PolicyDocument = policyDocument
        };

        var response = await _IAMService.PutRolePolicyAsync(request);
        return response.HttpStatusCode == HttpStatusCode.OK;
    }

    /// <summary>
    /// Add or update an inline policy document that is embedded in an IAM user.
    /// </summary>
    /// <param name="userName">The name of the IAM user.</param>
    /// <param name="policyName">The name of the IAM policy.</param>
    /// <param name="policyDocument">The policy document defining the IAM policy.</
param>

```



```
/// <returns>A Boolean value indicating the success of the action.</returns>
public async Task<bool> PutUserPolicyAsync(string userName, string policyName,
string policyDocument)
{
    var request = new PutUserPolicyRequest
    {
        UserName = userName,
        PolicyName = policyName,
        PolicyDocument = policyDocument
    };

    var response = await _IAMService.PutUserPolicyAsync(request);
    return response.HttpStatusCode == System.Net.HttpStatusCode.OK;
}

/// <summary>
/// Wait for a new access key to be ready to use.
/// </summary>
/// <param name="accessKeyId">The Id of the access key.</param>
/// <returns>A boolean value indicating the success of the action.</returns>
public async Task<bool> WaitUntilAccessKeyIsReady(string accessKeyId)
{
    var keyReady = false;

    do
    {
        try
        {
            var response = await _IAMService.GetAccessKeyLastUsedAsync(
                new GetAccessKeyLastUsedRequest { AccessKeyId = accessKeyId });
            if (response.UserName is not null)
            {
                keyReady = true;
            }
        }
        catch (NoSuchEntityException)
        {
            keyReady = false;
        }
    } while (!keyReady);

    return keyReady;
}
}
```

```
using Microsoft.Extensions.Configuration;

namespace IAMBasics;

public class IAMBasics
{
    private static ILogger logger = null!;

    static async Task Main(string[] args)
    {
        // Set up dependency injection for the AWS service.
        using var host = Host.CreateDefaultBuilder(args)
            .ConfigureLogging(logging =>
                logging.AddFilter("System", LogLevel.Debug)
                    .AddFilter<DebugLoggerProvider>("Microsoft",
LogLevel.Information)
                    .AddFilter<ConsoleLoggerProvider>("Microsoft", LogLevel.Trace))
            .ConfigureServices((_, services) =>
                services.AddAWSService<IAmazonIdentityManagementService>()
                    .AddTransient<IAMWrapper>()
                    .AddTransient<UIWrapper>()
                )
            .Build();

        logger = LoggerFactory.Create(builder => { builder.AddConsole(); })
            .CreateLogger<IAMBasics>();

        IConfiguration configuration = new ConfigurationBuilder()
            .SetBasePath(Directory.GetCurrentDirectory())
            .AddJsonFile("settings.json") // Load test settings from .json file.
            .AddJsonFile("settings.local.json",
                true) // Optionally load local settings.
            .Build();

        // Values needed for user, role, and policies.
        string userName = configuration["UserName"]!;
        string s3PolicyName = configuration["S3PolicyName"]!;
        string roleName = configuration["RoleName"]!;
```

```

var iamWrapper = host.Services.GetRequiredService<IAMWrapper>();
var uiWrapper = host.Services.GetRequiredService<UIWrapper>();

uiWrapper.DisplayBasicsOverview();
uiWrapper.PressEnter();

// First create a user. By default, the new user has
// no permissions.
uiWrapper.DisplayTitle("Create User");
Console.WriteLine($"Creating a new user with user name: {userName}.");
var user = await iamWrapper.CreateUserAsync(userName);
var userArn = user.Arn;

Console.WriteLine($"Successfully created user: {userName} with ARN:
{userArn}.");
uiWrapper.WaitABit(15, "Now let's wait for the user to be ready for use.");

// Define a role policy document that allows the new user
// to assume the role.
string assumeRolePolicyDocument = "{" +
    "\"Version\": \"2012-10-17\"," +
    "\"Statement\": [{" +
        "\"Effect\": \"Allow\"," +
        "\"Principal\": {" +
            "\"AWS\": \"{userArn}\"" +
        "}," +
        "\"Action\": \"sts:AssumeRole\"" +
    "}]}" +
    "}";

// Permissions to list all buckets.
string policyDocument = "{" +
    "\"Version\": \"2012-10-17\"," +
    "\"Statement\" : [{" +
        "\"Action\" : [\"s3:ListAllMyBuckets\"]," +
        "\"Effect\" : \"Allow\"," +
        "\"Resource\" : \"*\"," +
    "}]}" +
    "}";

// Create an AccessKey for the user.
uiWrapper.DisplayTitle("Create access key");
Console.WriteLine("Now let's create an access key for the new user.");
var accessKey = await iamWrapper.CreateAccessKeyAsync(userName);

```

```
var accessKeyId = accessKey.AccessKeyId;
var secretAccessKey = accessKey.SecretAccessKey;

Console.WriteLine($"We have created the access key with Access key id:
{accessKeyId}.");

Console.WriteLine("Now let's wait until the IAM access key is ready to
use.");
var keyReady = await iamWrapper.WaitUntilAccessKeyIsReady(accessKeyId);

// Now try listing the Amazon Simple Storage Service (Amazon S3)
// buckets. This should fail at this point because the user doesn't
// have permissions to perform this task.
uiWrapper.DisplayTitle("Try to display Amazon S3 buckets");
Console.WriteLine("Now let's try to display a list of the user's Amazon S3
buckets.");
var s3Client1 = new AmazonS3Client(accessKeyId, secretAccessKey);
var stsClient1 = new AmazonSecurityTokenServiceClient(accessKeyId,
secretAccessKey);

var s3Wrapper = new S3Wrapper(s3Client1, stsClient1);
var buckets = await s3Wrapper.ListMyBucketsAsync();

Console.WriteLine(buckets is null
    ? "As expected, the call to list the buckets has returned a null list."
    : "Something went wrong. This shouldn't have worked.");

uiWrapper.PressEnter();

uiWrapper.DisplayTitle("Create IAM role");
Console.WriteLine($"Creating the role: {roleName}");

// Creating an IAM role to allow listing the S3 buckets. A role name
// is not case sensitive and must be unique to the account for which it
// is created.
var roleArn = await iamWrapper.CreateRoleAsync(roleName,
assumeRolePolicyDocument);

uiWrapper.PressEnter();

// Create a policy with permissions to list S3 buckets.
uiWrapper.DisplayTitle("Create IAM policy");
Console.WriteLine($"Creating the policy: {s3PolicyName}");
```

```
        Console.WriteLine("with permissions to list the Amazon S3 buckets for the
account.");
        var policy = await iamWrapper.CreatePolicyAsync(s3PolicyName,
policyDocument);

        // Wait 15 seconds for the IAM policy to be available.
        uiWrapper.WaitABit(15, "Waiting for the policy to be available.");

        // Attach the policy to the role you created earlier.
        uiWrapper.DisplayTitle("Attach new IAM policy");
        Console.WriteLine("Now let's attach the policy to the role.");
        await iamWrapper.AttachRolePolicyAsync(policy.Arn, roleName);

        // Wait 15 seconds for the role to be updated.
        Console.WriteLine();
        uiWrapper.WaitABit(15, "Waiting for the policy to be attached.");

        // Use the AWS Security Token Service (AWS STS) to have the user
        // assume the role we created.
        var stsClient2 = new AmazonSecurityTokenServiceClient(accessKeyId,
secretAccessKey);

        // Wait for the new credentials to become valid.
        uiWrapper.WaitABit(10, "Waiting for the credentials to be valid.");

        var assumedRoleCredentials = await s3Wrapper.AssumeS3RoleAsync("temporary-
session", roleArn);

        // Try again to list the buckets using the client created with
        // the new user's credentials. This time, it should work.
        var s3Client2 = new AmazonS3Client(assumedRoleCredentials);

        s3Wrapper.UpdateClients(s3Client2, stsClient2);

        buckets = await s3Wrapper.ListMyBucketsAsync();

        uiWrapper.DisplayTitle("List Amazon S3 buckets");
        Console.WriteLine("This time we should have buckets to list.");
        if (buckets is not null)
        {
            buckets.ForEach(bucket =>
            {
                Console.WriteLine($"{bucket.BucketName} created:
{bucket.CreationDate}");
            });
        }
    }
}
```

```

        });
    }

    uiWrapper.PressEnter();

    // Now clean up all the resources used in the example.
    uiWrapper.DisplayTitle("Clean up resources");
    Console.WriteLine("Thank you for watching. The IAM Basics demo is
complete.");
    Console.WriteLine("Please wait while we clean up the resources we
created.");

    await iamWrapper.DetachRolePolicyAsync(policy.Arn, roleName);

    await iamWrapper.DeletePolicyAsync(policy.Arn);

    await iamWrapper.DeleteRoleAsync(roleName);

    await iamWrapper.DeleteAccessKeyAsync(accessKeyId, userName);

    await iamWrapper.DeleteUserAsync(userName);

    uiWrapper.PressEnter();

    Console.WriteLine("All done cleaning up our resources. Thank you for your
patience.");
    }
}

namespace IamScenariosCommon;

using System.Net;

/// <summary>
/// A class to perform Amazon Simple Storage Service (Amazon S3) actions for
/// the IAM Basics scenario.
/// </summary>
public class S3Wrapper
{
    private IAmazonS3 _s3Service;
    private IAmazonSecurityTokenService _stsService;

    /// <summary>

```

```

    /// Constructor for the S3Wrapper class.
    /// </summary>
    /// <param name="s3Service">An Amazon S3 client object.</param>
    /// <param name="stsService">An AWS Security Token Service (AWS STS)
    /// client object.</param>
    public S3Wrapper(IAmazonS3 s3Service, IAmazonSecurityTokenService stsService)
    {
        _s3Service = s3Service;
        _stsService = stsService;
    }

    /// <summary>
    /// Assumes an AWS Identity and Access Management (IAM) role that allows
    /// Amazon S3 access for the current session.
    /// </summary>
    /// <param name="roleSession">A string representing the current session.</param>
    /// <param name="roleToAssume">The name of the IAM role to assume.</param>
    /// <returns>Credentials for the newly assumed IAM role.</returns>
    public async Task<Credentials> AssumeS3RoleAsync(string roleSession, string
roleToAssume)
    {
        // Create the request to use with the AssumeRoleAsync call.
        var request = new AssumeRoleRequest()
        {
            RoleSessionName = roleSession,
            RoleArn = roleToAssume,
        };

        var response = await _stsService.AssumeRoleAsync(request);

        return response.Credentials;
    }

    /// <summary>
    /// Delete an S3 bucket.
    /// </summary>
    /// <param name="bucketName">Name of the S3 bucket to delete.</param>
    /// <returns>A Boolean value indicating the success of the action.</returns>
    public async Task<bool> DeleteBucketAsync(string bucketName)
    {
        var result = await _s3Service.DeleteBucketAsync(new DeleteBucketRequest
{ BucketName = bucketName });
        return result.HttpStatusCode == HttpStatusCode.OK;
    }

```

```

    }

    /// <summary>
    /// List the buckets that are owned by the user's account.
    /// </summary>
    /// <returns>Async Task.</returns>
    public async Task<List<S3Bucket>?> ListMyBucketsAsync()
    {
        try
        {
            // Get the list of buckets accessible by the new user.
            var response = await _s3Service.ListBucketsAsync();

            return response.Buckets;
        }
        catch (AmazonS3Exception ex)
        {
            // Something else went wrong. Display the error message.
            Console.WriteLine($"Error: {ex.Message}");
            return null;
        }
    }

    /// <summary>
    /// Create a new S3 bucket.
    /// </summary>
    /// <param name="bucketName">The name for the new bucket.</param>
    /// <returns>A Boolean value indicating whether the action completed
    /// successfully.</returns>
    public async Task<bool> PutBucketAsync(string bucketName)
    {
        var response = await _s3Service.PutBucketAsync(new PutBucketRequest
        { BucketName = bucketName });
        return response.HttpStatusCode == HttpStatusCode.OK;
    }

    /// <summary>
    /// Update the client objects with new client objects. This is available
    /// because the scenario uses the methods of this class without and then
    /// with the proper permissions to list S3 buckets.
    /// </summary>
    /// <param name="s3Service">The Amazon S3 client object.</param>
    /// <param name="stsService">The AWS STS client object.</param>

```



```
        public void UpdateClients(IAmazonS3 s3Service, IAmazonSecurityTokenService
stsService)
        {
            _s3Service = s3Service;
            _stsService = stsService;
        }
    }

namespace IamScenariosCommon;

public class UIWrapper
{
    public readonly string SepBar = new('-', Console.WindowWidth);

    /// <summary>
    /// Show information about the IAM Groups scenario.
    /// </summary>
    public void DisplayGroupsOverview()
    {
        Console.Clear();

        DisplayTitle("Welcome to the IAM Groups Demo");
        Console.WriteLine("This example application does the following:");
        Console.WriteLine("\t1. Creates an Amazon Identity and Access Management
(IAM) group.");
        Console.WriteLine("\t2. Adds an IAM policy to the IAM group giving it full
access to Amazon S3.");
        Console.WriteLine("\t3. Creates a new IAM user.");
        Console.WriteLine("\t4. Creates an IAM access key for the user.");
        Console.WriteLine("\t5. Adds the user to the IAM group.");
        Console.WriteLine("\t6. Lists the buckets on the account.");
        Console.WriteLine("\t7. Proves that the user has full Amazon S3 access by
creating a bucket.");
        Console.WriteLine("\t8. List the buckets again to show the new bucket.");
        Console.WriteLine("\t9. Cleans up all the resources created.");
    }

    /// <summary>
    /// Show information about the IAM Basics scenario.
    /// </summary>
    public void DisplayBasicsOverview()
    {
        Console.Clear();
    }
}
```

```

        DisplayTitle("Welcome to IAM Basics");
        Console.WriteLine("This example application does the following:");
        Console.WriteLine("\t1. Creates a user with no permissions.");
        Console.WriteLine("\t2. Creates a role and policy that grant
s3:ListAllMyBuckets permission.");
        Console.WriteLine("\t3. Grants the user permission to assume the role.");
        Console.WriteLine("\t4. Creates an S3 client object as the user and tries to
list buckets (this will fail).");
        Console.WriteLine("\t5. Gets temporary credentials by assuming the role.");
        Console.WriteLine("\t6. Creates a new S3 client object with the temporary
credentials and lists the buckets (this will succeed).");
        Console.WriteLine("\t7. Deletes all the resources.");
    }

    /// <summary>
    /// Display a message and wait until the user presses enter.
    /// </summary>
    public void PressEnter()
    {
        Console.Write("\nPress <Enter> to continue. ");
        _ = Console.ReadLine();
        Console.WriteLine();
    }

    /// <summary>
    /// Pad a string with spaces to center it on the console display.
    /// </summary>
    /// <param name="strToCenter">The string to be centered.</param>
    /// <returns>The padded string.</returns>
    public string CenterString(string strToCenter)
    {
        var padAmount = (Console.WindowWidth - strToCenter.Length) / 2;
        var leftPad = new string(' ', padAmount);
        return $"{leftPad}{strToCenter}";
    }

    /// <summary>
    /// Display a line of hyphens, the centered text of the title, and another
    /// line of hyphens.
    /// </summary>
    /// <param name="strTitle">The string to be displayed.</param>
    public void DisplayTitle(string strTitle)
    {

```

```
        Console.WriteLine(SepBar);
        Console.WriteLine(CenterString(strTitle));
        Console.WriteLine(SepBar);
    }

    /// <summary>
    /// Display a countdown and wait for a number of seconds.
    /// </summary>
    /// <param name="numSeconds">The number of seconds to wait.</param>
    public void WaitABit(int numSeconds, string msg)
    {
        Console.WriteLine(msg);

        // Wait for the requested number of seconds.
        for (int i = numSeconds; i > 0; i--)
        {
            System.Threading.Thread.Sleep(1000);
            Console.Write($"{i}...");
        }

        PressEnter();
    }
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的下列主題。

- [AttachRolePolicy](#)
- [CreateAccessKey](#)
- [CreatePolicy](#)
- [CreateRole](#)
- [CreateUser](#)
- [DeleteAccessKey](#)
- [DeletePolicy](#)
- [DeleteRole](#)
- [DeleteUser](#)
- [DeleteUserPolicy](#)
- [DetachRolePolicy](#)

- [PutUserPolicy](#)

動作

AttachRolePolicy

以下程式碼範例顯示如何使用 AttachRolePolicy。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Attach an IAM policy to a role.
/// </summary>
/// <param name="policyArn">The policy to attach.</param>
/// <param name="roleName">The role that the policy will be attached to.</param>
/// <returns>A Boolean value indicating the success of the action.</returns>
public async Task<bool> AttachRolePolicyAsync(string policyArn, string roleName)
{
    var response = await _IAMService.AttachRolePolicyAsync(new
AttachRolePolicyRequest
    {
        PolicyArn = policyArn,
        RoleName = roleName,
    });

    return response.HttpStatusCode == System.Net.HttpStatusCode.OK;
}
```

- 如需 API 詳細資訊，請參閱 適用於 .NET 的 AWS SDK API Reference 中的 [AttachRolePolicy](#)。

CreateAccessKey

以下程式碼範例顯示如何使用 CreateAccessKey。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Create an IAM access key for a user.
/// </summary>
/// <param name="userName">The username for which to create the IAM access
/// key.</param>
/// <returns>The AccessKey.</returns>
public async Task<AccessKey> CreateAccessKeyAsync(string userName)
{
    var response = await _IAMService.CreateAccessKeyAsync(new
CreateAccessKeyRequest
    {
        UserName = userName,
    });

    return response.AccessKey;
}
```

- 如需 API 詳細資訊，請參閱 適用於 .NET 的 AWS SDK API Reference 中的 [CreateAccessKey](#)。

CreateInstanceProfile

以下程式碼範例顯示如何使用 CreateInstanceProfile。

適用於 .NET 的 SDK

 Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```

    /// <summary>
    /// Create a policy, role, and profile that is associated with instances with a
    specified name.
    /// An instance's associated profile defines a role that is assumed by the
    /// instance. The role has attached policies that specify the AWS permissions
    granted to
    /// clients that run on the instance.
    /// </summary>
    /// <param name="policyName">Name to use for the policy.</param>
    /// <param name="roleName">Name to use for the role.</param>
    /// <param name="profileName">Name to use for the profile.</param>
    /// <param name="ssmOnlyPolicyFile">Path to a policy file for SSM.</param>
    /// <param name="awsManagedPolicies">AWS Managed policies to be attached to the
    role.</param>
    /// <returns>The Arn of the profile.</returns>
    public async Task<string> CreateInstanceProfileWithName(
        string policyName,
        string roleName,
        string profileName,
        string ssmOnlyPolicyFile,
        List<string>? awsManagedPolicies = null)
    {

        var assumeRoleDoc = "{" +
                                "\"Version\": \"2012-10-17\", " +
                                "\"Statement\": [{ " +
                                    "\"Effect\": \"Allow\", " +
                                    "\"Principal\": { " +
                                        "\"Service\": [ " +
                                            "\"ec2.amazonaws.com\" " +
                                        "], " +
                                    "}, " +
                                "\"Action\": \"sts:AssumeRole\" " +
                                "}] " +

```

```
        "});

    var policyDocument = await File.ReadAllTextAsync(ssmOnlyPolicyFile);

    var policyArn = "";

    try
    {
        var createPolicyResult = await _amazonIam.CreatePolicyAsync(
            new CreatePolicyRequest
            {
                PolicyName = policyName,
                PolicyDocument = policyDocument
            });
        policyArn = createPolicyResult.Policy.Arn;
    }
    catch (EntityAlreadyExistsException)
    {
        // The policy already exists, so we look it up to get the Arn.
        var policiesPaginator = _amazonIam.Paginators.ListPolicies(
            new ListPoliciesRequest()
            {
                Scope = PolicyScopeType.Local
            });
        // Get the entire list using the paginator.
        await foreach (var policy in policiesPaginator.Policies)
        {
            if (policy.PolicyName.Equals(policyName))
            {
                policyArn = policy.Arn;
            }
        }

        if (policyArn == null)
        {
            throw new InvalidOperationException("Policy not found");
        }
    }

    try
    {
        await _amazonIam.CreateRoleAsync(new CreateRoleRequest()
        {
            RoleName = roleName,
```

```

        AssumeRolePolicyDocument = assumeRoleDoc,
    });
    await _amazonIam.AttachRolePolicyAsync(new AttachRolePolicyRequest()
    {
        RoleName = roleName,
        PolicyArn = policyArn
    });
    if (awsManagedPolicies != null)
    {
        foreach (var awsPolicy in awsManagedPolicies)
        {
            await _amazonIam.AttachRolePolicyAsync(new
AttachRolePolicyRequest()
            {
                PolicyArn = $"arn:aws:iam::aws:policy/{awsPolicy}",
                RoleName = roleName
            });
        }
    }
}
catch (EntityAlreadyExistsException)
{
    Console.WriteLine("Role already exists.");
}

string profileArn = "";
try
{
    var profileCreateResponse = await _amazonIam.CreateInstanceProfileAsync(
        new CreateInstanceProfileRequest()
        {
            InstanceProfileName = profileName
        });
    // Allow time for the profile to be ready.
    profileArn = profileCreateResponse.InstanceProfile.Arn;
    Thread.Sleep(10000);
    await _amazonIam.AddRoleToInstanceProfileAsync(
        new AddRoleToInstanceProfileRequest()
        {
            InstanceProfileName = profileName,
            RoleName = roleName
        });
}

```



```

        catch (EntityAlreadyExistsException)
        {
            Console.WriteLine("Policy already exists.");
            var profileGetResponse = await _amazonIam.GetInstanceProfileAsync(
                new GetInstanceProfileRequest()
                {
                    InstanceProfileName = profileName
                });
            profileArn = profileGetResponse.InstanceProfile.Arn;
        }
        return profileArn;
    }
}

```

- 如需 API 詳細資訊，請參閱 適用於 .NET 的 AWS SDK API Reference 中的 [CreateInstanceProfile](#)。

CreatePolicy

以下程式碼範例顯示如何使用 CreatePolicy。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```

/// <summary>
/// Create an IAM policy.
/// </summary>
/// <param name="policyName">The name to give the new IAM policy.</param>
/// <param name="policyDocument">The policy document for the new policy.</param>
/// <returns>The new IAM policy object.</returns>
public async Task<ManagedPolicy> CreatePolicyAsync(string policyName, string
policyDocument)
{
    var response = await _IAMService.CreatePolicyAsync(new CreatePolicyRequest
    {
        PolicyDocument = policyDocument,

```

```
        PolicyName = policyName,
    });

    return response.Policy;
}
```

- 如需 API 詳細資訊，請參閱 適用於 .NET 的 AWS SDK API Reference 中的 [CreatePolicy](#)。

CreateRole

以下程式碼範例顯示如何使用 CreateRole。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Create a new IAM role.
/// </summary>
/// <param name="roleName">The name of the IAM role.</param>
/// <param name="rolePolicyDocument">The name of the IAM policy document
/// for the new role.</param>
/// <returns>The Amazon Resource Name (ARN) of the role.</returns>
public async Task<string> CreateRoleAsync(string roleName, string
rolePolicyDocument)
{
    var request = new CreateRoleRequest
    {
        RoleName = roleName,
        AssumeRolePolicyDocument = rolePolicyDocument,
    };

    var response = await _IAMService.CreateRoleAsync(request);
    return response.Role.Arn;
}
```

- 如需 API 詳細資訊，請參閱 適用於 .NET 的 AWS SDK API Reference 中的 [CreateRole](#)。

CreateServiceLinkedRole

以下程式碼範例顯示如何使用 CreateServiceLinkedRole。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Create an IAM service-linked role.
/// </summary>
/// <param name="serviceName">The name of the AWS Service.</param>
/// <param name="description">A description of the IAM service-linked role.</
param>
/// <returns>The IAM role that was created.</returns>
public async Task<Role> CreateServiceLinkedRoleAsync(string serviceName, string
description)
{
    var request = new CreateServiceLinkedRoleRequest
    {
        AWSServiceName = serviceName,
        Description = description
    };

    var response = await _IAMService.CreateServiceLinkedRoleAsync(request);
    return response.Role;
}
```

- 如需 API 詳細資訊，請參閱 適用於 .NET 的 AWS SDK API Reference 中的 [CreateServiceLinkedRole](#)。

CreateUser

以下程式碼範例顯示如何使用 CreateUser。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Create an IAM user.
/// </summary>
/// <param name="userName">The username for the new IAM user.</param>
/// <returns>The IAM user that was created.</returns>
public async Task<User> CreateUserAsync(string userName)
{
    var response = await _IAMService.CreateUserAsync(new CreateUserRequest
    { UserName = userName });
    return response.User;
}
```

- 如需 API 詳細資訊，請參閱 適用於 .NET 的 AWS SDK API Reference 中的 [CreateUser](#)。

DeleteAccessKey

以下程式碼範例顯示如何使用 DeleteAccessKey。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```

    /// <summary>
    /// Delete an IAM user's access key.
    /// </summary>
    /// <param name="accessKeyId">The Id for the IAM access key.</param>
    /// <param name="userName">The username of the user that owns the IAM
    /// access key.</param>
    /// <returns>A Boolean value indicating the success of the action.</returns>
    public async Task<bool> DeleteAccessKeyAsync(string accessKeyId, string
    userName)
    {
        var response = await _IAMService.DeleteAccessKeyAsync(new
    DeleteAccessKeyRequest
        {
            AccessKeyId = accessKeyId,
            UserName = userName,
        });

        return response.HttpStatusCode == System.Net.HttpStatusCode.OK;
    }

```

- 如需 API 詳細資訊，請參閱 適用於 .NET 的 AWS SDK API Reference 中的 [DeleteAccessKey](#)。

DeleteInstanceProfile

以下程式碼範例顯示如何使用 DeleteInstanceProfile。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```

    /// <summary>
    /// Detaches a role from an instance profile, detaches policies from the role,
    /// and deletes all the resources.
    /// </summary>
    /// <param name="profileName">The name of the profile to delete.</param>

```

```

/// <param name="roleName">The name of the role to delete.</param>
/// <returns>Async task.</returns>
public async Task DeleteInstanceProfile(string profileName, string roleName)
{
    try
    {
        await _amazonIam.RemoveRoleFromInstanceProfileAsync(
            new RemoveRoleFromInstanceProfileRequest()
            {
                InstanceProfileName = profileName,
                RoleName = roleName
            });
        await _amazonIam.DeleteInstanceProfileAsync(
            new DeleteInstanceProfileRequest() { InstanceProfileName =
profileName });
        var attachedPolicies = await _amazonIam.ListAttachedRolePoliciesAsync(
            new ListAttachedRolePoliciesRequest() { RoleName = roleName });
        foreach (var policy in attachedPolicies.AttachedPolicies)
        {
            await _amazonIam.DetachRolePolicyAsync(
                new DetachRolePolicyRequest()
                {
                    RoleName = roleName,
                    PolicyArn = policy.PolicyArn
                });
            // Delete the custom policies only.
            if (!policy.PolicyArn.StartsWith("arn:aws:iam::aws"))
            {
                await _amazonIam.DeletePolicyAsync(
                    new Amazon.IdentityManagement.Model.DeletePolicyRequest()
                    {
                        PolicyArn = policy.PolicyArn
                    });
            }
        }

        await _amazonIam.DeleteRoleAsync(
            new DeleteRoleRequest() { RoleName = roleName });
    }
    catch (NoSuchEntityException)
    {
        Console.WriteLine($"Instance profile {profileName} does not exist.");
    }
}

```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [DeleteInstanceProfile](#)。

DeletePolicy

以下程式碼範例顯示如何使用 DeletePolicy。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Delete an IAM policy.
/// </summary>
/// <param name="policyArn">The Amazon Resource Name (ARN) of the policy to
/// delete.</param>
/// <returns>A Boolean value indicating the success of the action.</returns>
public async Task<bool> DeletePolicyAsync(string policyArn)
{
    var response = await _IAMService.DeletePolicyAsync(new DeletePolicyRequest
    { PolicyArn = policyArn });
    return response.HttpStatusCode == System.Net.HttpStatusCode.OK;
}
```

- 如需 API 詳細資訊，請參閱 適用於 .NET 的 AWS SDK API Reference 中的 [DeletePolicy](#)。

DeleteRole

以下程式碼範例顯示如何使用 DeleteRole。

適用於 .NET 的 SDK

 Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Delete an IAM role.
/// </summary>
/// <param name="roleName">The name of the IAM role to delete.</param>
/// <returns>A Boolean value indicating the success of the action.</returns>
public async Task<bool> DeleteRoleAsync(string roleName)
{
    var response = await _IAMService.DeleteRoleAsync(new DeleteRoleRequest
    { RoleName = roleName });
    return response.HttpStatusCode == System.Net.HttpStatusCode.OK;
}
```

- 如需 API 詳細資訊，請參閱 適用於 .NET 的 AWS SDK API Reference 中的 [DeleteRole](#)。

DeleteRolePolicy

以下程式碼範例顯示如何使用 DeleteRolePolicy。

適用於 .NET 的 SDK

 Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Delete an IAM role policy.
/// </summary>
/// <param name="roleName">The name of the IAM role.</param>
```



```

    /// <param name="policyName">The name of the IAM role policy to delete.</param>
    /// <returns>A Boolean value indicating the success of the action.</returns>
    public async Task<bool> DeleteRolePolicyAsync(string roleName, string
policyName)
    {
        var response = await _IAMService.DeleteRolePolicyAsync(new
DeleteRolePolicyRequest
        {
            PolicyName = policyName,
            RoleName = roleName,
        });

        return response.HttpStatusCode == System.Net.HttpStatusCode.OK;
    }

```

- 如需 API 詳細資訊，請參閱 適用於 .NET 的 AWS SDK API Reference 中的 [DeleteRolePolicy](#)。

DeleteUser

以下程式碼範例顯示如何使用 DeleteUser。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```

    /// <summary>
    /// Delete an IAM user.
    /// </summary>
    /// <param name="userName">The username of the IAM user to delete.</param>
    /// <returns>A Boolean value indicating the success of the action.</returns>
    public async Task<bool> DeleteUserAsync(string userName)
    {
        var response = await _IAMService.DeleteUserAsync(new DeleteUserRequest
{ UserName = userName });

        return response.HttpStatusCode == System.Net.HttpStatusCode.OK;
    }

```

```
}
```

- 如需 API 詳細資訊，請參閱 適用於 .NET 的 AWS SDK API Reference 中的 [DeleteUser](#)。

DeleteUserPolicy

以下程式碼範例顯示如何使用 DeleteUserPolicy。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Delete an IAM user policy.
/// </summary>
/// <param name="policyName">The name of the IAM policy to delete.</param>
/// <param name="userName">The username of the IAM user.</param>
/// <returns>A Boolean value indicating the success of the action.</returns>
public async Task<bool> DeleteUserPolicyAsync(string policyName, string
userName)
{
    var response = await _IAMService.DeleteUserPolicyAsync(new
DeleteUserPolicyRequest { PolicyName = policyName, UserName = userName });

    return response.HttpStatusCode == System.Net.HttpStatusCode.OK;
}
```

- 如需 API 詳細資訊，請參閱 適用於 .NET 的 AWS SDK API Reference 中的 [DeleteUserPolicy](#)。

DetachRolePolicy

以下程式碼範例顯示如何使用 DetachRolePolicy。

適用於 .NET 的 SDK

 Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Detach an IAM policy from an IAM role.
/// </summary>
/// <param name="policyArn">The Amazon Resource Name (ARN) of the IAM policy.</
param>
/// <param name="roleName">The name of the IAM role.</param>
/// <returns>A Boolean value indicating the success of the action.</returns>
public async Task<bool> DetachRolePolicyAsync(string policyArn, string roleName)
{
    var response = await _IAMService.DetachRolePolicyAsync(new
DetachRolePolicyRequest
    {
        PolicyArn = policyArn,
        RoleName = roleName,
    });

    return response.HttpStatusCode == System.Net.HttpStatusCode.OK;
}
```

- 如需 API 詳細資訊，請參閱 適用於 .NET 的 AWS SDK API Reference 中的 [DetachRolePolicy](#)。

GetAccountPasswordPolicy

以下程式碼範例顯示如何使用 GetAccountPasswordPolicy。

適用於 .NET 的 SDK

 Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Gets the IAM password policy for an AWS account.
/// </summary>
/// <returns>The PasswordPolicy for the AWS account.</returns>
public async Task<PasswordPolicy> GetAccountPasswordPolicyAsync()
{
    var response = await _IAMService.GetAccountPasswordPolicyAsync(new
    GetAccountPasswordPolicyRequest());
    return response.PasswordPolicy;
}
```

- 如需 API 詳細資訊，請參閱 適用於 .NET 的 AWS SDK API Reference 中的 [GetAccountPasswordPolicy](#)。

GetPolicy

以下程式碼範例顯示如何使用 GetPolicy。

適用於 .NET 的 SDK

 Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Get information about an IAM policy.
/// </summary>
```

```
/// <param name="policyArn">The IAM policy to retrieve information for.</param>
/// <returns>The IAM policy.</returns>
public async Task<ManagedPolicy> GetPolicyAsync(string policyArn)
{
    var response = await _IAMService.GetPolicyAsync(new GetPolicyRequest
    { PolicyArn = policyArn });
    return response.Policy;
}
```

- 如需 API 詳細資訊，請參閱 適用於 .NET 的 AWS SDK API Reference 中的 [GetPolicy](#)。

GetRole

以下程式碼範例顯示如何使用 GetRole。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Get information about an IAM role.
/// </summary>
/// <param name="roleName">The name of the IAM role to retrieve information
/// for.</param>
/// <returns>The IAM role that was retrieved.</returns>
public async Task<Role> GetRoleAsync(string roleName)
{
    var response = await _IAMService.GetRoleAsync(new GetRoleRequest
    {
        RoleName = roleName,
    });

    return response.Role;
}
```

- 如需 API 詳細資訊，請參閱 適用於 .NET 的 AWS SDK API Reference 中的 [GetRole](#)。

GetUser

以下程式碼範例顯示如何使用 GetUser。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Get information about an IAM user.
/// </summary>
/// <param name="userName">The username of the user.</param>
/// <returns>An IAM user object.</returns>
public async Task<User> GetUserAsync(string userName)
{
    var response = await _IAMService.GetUserAsync(new GetUserRequest { UserName
= userName });
    return response.User;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [GetUser](#)。

ListAttachedRolePolicies

以下程式碼範例顯示如何使用 ListAttachedRolePolicies。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// List the IAM role policies that are attached to an IAM role.
/// </summary>
/// <param name="roleName">The IAM role to list IAM policies for.</param>
/// <returns>A list of the IAM policies attached to the IAM role.</returns>
public async Task<List<AttachedPolicyType>> ListAttachedRolePoliciesAsync(string
roleName)
{
    var attachedPolicies = new List<AttachedPolicyType>();
    var attachedRolePoliciesPaginator =
_IAMService.Paginators.ListAttachedRolePolicies(new ListAttachedRolePoliciesRequest
{ RoleName = roleName });

    await foreach (var response in attachedRolePoliciesPaginator.Responses)
    {
        attachedPolicies.AddRange(response.AttachedPolicies);
    }

    return attachedPolicies;
}
```

- 如需 API 詳細資訊，請參閱 適用於 .NET 的 AWS SDK API Reference 中的 [ListAttachedRolePolicies](#)。

ListGroups

以下程式碼範例顯示如何使用 ListGroups。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// List IAM groups.
/// </summary>
/// <returns>A list of IAM groups.</returns>
public async Task<List<Group>> ListGroupsAsync()
{
    var groupsPaginator = _IAMService.Paginators.ListGroups(new
ListGroupsRequest());
    var groups = new List<Group>();

    await foreach (var response in groupsPaginator.Responses)
    {
        groups.AddRange(response.Groups);
    }

    return groups;
}
```

- 如需 API 詳細資訊，請參閱 適用於 .NET 的 AWS SDK API Reference 中的 [ListGroups](#)。

ListPolicies

以下程式碼範例顯示如何使用 ListPolicies。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。


```
/// <summary>
/// List IAM policies.
/// </summary>
/// <returns>A list of the IAM policies.</returns>
public async Task<List<ManagedPolicy>> ListPoliciesAsync()
{
    var listPoliciesPaginator = _IAMService.Paginators.ListPolicies(new
ListPoliciesRequest());
    var policies = new List<ManagedPolicy>();

    await foreach (var response in listPoliciesPaginator.Responses)
    {
        policies.AddRange(response.Policies);
    }

    return policies;
}
```

- 如需 API 詳細資訊，請參閱 適用於 .NET 的 AWS SDK API Reference 中的 [ListPolicies](#)。

ListRolePolicies

以下程式碼範例顯示如何使用 ListRolePolicies。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// List IAM role policies.
/// </summary>
/// <param name="roleName">The IAM role for which to list IAM policies.</param>
/// <returns>A list of IAM policy names.</returns>
public async Task<List<string>> ListRolePoliciesAsync(string roleName)
{

```

```
var listRolePoliciesPaginator = _IAMService.Paginators.ListRolePolicies(new
ListRolePoliciesRequest { RoleName = roleName });
var policyNames = new List<string>();

await foreach (var response in listRolePoliciesPaginator.Responses)
{
    policyNames.AddRange(response.PolicyNames);
}

return policyNames;
}
```

- 如需 API 詳細資訊，請參閱 適用於 .NET 的 AWS SDK API Reference 中的 [ListRolePolicies](#)。

ListRoles

以下程式碼範例顯示如何使用 ListRoles。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// List IAM roles.
/// </summary>
/// <returns>A list of IAM roles.</returns>
public async Task<List<Role>> ListRolesAsync()
{
    var listRolesPaginator = _IAMService.Paginators.ListRoles(new
ListRolesRequest());
    var roles = new List<Role>();

    await foreach (var response in listRolesPaginator.Responses)
    {
        roles.AddRange(response.Roles);
    }
}
```

```
    }  
  
    return roles;  
}
```

- 如需 API 詳細資訊，請參閱 適用於 .NET 的 AWS SDK API Reference 中的 [ListRoles](#)。

ListSAMLProviders

以下程式碼範例顯示如何使用 ListSAMLProviders。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>  
/// List SAML authentication providers.  
/// </summary>  
/// <returns>A list of SAML providers.</returns>  
public async Task<List<SAMLProviderListEntry>> ListSAMLProvidersAsync()  
{  
    var response = await _IAMService.ListSAMLProvidersAsync(new  
ListSAMLProvidersRequest());  
    return response.SAMLProviderList;  
}
```

- 如需 API 詳細資訊，請參閱 適用於 .NET 的 AWS SDK API Reference 中的 [ListSAMLProviders](#)。

ListUsers

以下程式碼範例顯示如何使用 ListUsers。

適用於 .NET 的 SDK

 Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// List IAM users.
/// </summary>
/// <returns>A list of IAM users.</returns>
public async Task<List<User>> ListUsersAsync()
{
    var listUsersPaginator = _IAMService.Paginators.ListUsers(new
ListUsersRequest());
    var users = new List<User>();

    await foreach (var response in listUsersPaginator.Responses)
    {
        users.AddRange(response.Users);
    }

    return users;
}
```

- 如需 API 詳細資訊，請參閱 適用於 .NET 的 AWS SDK API Reference 中的 [ListUsers](#)。

PutRolePolicy

以下程式碼範例顯示如何使用 PutRolePolicy。

適用於 .NET 的 SDK

 Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```

    /// <summary>
    /// Update the inline policy document embedded in a role.
    /// </summary>
    /// <param name="policyName">The name of the policy to embed.</param>
    /// <param name="roleName">The name of the role to update.</param>
    /// <param name="policyDocument">The policy document that defines the role.</
param>
    /// <returns>A Boolean value indicating the success of the action.</returns>
    public async Task<bool> PutRolePolicyAsync(string policyName, string roleName,
string policyDocument)
    {
        var request = new PutRolePolicyRequest
        {
            PolicyName = policyName,
            RoleName = roleName,
            PolicyDocument = policyDocument
        };

        var response = await _IAMService.PutRolePolicyAsync(request);
        return response.HttpStatusCode == HttpStatusCode.OK;
    }

```

- 如需 API 詳細資訊，請參閱 適用於 .NET 的 AWS SDK API Reference 中的 [PutRolePolicy](#)。

案例

建置及管理彈性服務

下列程式碼範例會示範如何建立負載平衡的 Web 服務，以傳回書籍、影片和歌曲建議。此範例顯示服務如何回應失故障，以及如何在發生故障時重組服務以提高復原能力。

- 使用 Amazon EC2 Auto Scaling 群組根據啟動範本建立 Amazon Elastic Compute Cloud (Amazon EC2) 執行個體，並將執行個體數量保持在指定範圍內。
- 使用 Elastic Load Balancing 處理和分發 HTTP 請求。
- 監控 Auto Scaling 群組中執行個體的運作狀態，並且只將請求轉送給運作良好的執行個體。
- 在每個 EC2 執行個體上執行一個 Python Web 伺服器來處理 HTTP 請求。Web 伺服器會回應建議和運作狀態檢查。
- 使用 Amazon DynamoDB 資料表模擬建議服務。

- 透過更新 AWS Systems Manager 參數來控制 Web 伺服器對請求和運作狀態檢查的回應。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

在命令提示中執行互動式案例。

```
static async Task Main(string[] args)
{
    _configuration = new ConfigurationBuilder()
        .SetBasePath(Directory.GetCurrentDirectory())
        .AddJsonFile("settings.json") // Load settings from .json file.
        .AddJsonFile("settings.local.json",
            true) // Optionally, load local settings.
        .Build();

    // Set up dependency injection for the AWS services.
    using var host = Host.CreateDefaultBuilder(args)
        .ConfigureLogging(logging =>
            logging.AddFilter("System", LogLevel.Debug)
                .AddFilter<DebugLoggerProvider>("Microsoft",
                    LogLevel.Information)
                .AddFilter<ConsoleLoggerProvider>("Microsoft", LogLevel.Trace))
        .ConfigureServices((_, services) =>
            services.AddAWSService<IAmazonIdentityManagementService>()
                .AddAWSService<IAmazonDynamoDB>()
                .AddAWSService<IAmazonElasticLoadBalancingV2>()
                .AddAWSService<IAmazonSimpleSystemsManagement>()
                .AddAWSService<IAmazonAutoScaling>()
                .AddAWSService<IAmazonEC2>()
                .AddTransient<AutoScalerWrapper>()
                .AddTransient<ElasticLoadBalancerWrapper>()
                .AddTransient<SmParameterWrapper>()
                .AddTransient<Recommendations>()
                .AddSingleton<IConfiguration>(_configuration)
        )
    }
```

```

        .Build();

        ServicesSetup(host);
        ResourcesSetup();

        try
        {
            Console.WriteLine(new string('-', 80));
            Console.WriteLine("Welcome to the Resilient Architecture Example
Scenario.");
            Console.WriteLine(new string('-', 80));
            await Deploy(true);

            Console.WriteLine("Now let's begin the scenario.");
            Console.WriteLine(new string('-', 80));
            await Demo(true);

            Console.WriteLine(new string('-', 80));
            Console.WriteLine("Finally, let's clean up our resources.");
            Console.WriteLine(new string('-', 80));

            await DestroyResources(true);

            Console.WriteLine(new string('-', 80));
            Console.WriteLine("Resilient Architecture Example Scenario is
complete.");
            Console.WriteLine(new string('-', 80));
        }
        catch (Exception ex)
        {
            Console.WriteLine(new string('-', 80));
            Console.WriteLine($"There was a problem running the scenario:
{ex.Message}");
            await DestroyResources(true);
            Console.WriteLine(new string('-', 80));
        }
    }

    /// <summary>
    /// Setup any common resources, also used for integration testing.
    /// </summary>
    public static void ResourcesSetup()
    {
        _httpClient = new HttpClient();
    }

```

```

    }

    /// <summary>
    /// Populate the services for use within the console application.
    /// </summary>
    /// <param name="host">The services host.</param>
    private static void ServicesSetup(IHost host)
    {
        _elasticLoadBalancerWrapper =
host.Services.GetRequiredService<ElasticLoadBalancerWrapper>();
        _iamClient =
host.Services.GetRequiredService<IAmazonIdentityManagementService>();
        _recommendations = host.Services.GetRequiredService<Recommendations>();
        _autoScalerWrapper = host.Services.GetRequiredService<AutoScalerWrapper>();
        _smParameterWrapper =
host.Services.GetRequiredService<SmParameterWrapper>();
    }

    /// <summary>
    /// Deploy necessary resources for the scenario.
    /// </summary>
    /// <param name="interactive">True to run as interactive.</param>
    /// <returns>True if successful.</returns>
    public static async Task<bool> Deploy(bool interactive)
    {
        var protocol = "HTTP";
        var port = 80;
        var sshPort = 22;

        Console.WriteLine(
            "\nFor this demo, we'll use the AWS SDK for .NET to create several AWS
resources\n" +
            "to set up a load-balanced web service endpoint and explore some ways to
make it resilient\n" +
            "against various kinds of failures.\n\n" +
            "Some of the resources create by this demo are:\n");

        Console.WriteLine(
            "\t* A DynamoDB table that the web service depends on to provide book,
movie, and song recommendations.");
        Console.WriteLine(
            "\t* An EC2 launch template that defines EC2 instances that each contain
a Python web server.");
        Console.WriteLine(

```



```

        "\t* An EC2 Auto Scaling group that manages EC2 instances across several
Availability Zones.");
        Console.WriteLine(
            "\t* An Elastic Load Balancing (ELB) load balancer that targets the Auto
Scaling group to distribute requests.");
        Console.WriteLine(new string('-', 80));
        Console.WriteLine("Press Enter when you're ready to start deploying
resources.");
        if (interactive)
            Console.ReadLine();

        // Create and populate the DynamoDB table.
        var databaseTableName = _configuration["databaseName"];
        var recommendationsPath = Path.Join(_configuration["resourcePath"],
            "recommendations_objects.json");
        Console.WriteLine($"Creating and populating a DynamoDB table named
{databaseTableName}.");
        await _recommendations.CreateDatabaseWithName(databaseTableName);
        await _recommendations.PopulateDatabase(databaseTableName,
recommendationsPath);
        Console.WriteLine(new string('-', 80));

        // Create the EC2 Launch Template.

        Console.WriteLine(
            $"Creating an EC2 launch template that runs 'server_startup_script.sh'
when an instance starts.\n"
            + "\nThis script starts a Python web server defined in the `server.py`
script. The web server\n"
            + "listens to HTTP requests on port 80 and responds to requests to '/'
and to '/healthcheck'.\n"
            + "For demo purposes, this server is run as the root user. In
production, the best practice is to\n"
            + "run a web server, such as Apache, with least-privileged
credentials.");
        Console.WriteLine(
            "\n\nThe template also defines an IAM policy that each instance uses to
assume a role that grants\n"
            + "permissions to access the DynamoDB recommendation table and Systems
Manager parameters\n"
            + "that control the flow of the demo.");

        var startupScriptPath = Path.Join(_configuration["resourcePath"],
            "server_startup_script.sh");

```

```

        var instancePolicyPath = Path.Join(_configuration["resourcePath"],
            "instance_policy.json");
        await _autoScalerWrapper.CreateTemplate(startupScriptPath,
instancePolicyPath);
        Console.WriteLine(new string('-', 80));

        Console.WriteLine(
            "Creating an EC2 Auto Scaling group that maintains three EC2 instances,
each in a different\n"
            + "Availability Zone.\n");
        var zones = await _autoScalerWrapper.DescribeAvailabilityZones();
        await _autoScalerWrapper.CreateGroupOfSize(3, _autoScalerWrapper.GroupName,
zones);
        Console.WriteLine(new string('-', 80));

        Console.WriteLine(
            "At this point, you have EC2 instances created. Once each instance
starts, it listens for\n"
            + "HTTP requests. You can see these instances in the console or continue
with the demo.\n");

        Console.WriteLine(new string('-', 80));
        Console.WriteLine("Press Enter when you're ready to continue.");
        if (interactive)
            Console.ReadLine();

        Console.WriteLine("Creating variables that control the flow of the demo.");
        await _smParameterWrapper.Reset();

        Console.WriteLine(
            "\nCreating an Elastic Load Balancing target group and load balancer.
The target group\n"
            + "defines how the load balancer connects to instances. The load
balancer provides a\n"
            + "single endpoint where clients connect and dispatches requests to
instances in the group.");

        var defaultVpc = await _autoScalerWrapper.GetDefaultVpc();
        var subnets = await
_autoScalerWrapper.GetAllVpcSubnetsForZones(defaultVpc.VpcId, zones);
        var subnetIds = subnets.Select(s => s.SubnetId).ToList();
        var targetGroup = await
_elasticLoadBalancerWrapper.CreateTargetGroupOnVpc(_elasticLoadBalancerWrapper.TargetGroupN
protocol, port, defaultVpc.VpcId);

```

```

        await
_elasticLoadBalancerWrapper.CreateLoadBalancerAndListener(_elasticLoadBalancerWrapper.LoadB
subnetIds, targetGroup);
        await
_autoScalerWrapper.AttachLoadBalancerToGroup(_autoScalerWrapper.GroupName,
targetGroup.TargetGroupArn);
        Console.WriteLine("\nVerifying access to the load balancer endpoint...");
        var endPoint = await
_elasticLoadBalancerWrapper.GetEndpointForLoadBalancerByName(_elasticLoadBalancerWrapper.Lo
        var loadBalancerAccess = await
_elasticLoadBalancerWrapper.VerifyLoadBalancerEndpoint(endPoint);

        if (!loadBalancerAccess)
        {
            Console.WriteLine("\nCouldn't connect to the load balancer, verifying
that the port is open...");

            var ipString = await _httpClient.GetStringAsync("https://
checkip.amazonaws.com");
            ipString = ipString.Trim();

            var defaultSecurityGroup = await
_autoScalerWrapper.GetDefaultSecurityGroupForVpc(defaultVpc);
            var portIsOpen =
_autoScalerWrapper.VerifyInboundPortForGroup(defaultSecurityGroup, port, ipString);
            var sshPortIsOpen =
_autoScalerWrapper.VerifyInboundPortForGroup(defaultSecurityGroup, sshPort,
ipString);

            if (!portIsOpen)
            {
                Console.WriteLine(
                    "\nFor this example to work, the default security group for your
default VPC must\n"
                    + "allows access from this computer. You can either add it
automatically from this\n"
                    + "example or add it yourself using the AWS Management Console.
\n");

                if (!interactive || GetYesNoResponse(
                    "Do you want to add a rule to the security group to allow
inbound traffic from your computer's IP address?"))
                {

```

```

        await
        _autoScalerWrapper.OpenInboundPort(defaultSecurityGroup.GroupId, port, ipString);
    }
}

if (!sshPortIsOpen)
{
    if (!interactive || GetYesNoResponse(
        "Do you want to add a rule to the security group to allow
inbound SSH traffic for debugging from your computer's IP address?"))
    {
        await
        _autoScalerWrapper.OpenInboundPort(defaultSecurityGroup.GroupId, sshPort,
ipString);
    }
}

loadBalancerAccess = await
_elasticLoadBalancerWrapper.VerifyLoadBalancerEndpoint(endPoint);
}

if (loadBalancerAccess)
{
    Console.WriteLine("Your load balancer is ready. You can access it by
browsing to:");
    Console.WriteLine($"\\thttp://{endPoint}\\n");
}
else
{
    Console.WriteLine(
        "\\nCouldn't get a successful response from the load balancer
endpoint. Troubleshoot by\\n"
        + "manually verifying that your VPC and security group are
configured correctly and that\\n"
        + "you can successfully make a GET request to the load balancer
endpoint:\\n");
    Console.WriteLine($"\\thttp://{endPoint}\\n");
}
Console.WriteLine(new string('-', 80));
Console.WriteLine("Press Enter when you're ready to continue with the
demo.");
if (interactive)
    Console.ReadLine();
return true;
}

```

```

/// <summary>
/// Demonstrate the steps of the scenario.
/// </summary>
/// <param name="interactive">True to run as an interactive scenario.</param>
/// <returns>Async task.</returns>
public static async Task<bool> Demo(bool interactive)
{
    var ssmOnlyPolicy = Path.Join(_configuration["resourcePath"],
        "ssm_only_policy.json");

    Console.WriteLine(new string('-', 80));
    Console.WriteLine("Resetting parameters to starting values for demo.");
    await _smParameterWrapper.Reset();

    Console.WriteLine("\nThis part of the demonstration shows how to toggle
different parts of the system\n" +
        "to create situations where the web service fails, and
shows how using a resilient\n" +
        "architecture can keep the web service running in spite of
these failures.");
    Console.WriteLine(new string('-', 88));
    Console.WriteLine("At the start, the load balancer endpoint returns
recommendations and reports that all targets are healthy.");
    if (interactive)
        await DemoActionChoices();

    Console.WriteLine($"The web service running on the EC2 instances gets
recommendations by querying a DynamoDB table.\n" +
        $"The table name is contained in a Systems Manager
parameter named '{_smParameterWrapper.TableParameter}'.\n" +
        $"To simulate a failure of the recommendation service,
let's set this parameter to name a non-existent table.\n");
    await
_smParameterWrapper.PutParameterByName(_smParameterWrapper.TableParameter, "this-
is-not-a-table");
    Console.WriteLine("\nNow, sending a GET request to the load balancer
endpoint returns a failure code. But, the service reports as\n" +
        "healthy to the load balancer because shallow health
checks don't check for failure of the recommendation service.");
    if (interactive)
        await DemoActionChoices();
}

```

```

        Console.WriteLine("Instead of failing when the recommendation service fails,
the web service can return a static response.");
        Console.WriteLine("While this is not a perfect solution, it presents the
customer with a somewhat better experience than failure.");

        await
_smParameterWrapper.PutParameterByName(_smParameterWrapper.FailureResponseParameter,
"static");

        Console.WriteLine("\nNow, sending a GET request to the load balancer
endpoint returns a static response.");
        Console.WriteLine("The service still reports as healthy because health
checks are still shallow.");
        if (interactive)
            await DemoActionChoices();

        Console.WriteLine("Let's reinstate the recommendation service.\n");
        await
_smParameterWrapper.PutParameterByName(_smParameterWrapper.TableParameter,
_smParameterWrapper.TableName);
        Console.WriteLine(
            "\nLet's also substitute bad credentials for one of the instances in the
target group so that it can't\n" +
            "access the DynamoDB recommendation table.\n"
        );
        await _autoScalerWrapper.CreateInstanceProfileWithName(
            _autoScalerWrapper.BadCredsPolicyName,
            _autoScalerWrapper.BadCredsRoleName,
            _autoScalerWrapper.BadCredsProfileName,
            ssmOnlyPolicy,
            new List<string> { "AmazonSSMManagedInstanceCore" }
        );
        var instances = await
_autoScalerWrapper.GetInstancesByGroupName(_autoScalerWrapper.GroupName);
        var badInstanceId = instances.First();
        var instanceProfile = await
_autoScalerWrapper.GetInstanceProfile(badInstanceId);
        Console.WriteLine(
            $"Replacing the profile for instance {badInstanceId} with a profile that
contains\n" +
            "bad credentials...\n"
        );
        await _autoScalerWrapper.ReplaceInstanceProfile(
            badInstanceId,

```

```

        _autoScalerWrapper.BadCredsProfileName,
        instanceProfile.AssociationId
    );
    Console.WriteLine(
        "Now, sending a GET request to the load balancer endpoint returns either
a recommendation or a static response,\n" +
        "depending on which instance is selected by the load balancer.\n"
    );
    if (interactive)
        await DemoActionChoices();

    Console.WriteLine("\nLet's implement a deep health check. For this demo, a
deep health check tests whether");
    Console.WriteLine("the web service can access the DynamoDB table that it
depends on for recommendations. Note that");
    Console.WriteLine("the deep health check is only for ELB routing and not for
Auto Scaling instance health.");
    Console.WriteLine("This kind of deep health check is not recommended for
Auto Scaling instance health, because it");
    Console.WriteLine("risks accidental termination of all instances in the Auto
Scaling group when a dependent service fails.");

    Console.WriteLine("\nBy implementing deep health checks, the load balancer
can detect when one of the instances is failing");
    Console.WriteLine("and take that instance out of rotation.");

    await
_smParameterWrapper.PutParameterByName(_smParameterWrapper.HealthCheckParameter,
"deep");

    Console.WriteLine($"Now, checking target health indicates that the
instance with bad credentials ({badInstanceId})");
    Console.WriteLine("is unhealthy. Note that it might take a minute or two for
the load balancer to detect the unhealthy");
    Console.WriteLine("instance. Sending a GET request to the load balancer
endpoint always returns a recommendation, because");
    Console.WriteLine("the load balancer takes unhealthy instances out of its
rotation.");

    if (interactive)
        await DemoActionChoices();

    Console.WriteLine("\nBecause the instances in this demo are controlled by an
auto scaler, the simplest way to fix an unhealthy");

```

```

        Console.WriteLine("instance is to terminate it and let the auto scaler start
a new instance to replace it.");

        await _autoScalerWrapper.TryTerminateInstanceById(badInstanceId);

        Console.WriteLine($"\\nEven while the instance is terminating and the new
instance is starting, sending a GET");
        Console.WriteLine("request to the web service continues to get a successful
recommendation response because");
        Console.WriteLine("starts and reports as healthy, it is included in the load
balancing rotation.");
        Console.WriteLine("Note that terminating and replacing an instance typically
takes several minutes, during which time you");
        Console.WriteLine("can see the changing health check status until the new
instance is running and healthy.");

        if (interactive)
            await DemoActionChoices();

        Console.WriteLine("\\nIf the recommendation service fails now, deep health
checks mean all instances report as unhealthy.");

        await
_smParameterWrapper.PutParameterByName(_smParameterWrapper.TableParameter, "this-
is-not-a-table");

        Console.WriteLine($"\\nWhen all instances are unhealthy, the load balancer
continues to route requests even to");
        Console.WriteLine("unhealthy instances, allowing them to fail open and
return a static response rather than fail");
        Console.WriteLine("closed and report failure to the customer.");

        if (interactive)
            await DemoActionChoices();
        await _smParameterWrapper.Reset();

        Console.WriteLine(new string('-', 80));
        return true;
    }

    /// <summary>
    /// Clean up the resources from the scenario.
    /// </summary>
    /// <param name="interactive">True to ask the user for cleanup.</param>

```



```

    /// <returns>Async task.</returns>
    public static async Task<bool> DestroyResources(bool interactive)
    {
        Console.WriteLine(new string('-', 80));
        Console.WriteLine(
            "To keep things tidy and to avoid unwanted charges on your account, we
can clean up all AWS resources\n" +
            "that were created for this demo."
        );

        if (!interactive || GetYesNoResponse("Do you want to clean up all demo
resources? (y/n) "))
        {
            await
_elasticLoadBalancerWrapper.DeleteLoadBalancerByName(_elasticLoadBalancerWrapper.LoadBalancerName);
            await
_elasticLoadBalancerWrapper.DeleteTargetGroupByName(_elasticLoadBalancerWrapper.TargetGroupName);
            await
_autoScalerWrapper.TerminateAndDeleteAutoScalingGroupWithName(_autoScalerWrapper.GroupName);
            await
_autoScalerWrapper.DeleteKeyPairByName(_autoScalerWrapper.KeyPairName);
            await
_autoScalerWrapper.DeleteTemplateByName(_autoScalerWrapper.LaunchTemplateName);
            await _autoScalerWrapper.DeleteInstanceProfile(
                _autoScalerWrapper.BadCredsProfileName,
                _autoScalerWrapper.BadCredsRoleName
            );
            await
_recommendations.DestroyDatabaseByName(_recommendations.TableName);
        }
        else
        {
            Console.WriteLine(
                "Ok, we'll leave the resources intact.\n" +
                "Don't forget to delete them when you're done with them or you might
incur unexpected charges."
            );
        }

        Console.WriteLine(new string('-', 80));
        return true;
    }

```

建立包裝 Auto Scaling 和 Amazon EC2 動作的類別。

```
/// <summary>
/// Encapsulates Amazon EC2 Auto Scaling and EC2 management methods.
/// </summary>
public class AutoScalerWrapper
{
    private readonly IAmazonAutoScaling _amazonAutoScaling;
    private readonly IAmazonEC2 _amazonEc2;
    private readonly IAmazonSimpleSystemsManagement _amazonSsm;
    private readonly IAmazonIdentityManagementService _amazonIam;
    private readonly ILogger<AutoScalerWrapper> _logger;

    private readonly string _instanceType = "";
    private readonly string _amiParam = "";
    private readonly string _launchTemplateName = "";
    private readonly string _groupName = "";
    private readonly string _instancePolicyName = "";
    private readonly string _instanceRoleName = "";
    private readonly string _instanceProfileName = "";
    private readonly string _badCredsProfileName = "";
    private readonly string _badCredsRoleName = "";
    private readonly string _badCredsPolicyName = "";
    private readonly string _keyPairName = "";

    public string GroupName => _groupName;
    public string KeyPairName => _keyPairName;
    public string LaunchTemplateName => _launchTemplateName;
    public string InstancePolicyName => _instancePolicyName;
    public string BadCredsProfileName => _badCredsProfileName;
    public string BadCredsRoleName => _badCredsRoleName;
    public string BadCredsPolicyName => _badCredsPolicyName;

    /// <summary>
    /// Constructor for the AutoScalerWrapper.
    /// </summary>
    /// <param name="amazonAutoScaling">The injected AutoScaling client.</param>
    /// <param name="amazonEc2">The injected EC2 client.</param>
    /// <param name="amazonIam">The injected IAM client.</param>
    /// <param name="amazonSsm">The injected SSM client.</param>
    public AutoScalerWrapper(
        IAmazonAutoScaling amazonAutoScaling,
        IAmazonEC2 amazonEc2,
        IAmazonSimpleSystemsManagement amazonSsm,
```

```

        IAmazonIdentityManagementService amazonIam,
        IConfiguration configuration,
        ILogger<AutoScalerWrapper> logger)
    {
        _amazonAutoScaling = amazonAutoScaling;
        _amazonEc2 = amazonEc2;
        _amazonSsm = amazonSsm;
        _amazonIam = amazonIam;
        _logger = logger;

        var prefix = configuration["resourcePrefix"];
        _instanceType = configuration["instanceType"];
        _amiParam = configuration["amiParam"];

        _launchTemplateName = prefix + "-template";
        _groupName = prefix + "-group";
        _instancePolicyName = prefix + "-pol";
        _instanceRoleName = prefix + "-role";
        _instanceProfileName = prefix + "-prof";
        _badCredsPolicyName = prefix + "-bc-pol";
        _badCredsRoleName = prefix + "-bc-role";
        _badCredsProfileName = prefix + "-bc-prof";
        _keyPairName = prefix + "-key-pair";
    }

    /// <summary>
    /// Create a policy, role, and profile that is associated with instances with a
    specified name.
    /// An instance's associated profile defines a role that is assumed by the
    /// instance. The role has attached policies that specify the AWS permissions
    granted to
    /// clients that run on the instance.
    /// </summary>
    /// <param name="policyName">Name to use for the policy.</param>
    /// <param name="roleName">Name to use for the role.</param>
    /// <param name="profileName">Name to use for the profile.</param>
    /// <param name="ssmOnlyPolicyFile">Path to a policy file for SSM.</param>
    /// <param name="awsManagedPolicies">AWS Managed policies to be attached to the
    role.</param>
    /// <returns>The Arn of the profile.</returns>
    public async Task<string> CreateInstanceProfileWithName(
        string policyName,
        string roleName,
        string profileName,

```

```

string ssmOnlyPolicyFile,
List<string>? awsManagedPolicies = null)
{

    var assumeRoleDoc = "{" +
        "\"Version\": \"2012-10-17\", \" +
        "\"Statement\": [{\" +
            "\"Effect\": \"Allow\", \" +
            "\"Principal\": {\" +
            "\"Service\": [\" +
                \"ec2.amazonaws.com\"\" +
            "]" +
            \",\" +
            "\"Action\": \"sts:AssumeRole\"\" +
            \"]}\" +
        "}";

    var policyDocument = await File.ReadAllTextAsync(ssmOnlyPolicyFile);

    var policyArn = "";

    try
    {
        var createPolicyResult = await _amazonIam.CreatePolicyAsync(
            new CreatePolicyRequest
            {
                PolicyName = policyName,
                PolicyDocument = policyDocument
            });
        policyArn = createPolicyResult.Policy.Arn;
    }
    catch (EntityAlreadyExistsException)
    {
        // The policy already exists, so we look it up to get the Arn.
        var policiesPaginator = _amazonIam.Paginators.ListPolicies(
            new ListPoliciesRequest()
            {
                Scope = PolicyScopeType.Local
            });
        // Get the entire list using the paginator.
        await foreach (var policy in policiesPaginator.Policies)
        {
            if (policy.PolicyName.Equals(policyName))
            {

```

```

        policyArn = policy.Arn;
    }
}

if (policyArn == null)
{
    throw new InvalidOperationException("Policy not found");
}

try
{
    await _amazonIam.CreateRoleAsync(new CreateRoleRequest()
    {
        RoleName = roleName,
        AssumeRolePolicyDocument = assumeRoleDoc,
    });
    await _amazonIam.AttachRolePolicyAsync(new AttachRolePolicyRequest()
    {
        RoleName = roleName,
        PolicyArn = policyArn
    });
    if (awsManagedPolicies != null)
    {
        foreach (var awsPolicy in awsManagedPolicies)
        {
            await _amazonIam.AttachRolePolicyAsync(new
AttachRolePolicyRequest()
            {
                PolicyArn = $"arn:aws:iam::aws:policy/{awsPolicy}",
                RoleName = roleName
            });
        }
    }
}
catch (EntityAlreadyExistsException)
{
    Console.WriteLine("Role already exists.");
}

string profileArn = "";
try
{
    var profileCreateResponse = await _amazonIam.CreateInstanceProfileAsync(

```

```

        new CreateInstanceProfileRequest()
        {
            InstanceProfileName = profileName
        });
    // Allow time for the profile to be ready.
    profileArn = profileCreateResponse.InstanceProfile.Arn;
    Thread.Sleep(10000);
    await _amazonIam.AddRoleToInstanceProfileAsync(
        new AddRoleToInstanceProfileRequest()
        {
            InstanceProfileName = profileName,
            RoleName = roleName
        });

    }
    catch (EntityAlreadyExistsException)
    {
        Console.WriteLine("Policy already exists.");
        var profileGetResponse = await _amazonIam.GetInstanceProfileAsync(
            new GetInstanceProfileRequest()
            {
                InstanceProfileName = profileName
            });
        profileArn = profileGetResponse.InstanceProfile.Arn;
    }
    return profileArn;
}

/// <summary>
/// Create a new key pair and save the file.
/// </summary>
/// <param name="newKeyPairName">The name of the new key pair.</param>
/// <returns>Async task.</returns>
public async Task CreateKeyPair(string newKeyPairName)
{
    try
    {
        var keyResponse = await _amazonEc2.CreateKeyPairAsync(
            new CreateKeyPairRequest() { KeyName = newKeyPairName });
        await File.WriteAllTextAsync($"{newKeyPairName}.pem",
            keyResponse.KeyPair.KeyMaterial);
        Console.WriteLine($"Created key pair {newKeyPairName}.");
    }
    catch (AlreadyExistsException)

```

```

        {
            Console.WriteLine("Key pair already exists.");
        }
    }

    /// <summary>
    /// Delete the key pair and file by name.
    /// </summary>
    /// <param name="deleteKeyPairName">The key pair to delete.</param>
    /// <returns>Async task.</returns>
    public async Task DeleteKeyPairByName(string deleteKeyPairName)
    {
        try
        {
            await _amazonEc2.DeleteKeyPairAsync(
                new DeleteKeyPairRequest() { KeyName = deleteKeyPairName });
            File.Delete($"{deleteKeyPairName}.pem");
        }
        catch (FileNotFoundException)
        {
            Console.WriteLine($"Key pair {deleteKeyPairName} not found.");
        }
    }

    /// <summary>
    /// Creates an Amazon EC2 launch template to use with Amazon EC2 Auto Scaling.
    /// The launch template specifies a Bash script in its user data field that runs
    after
    /// the instance is started. This script installs the Python packages and starts
    a Python
    /// web server on the instance.
    /// </summary>
    /// <param name="startupScriptPath">The path to a Bash script file that is
    run.</param>
    /// <param name="instancePolicyPath">The path to a permissions policy to create
    and attach to the profile.</param>
    /// <returns>The template object.</returns>
    public async Task<Amazon.EC2.Model.LaunchTemplate> CreateTemplate(string
    startupScriptPath, string instancePolicyPath)
    {
        try
        {
            await CreateKeyPair(_keyPairName);

```

```

        await CreateInstanceProfileWithName(_instancePolicyName,
            _instanceRoleName,
            _instanceProfileName, instancePolicyPath);

        var startServerText = await File.ReadAllTextAsync(startupScriptPath);
        var plainTextBytes =
            System.Text.Encoding.UTF8.GetBytes(startServerText);

        var amiLatest = await _amazonSsm.GetParameterAsync(
            new GetParameterRequest() { Name = _amiParam });
        var amiId = amiLatest.Parameter.Value;
        var launchTemplateResponse = await _amazonEc2.CreateLaunchTemplateAsync(
            new CreateLaunchTemplateRequest()
            {
                LaunchTemplateName = _launchTemplateName,
                LaunchTemplateData = new RequestLaunchTemplateData()
                {
                    InstanceType = _instanceType,
                    ImageId = amiId,
                    IamInstanceProfile =
                        new
LaunchTemplateIamInstanceProfileSpecificationRequest()
                        {
                            Name = _instanceProfileName
                        },
                    KeyName = _keyPairName,
                    UserData = System.Convert.ToBase64String(plainTextBytes)
                }
            });
        return launchTemplateResponse.LaunchTemplate;
    }
    catch (AmazonEC2Exception ec2Exception)
    {
        if (ec2Exception.ErrorCode ==
            "InvalidLaunchTemplateName.AlreadyExistsException")
        {
            _logger.LogError($"Could not create the template, the name
{_launchTemplateName} already exists. " +
                $"Please try again with a unique name.");
        }

        throw;
    }
}

```



```

        catch (Exception ex)
        {
            _logger.LogError($"An error occurred while creating the template.:
{ex.Message}");
            throw;
        }
    }

    /// <summary>
    /// Get a list of Availability Zones in the AWS Region of the Amazon EC2 Client.
    /// </summary>
    /// <returns>A list of availability zones.</returns>
    public async Task<List<string>> DescribeAvailabilityZones()
    {
        try
        {
            var zoneResponse = await _amazonEc2.DescribeAvailabilityZonesAsync(
                new DescribeAvailabilityZonesRequest());
            return zoneResponse.AvailabilityZones.Select(z => z.ZoneName).ToList();
        }
        catch (AmazonEC2Exception ec2Exception)
        {
            _logger.LogError($"An Amazon EC2 error occurred while listing
availability zones.: {ec2Exception.Message}");
            throw;
        }
        catch (Exception ex)
        {
            _logger.LogError($"An error occurred while listing availability zones.:
{ex.Message}");
            throw;
        }
    }

    /// <summary>
    /// Create an EC2 Auto Scaling group of a specified size and name.
    /// </summary>
    /// <param name="groupSize">The size for the group.</param>
    /// <param name="groupName">The name for the group.</param>
    /// <param name="availabilityZones">The availability zones for the group.</
param>
    /// <returns>Async task.</returns>
    public async Task CreateGroupOfSize(int groupSize, string groupName,
List<string> availabilityZones)

```

```

    {
        try
        {
            await _amazonAutoScaling.CreateAutoScalingGroupAsync(
                new CreateAutoScalingGroupRequest()
                {
                    AutoScalingGroupName = groupName,
                    AvailabilityZones = availabilityZones,
                    LaunchTemplate =
                        new Amazon.AutoScaling.Model.LaunchTemplateSpecification()
                        {
                            LaunchTemplateName = _launchTemplateName,
                            Version = "$Default"
                        },
                    MaxSize = groupSize,
                    MinSize = groupSize
                });
            Console.WriteLine($"Created EC2 Auto Scaling group {groupName} with size {groupSize}.");
        }
        catch (EntityAlreadyExistsException)
        {
            Console.WriteLine($"EC2 Auto Scaling group {groupName} already exists.");
        }
    }

    /// <summary>
    /// Get the default VPC for the account.
    /// </summary>
    /// <returns>The default VPC object.</returns>
    public async Task<Vpc> GetDefaultVpc()
    {
        try
        {
            var vpcResponse = await _amazonEc2.DescribeVpcsAsync(
                new DescribeVpcsRequest()
                {
                    Filters = new List<Amazon.EC2.Model.Filter>()
                    {
                        new("is-default", new List<string>() { "true" })
                    }
                });
            return vpcResponse.Vpcs[0];
        }
    }

```

```

    }
    catch (AmazonEC2Exception ec2Exception)
    {
        if (ec2Exception.ErrorCode == "UnauthorizedOperation")
        {
            _logger.LogError(ec2Exception, $"You do not have the necessary
permissions to describe VPCs.");
        }

        throw;
    }
    catch (Exception ex)
    {
        _logger.LogError(ex, $"An error occurred while describing the vpcs.:
{ex.Message}");
        throw;
    }
}

/// <summary>
/// Get all the subnets for a Vpc in a set of availability zones.
/// </summary>
/// <param name="vpcId">The Id of the Vpc.</param>
/// <param name="availabilityZones">The list of availability zones.</param>
/// <returns>The collection of subnet objects.</returns>
public async Task<List<Subnet>> GetAllVpcSubnetsForZones(string vpcId,
List<string> availabilityZones)
{
    try
    {
        var subnets = new List<Subnet>();
        var subnetPaginator = _amazonEc2.Paginators.DescribeSubnets(
            new DescribeSubnetsRequest()
            {
                Filters = new List<Amazon.EC2.Model.Filter>()
                {
                    new("vpc-id", new List<string>() { vpcId }),
                    new("availability-zone", availabilityZones),
                    new("default-for-az", new List<string>() { "true" })
                }
            });

        // Get the entire list using the paginator.
        await foreach (var subnet in subnetPaginator.Subnets)

```

```

        {
            subnets.Add(subnet);
        }

        return subnets;
    }
    catch (AmazonEC2Exception ec2Exception)
    {
        if (ec2Exception.ErrorCode == "InvalidVpcID.NotFound")
        {
            _logger.LogError(ec2Exception, $"The specified VPC ID {vpcId} does
not exist.");
        }

        throw;
    }
    catch (Exception ex)
    {
        _logger.LogError(ex, $"An error occurred while describing the subnets.:
{ex.Message}");
        throw;
    }
}

/// <summary>
/// Delete a launch template by name.
/// </summary>
/// <param name="templateName">The name of the template to delete.</param>
/// <returns>Async task.</returns>
public async Task DeleteTemplateByName(string templateName)
{
    try
    {
        await _amazonEc2.DeleteLaunchTemplateAsync(
            new DeleteLaunchTemplateRequest()
            {
                LaunchTemplateName = templateName
            });
    }
    catch (AmazonEC2Exception ec2Exception)
    {
        if (ec2Exception.ErrorCode ==
"InvalidLaunchTemplateName.NotFoundException")
        {

```

```

        _logger.LogError(
            $"Could not delete the template, the name {_launchTemplateName}
was not found.");
    }

    throw;
}
catch (Exception ex)
{
    _logger.LogError($"An error occurred while deleting the template.:
{ex.Message}");
    throw;
}
}

/// <summary>
/// Detaches a role from an instance profile, detaches policies from the role,
/// and deletes all the resources.
/// </summary>
/// <param name="profileName">The name of the profile to delete.</param>
/// <param name="roleName">The name of the role to delete.</param>
/// <returns>Async task.</returns>
public async Task DeleteInstanceProfile(string profileName, string roleName)
{
    try
    {
        await _amazonIam.RemoveRoleFromInstanceProfileAsync(
            new RemoveRoleFromInstanceProfileRequest()
            {
                InstanceProfileName = profileName,
                RoleName = roleName
            });
        await _amazonIam.DeleteInstanceProfileAsync(
            new DeleteInstanceProfileRequest() { InstanceProfileName =
profileName });
        var attachedPolicies = await _amazonIam.ListAttachedRolePoliciesAsync(
            new ListAttachedRolePoliciesRequest() { RoleName = roleName });
        foreach (var policy in attachedPolicies.AttachedPolicies)
        {
            await _amazonIam.DetachRolePolicyAsync(
                new DetachRolePolicyRequest()
                {
                    RoleName = roleName,
                    PolicyArn = policy.PolicyArn
                }
            );
        }
    }
    catch (Exception ex)
    {
        _logger.LogError($"An error occurred while deleting the instance profile.:
{ex.Message}");
        throw;
    }
}

```

```

        });
        // Delete the custom policies only.
        if (!policy.PolicyArn.StartsWith("arn:aws:iam::aws"))
        {
            await _amazonIam.DeletePolicyAsync(
                new Amazon.IdentityManagement.Model.DeletePolicyRequest()
                {
                    PolicyArn = policy.PolicyArn
                });
        }
    }

    await _amazonIam.DeleteRoleAsync(
        new DeleteRoleRequest() { RoleName = roleName });
}
catch (NoSuchEntityException)
{
    Console.WriteLine($"Instance profile {profileName} does not exist.");
}
}

/// <summary>
/// Gets data about the instances in an EC2 Auto Scaling group by its group
name.
/// </summary>
/// <param name="group">The name of the auto scaling group.</param>
/// <returns>A collection of instance Ids.</returns>
public async Task<IEnumerable<string>> GetInstancesByGroupName(string group)
{
    var instanceResponse = await
    _amazonAutoScaling.DescribeAutoScalingGroupsAsync(
        new DescribeAutoScalingGroupsRequest()
        {
            AutoScalingGroupNames = new List<string>() { group }
        });
    var instanceIds = instanceResponse.AutoScalingGroups.SelectMany(
        g => g.Instances.Select(i => i.InstanceId));
    return instanceIds;
}

/// <summary>
/// Get the instance profile association data for an instance.
/// </summary>
/// <param name="instanceId">The Id of the instance.</param>

```

```

    /// <returns>Instance profile associations data.</returns>
    public async Task<IamInstanceProfileAssociation> GetInstanceProfile(string
instanceId)
    {
        try
        {
            var response = await
amazonEc2.DescribeIamInstanceProfileAssociationsAsync(
                new DescribeIamInstanceProfileAssociationsRequest()
                {
                    Filters = new List<Amazon.EC2.Model.Filter>()
                    {
                        new("instance-id", new List<string>() { instanceId })
                    },
                });
            return response.IamInstanceProfileAssociations[0];
        }
        catch (AmazonEC2Exception ec2Exception)
        {
            if (ec2Exception.ErrorCode == "InvalidInstanceID.NotFound")
            {
                _logger.LogError(ec2Exception, $"Instance {instanceId} not found");
            }

            throw;
        }
        catch (Exception ex)
        {
            _logger.LogError(ex, $"An error occurred while creating the template.:
{ex.Message}");
            throw;
        }
    }

    /// <summary>
    /// Replace the profile associated with a running instance. After the profile is
replaced, the instance
    /// is rebooted to ensure that it uses the new profile. When the instance is
ready, Systems Manager is
    /// used to restart the Python web server.
    /// </summary>
    /// <param name="instanceId">The Id of the instance to update.</param>
    /// <param name="credsProfileName">The name of the new profile to associate with
the specified instance.</param>

```

```

    /// <param name="associationId">The Id of the existing profile association for
    the instance.</param>
    /// <returns>Async task.</returns>
    public async Task ReplaceInstanceProfile(string instanceId, string
    credsProfileName, string associationId)
    {
        try
        {
            await _amazonEc2.ReplaceIamInstanceProfileAssociationAsync(
                new ReplaceIamInstanceProfileAssociationRequest()
                {
                    AssociationId = associationId,
                    IamInstanceProfile = new IamInstanceProfileSpecification()
                    {
                        Name = credsProfileName
                    }
                });
            // Allow time before resetting.
            Thread.Sleep(25000);

            await _amazonEc2.RebootInstancesAsync(
                new RebootInstancesRequest(new List<string>() { instanceId }));
            Thread.Sleep(25000);
            var instanceReady = false;
            var retries = 5;
            while (retries-- > 0 && !instanceReady)
            {
                var instancesPaginator =
                    _amazonSsm.Paginators.DescribeInstanceInformation(
                        new DescribeInstanceInformationRequest());
                // Get the entire list using the paginator.
                await foreach (var instance in
instancesPaginator.InstanceInformationList)
                {
                    instanceReady = instance.InstanceId == instanceId;
                    if (instanceReady)
                    {
                        break;
                    }
                }
            }
            Console.WriteLine("Waiting for instance to be running.");
            await WaitForInstanceState(instanceId, InstanceStateName.Running);
            Console.WriteLine("Instance ready.");

```



```

        Console.WriteLine($"Sending restart command to instance {instanceId}");
        await _amazonSsm.SendCommandAsync(
            new SendCommandRequest()
            {
                InstanceIds = new List<string>() { instanceId },
                DocumentName = "AWS-RunShellScript",
                Parameters = new Dictionary<string, List<string>>()
                {
                    {
                        "commands",
                        new List<string>() { "cd / && sudo python3 server.py"
80" }
                    }
                }
            });
        Console.WriteLine($"Restarted the web server on instance {instanceId}");
    }
    catch (AmazonEC2Exception ec2Exception)
    {
        if (ec2Exception.ErrorCode == "InvalidInstanceID.NotFound")
        {
            _logger.LogError(ec2Exception, $"Instance {instanceId} not found");
        }

        throw;
    }
    catch (Exception ex)
    {
        _logger.LogError(ex, $"An error occurred while replacing the template.:
{ex.Message}");
        throw;
    }
}

/// <summary>
/// Try to terminate an instance by its Id.
/// </summary>
/// <param name="instanceId">The Id of the instance to terminate.</param>
/// <returns>Async task.</returns>
public async Task TryTerminateInstanceById(string instanceId)
{
    var stopping = false;
    Console.WriteLine($"Stopping {instanceId}...");
    while (!stopping)

```

```

        {
            try
            {
                await _amazonAutoScaling.TerminateInstanceInAutoScalingGroupAsync(
                    new TerminateInstanceInAutoScalingGroupRequest()
                    {
                        InstanceId = instanceId,
                        ShouldDecrementDesiredCapacity = false
                    });
                stopping = true;
            }
            catch (ScalingActivityInProgressException)
            {
                Console.WriteLine($"Scaling activity in progress for {instanceId}.
Waiting...");
                Thread.Sleep(10000);
            }
        }
    }

    /// <summary>
    /// Tries to delete the EC2 Auto Scaling group. If the group is in use or in
    progress,
    /// waits and retries until the group is successfully deleted.
    /// </summary>
    /// <param name="groupName">The name of the group to try to delete.</param>
    /// <returns>Async task.</returns>
    public async Task TryDeleteGroupByName(string groupName)
    {
        var stopped = false;
        while (!stopped)
        {
            try
            {
                await _amazonAutoScaling.DeleteAutoScalingGroupAsync(
                    new DeleteAutoScalingGroupRequest()
                    {
                        AutoScalingGroupName = groupName
                    });
                stopped = true;
            }
            catch (Exception e)
                when ((e is ScalingActivityInProgressException)
                    || (e is Amazon.AutoScaling.Model.ResourceInUseException))
        }
    }

```

```

        {
            Console.WriteLine($"Some instances are still running. Waiting...");
            Thread.Sleep(10000);
        }
    }
}

/// <summary>
/// Terminate instances and delete the Auto Scaling group by name.
/// </summary>
/// <param name="groupName">The name of the group to delete.</param>
/// <returns>Async task.</returns>
public async Task TerminateAndDeleteAutoScalingGroupWithName(string groupName)
{
    var describeGroupsResponse = await
        _amazonAutoScaling.DescribeAutoScalingGroupsAsync(
            new DescribeAutoScalingGroupsRequest()
            {
                AutoScalingGroupNames = new List<string>() { groupName }
            });
    if (describeGroupsResponse.AutoScalingGroups.Any())
    {
        // Update the size to 0.
        await _amazonAutoScaling.UpdateAutoScalingGroupAsync(
            new UpdateAutoScalingGroupRequest()
            {
                AutoScalingGroupName = groupName,
                MinSize = 0
            });
        var group = describeGroupsResponse.AutoScalingGroups[0];
        foreach (var instance in group.Instances)
        {
            await TryTerminateInstanceById(instance.InstanceId);
        }

        await TryDeleteGroupByName(groupName);
    }
    else
    {
        Console.WriteLine($"No groups found with name {groupName}.");
    }
}

```

```

    /// <summary>
    /// Get the default security group for a specified Vpc.
    /// </summary>
    /// <param name="vpc">The Vpc to search.</param>
    /// <returns>The default security group.</returns>
    public async Task<SecurityGroup> GetDefaultSecurityGroupForVpc(Vpc vpc)
    {
        var groupResponse = await _amazonEc2.DescribeSecurityGroupsAsync(
            new DescribeSecurityGroupsRequest()
            {
                Filters = new List<Amazon.EC2.Model.Filter>()
                {
                    new ("group-name", new List<string>() { "default" }),
                    new ("vpc-id", new List<string>() { vpc.VpcId })
                }
            });
        return groupResponse.SecurityGroups[0];
    }

    /// <summary>
    /// Verify the default security group of a Vpc allows ingress from the calling
    computer.
    /// This can be done by allowing ingress from this computer's IP address.
    /// In some situations, such as connecting from a corporate network, you must
    instead specify
    /// a prefix list Id. You can also temporarily open the port to any IP address
    while running this example.
    /// If you do, be sure to remove public access when you're done.
    /// </summary>
    /// <param name="vpc">The group to check.</param>
    /// <param name="port">The port to verify.</param>
    /// <param name="ipAddress">This computer's IP address.</param>
    /// <returns>True if the ip address is allowed on the group.</returns>
    public bool VerifyInboundPortForGroup(SecurityGroup group, int port, string
ipAddress)
    {
        var portIsOpen = false;
        foreach (var ipPermission in group.IpPermissions)
        {
            if (ipPermission.FromPort == port)
            {
                foreach (var ipRange in ipPermission.Ipv4Ranges)
                {
                    var cidr = ipRange.CidrIp;

```

```

        if (cidr.StartsWith(ipAddress) || cidr == "0.0.0.0/0")
        {
            portIsOpen = true;
        }
    }

    if (ipPermission.PrefixListIds.Any())
    {
        portIsOpen = true;
    }

    if (!portIsOpen)
    {
        Console.WriteLine("The inbound rule does not appear to be open
to either this computer's IP\n" +
                                "address, to all IP addresses (0.0.0.0/0), or
to a prefix list ID.");
    }
    else
    {
        break;
    }
}

return portIsOpen;
}

/// <summary>
/// Add an ingress rule to the specified security group that allows access on
the
/// specified port from the specified IP address.
/// </summary>
/// <param name="groupId">The Id of the security group to modify.</param>
/// <param name="port">The port to open.</param>
/// <param name="ipAddress">The IP address to allow access.</param>
/// <returns>Async task.</returns>
public async Task OpenInboundPort(string groupId, int port, string ipAddress)
{
    await _amazonEc2.AuthorizeSecurityGroupIngressAsync(
        new AuthorizeSecurityGroupIngressRequest()
        {
            GroupId = groupId,
            IpPermissions = new List<IpPermission>()

```

```

        {
            new IpPermission()
            {
                FromPort = port,
                ToPort = port,
                IpProtocol = "tcp",
                Ipv4Ranges = new List<IpRange>()
                {
                    new IpRange() { CidrIp = $"{ipAddress}/32" }
                }
            }
        }
    });
}

/// <summary>
/// Attaches an Elastic Load Balancing (ELB) target group to this EC2 Auto
Scaling group.
/// The
/// </summary>
/// <param name="autoScalingGroupName">The name of the Auto Scaling group.</
param>
/// <param name="targetGroupArn">The Arn for the target group.</param>
/// <returns>Async task.</returns>
public async Task AttachLoadBalancerToGroup(string autoScalingGroupName, string
targetGroupArn)
{
    await _amazonAutoScaling.AttachLoadBalancerTargetGroupsAsync(
        new AttachLoadBalancerTargetGroupsRequest()
        {
            AutoScalingGroupName = autoScalingGroupName,
            TargetGroupARNs = new List<string>() { targetGroupArn }
        });
}

/// <summary>
/// Wait until an EC2 instance is in a specified state.
/// </summary>
/// <param name="instanceId">The instance Id.</param>
/// <param name="stateName">The state to wait for.</param>
/// <returns>A Boolean value indicating the success of the action.</returns>
public async Task<bool> WaitForInstanceState(string instanceId,
InstanceStateName stateName)
{

```

```

        var request = new DescribeInstancesRequest
        {
            InstanceIds = new List<string> { instanceId }
        };

        // Wait until the instance is in the specified state.
        var hasState = false;
        do
        {
            // Wait 5 seconds.
            Thread.Sleep(5000);

            // Check for the desired state.
            var response = await _amazonEc2.DescribeInstancesAsync(request);
            var instance = response.Reservations[0].Instances[0];
            hasState = instance.State.Name == stateName;
            Console.Write(". ");
        } while (!hasState);

        return hasState;
    }
}

```

建立包裝 Elastic Load Balancing 動作的類別。

```

/// <summary>
/// Encapsulates Elastic Load Balancer actions.
/// </summary>
public class ElasticLoadBalancerWrapper
{
    private readonly IAmazonElasticLoadBalancingV2 _amazonElasticLoadBalancingV2;
    private string? _endpoint = null;
    private readonly string _targetGroupName = "";
    private readonly string _loadBalancerName = "";
    HttpClient _httpClient = new();

    public string TargetGroupName => _targetGroupName;
    public string LoadBalancerName => _loadBalancerName;

    /// <summary>
    /// Constructor for the Elastic Load Balancer wrapper.

```

```

    /// </summary>
    /// <param name="amazonElasticLoadBalancingV2">The injected load balancing v2
client.</param>
    /// <param name="configuration">The injected configuration.</param>
    public ElasticLoadBalancerWrapper(
        IAmazonElasticLoadBalancingV2 amazonElasticLoadBalancingV2,
        IConfiguration configuration)
    {
        _amazonElasticLoadBalancingV2 = amazonElasticLoadBalancingV2;
        var prefix = configuration["resourcePrefix"];
        _targetGroupName = prefix + "-tg";
        _loadBalancerName = prefix + "-lb";
    }

    /// <summary>
    /// Get the HTTP Endpoint of a load balancer by its name.
    /// </summary>
    /// <param name="loadBalancerName">The name of the load balancer.</param>
    /// <returns>The HTTP endpoint.</returns>
    public async Task<string> GetEndpointForLoadBalancerByName(string
loadBalancerName)
    {
        if (_endpoint == null)
        {
            var endpointResponse =
                await _amazonElasticLoadBalancingV2.DescribeLoadBalancersAsync(
                    new DescribeLoadBalancersRequest()
                    {
                        Names = new List<string>() { loadBalancerName }
                    });
            _endpoint = endpointResponse.LoadBalancers[0].DNSName;
        }

        return _endpoint;
    }

    /// <summary>
    /// Return the GET response for an endpoint as text.
    /// </summary>
    /// <param name="endpoint">The endpoint for the request.</param>
    /// <returns>The request response.</returns>
    public async Task<string> GetEndPointResponse(string endpoint)
    {
        var endpointResponse = await _httpClient.GetAsync($"http://{endpoint}");
    }

```



```

        var textResponse = await endpointResponse.Content.ReadAsStringAsync();
        return textResponse!;
    }

    /// <summary>
    /// Get the target health for a group by name.
    /// </summary>
    /// <param name="groupName">The name of the group.</param>
    /// <returns>The collection of health descriptions.</returns>
    public async Task<List<TargetHealthDescription>>
CheckTargetHealthForGroup(string groupName)
    {
        List<TargetHealthDescription> result = null!;
        try
        {
            var groupResponse =
                await _amazonElasticLoadBalancingV2.DescribeTargetGroupsAsync(
                    new DescribeTargetGroupsRequest()
                    {
                        Names = new List<string>() { groupName }
                    });
            var healthResponse =
                await _amazonElasticLoadBalancingV2.DescribeTargetHealthAsync(
                    new DescribeTargetHealthRequest()
                    {
                        TargetGroupArn =
groupResponse.TargetGroups[0].TargetGroupArn
                    });
            ;
            result = healthResponse.TargetHealthDescriptions;
        }
        catch (TargetGroupNotFoundException)
        {
            Console.WriteLine($"Target group {groupName} not found.");
        }
        return result;
    }

    /// <summary>
    /// Create an Elastic Load Balancing target group. The target group specifies
    how the load balancer forwards
    /// requests to instances in the group and how instance health is checked.
    ///

```

```

    /// To speed up this demo, the health check is configured with shortened times
    and lower thresholds. In production,
    /// you might want to decrease the sensitivity of your health checks to avoid
    unwanted failures.
    /// </summary>
    /// <param name="groupName">The name for the group.</param>
    /// <param name="protocol">The protocol, such as HTTP.</param>
    /// <param name="port">The port to use to forward requests, such as 80.</param>
    /// <param name="vpcId">The Id of the Vpc in which the load balancer exists.</
param>
    /// <returns>The new TargetGroup object.</returns>
    public async Task<TargetGroup> CreateTargetGroupOnVpc(string groupName,
        ProtocolEnum protocol, int port, string vpcId)
    {
        var createResponse = await
        _amazonElasticLoadBalancingV2.CreateTargetGroupAsync(
            new CreateTargetGroupRequest()
            {
                Name = groupName,
                Protocol = protocol,
                Port = port,
                HealthCheckPath = "/healthcheck",
                HealthCheckIntervalSeconds = 10,
                HealthCheckTimeoutSeconds = 5,
                HealthyThresholdCount = 2,
                UnhealthyThresholdCount = 2,
                VpcId = vpcId
            });
        var targetGroup = createResponse.TargetGroups[0];
        return targetGroup;
    }

    /// <summary>
    /// Create an Elastic Load Balancing load balancer that uses the specified
    subnets
    /// and forwards requests to the specified target group.
    /// </summary>
    /// <param name="name">The name for the new load balancer.</param>
    /// <param name="subnetIds">Subnets for the load balancer.</param>
    /// <param name="targetGroup">Target group for forwarded requests.</param>
    /// <returns>The new LoadBalancer object.</returns>
    public async Task<LoadBalancer> CreateLoadBalancerAndListener(string name,
        List<string> subnetIds, TargetGroup targetGroup)
    {

```

```
var createLbResponse = await
_amazonElasticLoadBalancingV2.CreateLoadBalancerAsync(
    new CreateLoadBalancerRequest()
    {
        Name = name,
        Subnets = subnetIds
    });
var loadBalancerArn = createLbResponse.LoadBalancers[0].LoadBalancerArn;

// Wait for load balancer to be available.
var loadBalancerReady = false;
while (!loadBalancerReady)
{
    try
    {
        var describeResponse =
            await _amazonElasticLoadBalancingV2.DescribeLoadBalancersAsync(
                new DescribeLoadBalancersRequest()
                {
                    Names = new List<string>() { name }
                });

        var loadBalancerState =
describeResponse.LoadBalancers[0].State.Code;

        loadBalancerReady = loadBalancerState ==
LoadBalancerStateEnum.Active;
    }
    catch (LoadBalancerNotFoundException)
    {
        loadBalancerReady = false;
    }
    Thread.Sleep(10000);
}
// Create the listener.
await _amazonElasticLoadBalancingV2.CreateListenerAsync(
    new CreateListenerRequest()
    {
        LoadBalancerArn = loadBalancerArn,
        Protocol = targetGroup.Protocol,
        Port = targetGroup.Port,
        DefaultActions = new List<Action>()
        {
            new Action()
```

```

        {
            Type = ActionTypeEnum.Forward,
            TargetGroupArn = targetGroup.TargetGroupArn
        }
    }
});
return createLbResponse.LoadBalancers[0];
}

/// <summary>
/// Verify this computer can successfully send a GET request to the
/// load balancer endpoint.
/// </summary>
/// <param name="endpoint">The endpoint to check.</param>
/// <returns>True if successful.</returns>
public async Task<bool> VerifyLoadBalancerEndpoint(string endpoint)
{
    var success = false;
    var retries = 3;
    while (!success && retries > 0)
    {
        try
        {
            var endpointResponse = await _httpClient.GetAsync($"http://{
{endpoint}");
            Console.WriteLine($"Response: {endpointResponse.StatusCode}.");

            if (endpointResponse.IsSuccessStatusCode)
            {
                success = true;
            }
            else
            {
                retries = 0;
            }
        }
        catch (HttpRequestException)
        {
            Console.WriteLine("Connection error, retrying...");
            retries--;
            Thread.Sleep(10000);
        }
    }
}

```

```

        return success;
    }

    /// <summary>
    /// Delete a load balancer by its specified name.
    /// </summary>
    /// <param name="name">The name of the load balancer to delete.</param>
    /// <returns>Async task.</returns>
    public async Task DeleteLoadBalancerByName(string name)
    {
        try
        {
            var describeLoadBalancerResponse =
                await _amazonElasticLoadBalancingV2.DescribeLoadBalancersAsync(
                    new DescribeLoadBalancersRequest()
                    {
                        Names = new List<string>() { name }
                    });
            var lbArn =
                describeLoadBalancerResponse.LoadBalancers[0].LoadBalancerArn;
            await _amazonElasticLoadBalancingV2.DeleteLoadBalancerAsync(
                new DeleteLoadBalancerRequest()
                {
                    LoadBalancerArn = lbArn
                }
            );
        }
        catch (LoadBalancerNotFoundException)
        {
            Console.WriteLine($"Load balancer {name} not found.");
        }
    }

    /// <summary>
    /// Delete a TargetGroup by its specified name.
    /// </summary>
    /// <param name="groupName">Name of the group to delete.</param>
    /// <returns>Async task.</returns>
    public async Task DeleteTargetGroupByName(string groupName)
    {
        var done = false;
        while (!done)
        {
            try

```

```

        {
            var groupResponse =
                await _amazonElasticLoadBalancingV2.DescribeTargetGroupsAsync(
                    new DescribeTargetGroupsRequest()
                    {
                        Names = new List<string>() { groupName }
                    });

            var targetArn = groupResponse.TargetGroups[0].TargetGroupArn;
            await _amazonElasticLoadBalancingV2.DeleteTargetGroupAsync(
                new DeleteTargetGroupRequest() { TargetGroupArn = targetArn });
            Console.WriteLine($"Deleted load balancing target group
{groupName}.");
            done = true;
        }
        catch (TargetGroupNotFoundException)
        {
            Console.WriteLine(
                $"Target group {groupName} not found, could not delete.");
            done = true;
        }
        catch (ResourceInUseException)
        {
            Console.WriteLine("Target group not yet released, waiting...");
            Thread.Sleep(10000);
        }
    }
}
}

```

建立使用 DynamoDB 模擬建議服務的類別。

```

/// <summary>
/// Encapsulates a DynamoDB table to use as a service that recommends books, movies,
/// and songs.
/// </summary>
public class Recommendations
{
    private readonly IAmazonDynamoDB _amazonDynamoDb;
    private readonly DynamoDBContext _context;
    private readonly string _tableName;

```

```

public string TableName => _tableName;

/// <summary>
/// Constructor for the Recommendations service.
/// </summary>
/// <param name="amazonDynamoDb">The injected DynamoDb client.</param>
/// <param name="configuration">The injected configuration.</param>
public Recommendations(IAmazonDynamoDB amazonDynamoDb, IConfiguration
configuration)
{
    _amazonDynamoDb = amazonDynamoDb;
    _context = new DynamoDBContext(_amazonDynamoDb);
    _tableName = configuration["databaseName"]!;
}

/// <summary>
/// Create the DynamoDb table with a specified name.
/// </summary>
/// <param name="tableName">The name for the table.</param>
/// <returns>True when ready.</returns>
public async Task<bool> CreateDatabaseWithName(string tableName)
{
    try
    {
        Console.WriteLine($"Creating table {tableName}...");
        var createRequest = new CreateTableRequest()
        {
            TableName = tableName,
            AttributeDefinitions = new List<AttributeDefinition>()
            {
                new AttributeDefinition()
                {
                    AttributeName = "MediaType",
                    AttributeType = ScalarAttributeType.S
                },
                new AttributeDefinition()
                {
                    AttributeName = "ItemId",
                    AttributeType = ScalarAttributeType.N
                }
            },
            KeySchema = new List<KeySchemaElement>()
            {
                new KeySchemaElement()

```

```
        {
            AttributeName = "MediaType",
            KeyType = KeyType.HASH
        },
        new KeySchemaElement()
        {
            AttributeName = "ItemId",
            KeyType = KeyType.RANGE
        }
    },
    ProvisionedThroughput = new ProvisionedThroughput()
    {
        ReadCapacityUnits = 5,
        WriteCapacityUnits = 5
    }
};
await _amazonDynamoDb.CreateTableAsync(createRequest);

// Wait until the table is ACTIVE and then report success.
Console.WriteLine("\nWaiting for table to become active...");

var request = new DescribeTableRequest
{
    TableName = tableName
};

TableStatus status;
do
{
    Thread.Sleep(2000);

    var describeTableResponse = await
        _amazonDynamoDb.DescribeTableAsync(request);
    status = describeTableResponse.Table.TableStatus;

    Console.WriteLine(".");
}
while (status != "ACTIVE");

return status == TableStatus.ACTIVE;
}
catch (ResourceInUseException)
{
    Console.WriteLine($"Table {tableName} already exists.");
}
```



```

        return false;
    }
}

/// <summary>
/// Populate the database table with data from a specified path.
/// </summary>
/// <param name="databaseTableName">The name of the table.</param>
/// <param name="recommendationsPath">The path of the recommendations data.</
param>
/// <returns>Async task.</returns>
public async Task PopulateDatabase(string databaseTableName, string
recommendationsPath)
{
    var recommendationsText = await File.ReadAllTextAsync(recommendationsPath);
    var records =
        JsonSerializer.Deserialize<RecommendationModel[]>(recommendationsText);
    var batchWrite = _context.CreateBatchWrite<RecommendationModel>();

    foreach (var record in records!)
    {
        batchWrite.AddPutItem(record);
    }

    await batchWrite.ExecuteAsync();
}

/// <summary>
/// Delete the recommendation table by name.
/// </summary>
/// <param name="tableName">The name of the recommendation table.</param>
/// <returns>Async task.</returns>
public async Task DestroyDatabaseByName(string tableName)
{
    try
    {
        await _amazonDynamoDb.DeleteTableAsync(
            new DeleteTableRequest() { TableName = tableName });
        Console.WriteLine($"Table {tableName} was deleted.");
    }
    catch (ResourceNotFoundException)
    {
        Console.WriteLine($"Table {tableName} not found");
    }
}

```

```
    }
}
```

建立包裝 Systems Manager 動作的類別。

```
/// <summary>
/// Encapsulates Systems Manager parameter operations. This example uses these
/// parameters
/// to drive the demonstration of resilient architecture, such as failure of a
/// dependency or
/// how the service responds to a health check.
/// </summary>
public class SmParameterWrapper
{
    private readonly IAmazonSimpleSystemsManagement _amazonSimpleSystemsManagement;

    private readonly string _tableParameter = "doc-example-resilient-architecture-
table";
    private readonly string _failureResponseParameter = "doc-example-resilient-
architecture-failure-response";
    private readonly string _healthCheckParameter = "doc-example-resilient-
architecture-health-check";
    private readonly string _tableName = "";

    public string TableParameter => _tableParameter;
    public string TableName => _tableName;
    public string HealthCheckParameter => _healthCheckParameter;
    public string FailureResponseParameter => _failureResponseParameter;

    /// <summary>
    /// Constructor for the SmParameterWrapper.
    /// </summary>
    /// <param name="amazonSimpleSystemsManagement">The injected Simple Systems
Management client.</param>
    /// <param name="configuration">The injected configuration.</param>
    public SmParameterWrapper(IAmazonSimpleSystemsManagement
amazonSimpleSystemsManagement, IConfiguration configuration)
    {
        _amazonSimpleSystemsManagement = amazonSimpleSystemsManagement;
        _tableName = configuration["databaseName"]!;
    }
}
```

```
/// <summary>
/// Reset the Systems Manager parameters to starting values for the demo.
/// </summary>
/// <returns>Async task.</returns>
public async Task Reset()
{
    await this.PutParameterByName(_tableParameter, _tableName);
    await this.PutParameterByName(_failureResponseParameter, "none");
    await this.PutParameterByName(_healthCheckParameter, "shallow");
}

/// <summary>
/// Set the value of a named Systems Manager parameter.
/// </summary>
/// <param name="name">The name of the parameter.</param>
/// <param name="value">The value to set.</param>
/// <returns>Async task.</returns>
public async Task PutParameterByName(string name, string value)
{
    await _amazonSimpleSystemsManagement.PutParameterAsync(
        new PutParameterRequest() { Name = name, Value = value, Overwrite =
true });
}
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的下列主題。
 - [AttachLoadBalancerTargetGroups](#)
 - [CreateAutoScalingGroup](#)
 - [CreateInstanceProfile](#)
 - [CreateLaunchTemplate](#)
 - [CreateListener](#)
 - [CreateLoadBalancer](#)
 - [CreateTargetGroup](#)
 - [DeleteAutoScalingGroup](#)
 - [DeleteInstanceProfile](#)
 - [DeleteLaunchTemplate](#)
 - [DeleteLoadBalancer](#)

- [DeleteTargetGroup](#)
- [DescribeAutoScalingGroups](#)
- [DescribeAvailabilityZones](#)
- [DescribeIamInstanceProfileAssociations](#)
- [DescribeInstances](#)
- [DescribeLoadBalancers](#)
- [DescribeSubnets](#)
- [DescribeTargetGroups](#)
- [DescribeTargetHealth](#)
- [DescribeVpcs](#)
- [RebootInstances](#)
- [ReplaceIamInstanceProfileAssociation](#)
- [TerminateInstanceInAutoScalingGroup](#)
- [UpdateAutoScalingGroup](#)

使用的 Amazon Keyspaces 範例 適用於 .NET 的 SDK

下列程式碼範例示範如何使用 適用於 .NET 的 AWS SDK 搭配 Amazon Keyspaces 執行動作和實作常見案例。

基本概念是程式碼範例，這些範例說明如何在服務內執行基本操作。

Actions 是大型程式的程式碼摘錄，必須在內容中執行。雖然動作會告訴您如何呼叫個別服務函數，但您可以在其相關情境中查看內容中的動作。

每個範例均包含完整原始碼的連結，您可在連結中找到如何設定和執行內容中程式碼的相關指示。

主題

- [開始使用](#)
- [基本概念](#)
- [動作](#)

開始使用

Hello Amazon Keyspaces

下列程式碼範例說明如何開始使用 Amazon Keyspaces。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
namespace KeyspacesActions;

public class HelloKeyspaces
{
    private static ILogger logger = null!;

    static async Task Main(string[] args)
    {
        // Set up dependency injection for Amazon Keyspaces (for Apache Cassandra).
        using var host = Host.CreateDefaultBuilder(args)
            .ConfigureLogging(logging =>
                logging.AddFilter("System", LogLevel.Debug)
                .AddFilter<DebugLoggerProvider>("Microsoft",
                    LogLevel.Information)
                .AddFilter<ConsoleLoggerProvider>("Microsoft", LogLevel.Trace))
            .ConfigureServices((_, services) =>
                services.AddAWSService<IAmazonKeyspaces>()
                .AddTransient<KeyspacesWrapper>()
            )
            .Build();

        logger = LoggerFactory.Create(builder => { builder.AddConsole(); })
            .CreateLogger<HelloKeyspaces>();

        var keyspacesClient = host.Services.GetRequiredService<IAmazonKeyspaces>();
        var keyspacesWrapper = new KeyspacesWrapper(keyspacesClient);

        Console.WriteLine("Hello, Amazon Keyspaces! Let's list your keyspaces:");
```

```
        await keyspacesWrapper.ListKeyspaces();  
    }  
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [ListKeyspaces](#)。

基本概念

了解基本概念

以下程式碼範例顯示做法：

- 建立鍵空間和資料表。資料表結構描述會保留電影資料，並啟用時間點復原。
- 使用具有 SigV4 驗證的安全 TLS 連線，以連接至鍵空間。
- 查詢資料表。新增、擷取和更新電影資料。
- 更新資料表。新增資料欄以追蹤觀看的電影。
- 將資料表還原至其先前的狀態，並清除資源。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
global using System.Security.Cryptography.X509Certificates;  
global using Amazon.Keyspaces;  
global using Amazon.Keyspaces.Model;  
global using KeyspacesActions;  
global using KeyspacesScenario;  
global using Microsoft.Extensions.Configuration;  
global using Microsoft.Extensions.DependencyInjection;  
global using Microsoft.Extensions.Hosting;  
global using Microsoft.Extensions.Logging;  
global using Microsoft.Extensions.Logging.Console;  
global using Microsoft.Extensions.Logging.Debug;
```

```
global using Newtonsoft.Json;

namespace KeyspacesBasics;

/// <summary>
/// Amazon Keyspaces (for Apache Cassandra) scenario. Shows some of the basic
/// actions performed with Amazon Keyspaces.
/// </summary>
public class KeyspacesBasics
{
    private static ILogger logger = null!;

    static async Task Main(string[] args)
    {
        // Set up dependency injection for the Amazon service.
        using var host = Host.CreateDefaultBuilder(args)
            .ConfigureLogging(logging =>
                logging.AddFilter("System", LogLevel.Debug)
                    .AddFilter<DebugLoggerProvider>("Microsoft",
                        LogLevel.Information)
                    .AddFilter<ConsoleLoggerProvider>("Microsoft", LogLevel.Trace))
            .ConfigureServices((_, services) =>
                services.AddAWSService<IAmazonKeyspaces>()
                    .AddTransient<KeyspacesWrapper>()
                    .AddTransient<CassandraWrapper>()
                )
            .Build();

        logger = LoggerFactory.Create(builder => { builder.AddConsole(); })
            .CreateLogger<KeyspacesBasics>();

        var configuration = new ConfigurationBuilder()
            .SetBasePath(Directory.GetCurrentDirectory())
            .AddJsonFile("settings.json") // Load test settings from .json file.
            .AddJsonFile("settings.local.json",
                true) // Optionally load local settings.
            .Build();

        var keyspacesWrapper = host.Services.GetRequiredService<KeyspacesWrapper>();
        var uiMethods = new UiMethods();

        var keyspaceName = configuration["KeyspaceName"];
        var tableName = configuration["TableName"];
```

```
bool success; // Used to track the results of some operations.

uiMethods.DisplayOverview();
uiMethods.PressEnter();

// Create the keyspace.
var keyspaceArn = await keyspacesWrapper.CreateKeyspace(keyspaceName);

// Wait for the keyspace to be available. GetKeyspace results in a
// resource not found error until it is ready for use.
try
{
    var getKeyspaceArn = "";
    Console.Write($"Created {keyspaceName}. Waiting for it to become
available. ");
    do
    {
        getKeyspaceArn = await keyspacesWrapper.GetKeyspace(keyspaceName);
        Console.Write(". ");
    } while (getKeyspaceArn != keyspaceArn);
}
catch (ResourceNotFoundException)
{
    Console.WriteLine("Waiting for keyspace to be created.");
}

Console.WriteLine($"\\n\\nThe keyspace {keyspaceName} is ready for use.");

uiMethods.PressEnter();

// Create the table.
// First define the schema.
var allColumns = new List<ColumnDefinition>
{
    new ColumnDefinition { Name = "title", Type = "text" },
    new ColumnDefinition { Name = "year", Type = "int" },
    new ColumnDefinition { Name = "release_date", Type = "timestamp" },
    new ColumnDefinition { Name = "plot", Type = "text" },
};

var partitionKeys = new List<PartitionKey>
{
    new PartitionKey { Name = "year", },
```



```

        new PartitionKey { Name = "title" },
    };

    var tableSchema = new SchemaDefinition
    {
        AllColumns = allColumns,
        PartitionKeys = partitionKeys,
    };

    var tableArn = await keyspacesWrapper.CreateTable(keyspaceName, tableSchema,
tableName);

    // Wait for the table to be active.
    try
    {
        var resp = new GetTableResponse();
        Console.WriteLine("Waiting for the new table to be active. ");
        do
        {
            try
            {
                resp = await keyspacesWrapper.GetTable(keyspaceName, tableName);
                Console.WriteLine(".");
            }
            catch (ResourceNotFoundException)
            {
                Console.WriteLine(".");
            }
        } while (resp.Status != TableStatus.ACTIVE);

        // Display the table's schema.
        Console.WriteLine($"\\nTable {tableName} has been created in
{keyspaceName}");
        Console.WriteLine("Let's take a look at the schema.");
        uiMethods.DisplayTitle("All columns");
        resp.SchemaDefinition.AllColumns.ForEach(column =>
        {
            Console.WriteLine($"{column.Name, -40}\\t{column.Type, -20}");
        });

        uiMethods.DisplayTitle("Cluster keys");
        resp.SchemaDefinition.ClusteringKeys.ForEach(clusterKey =>
        {

```

```
Console.WriteLine($"{clusterKey.Name, -40}\t{clusterKey.OrderBy, -20}");
    });

    uiMethods.DisplayTitle("Partition keys");
    resp.SchemaDefinition.PartitionKeys.ForEach(partitionKey =>
    {
        Console.WriteLine($"{partitionKey.Name}");
    });

    uiMethods.PressEnter();
}
catch (ResourceNotFoundException ex)
{
    Console.WriteLine($"Error: {ex.Message}");
}

// Access Apache Cassandra using the Cassandra drive for C#.
var cassandraWrapper = host.Services.GetRequiredService<CassandraWrapper>();
var movieFilePath = configuration["MovieFile"];

Console.WriteLine("Let's add some movies to the table we created.");
var inserted = await cassandraWrapper.InsertIntoMovieTable(keyspaceName,
tableName, movieFilePath);

uiMethods.PressEnter();

Console.WriteLine("Added the following movies to the table:");
var rows = await cassandraWrapper.GetMovies(keyspaceName, tableName);
uiMethods.DisplayTitle("All Movies");

foreach (var row in rows)
{
    var title = row.GetValue<string>("title");
    var year = row.GetValue<int>("year");
    var plot = row.GetValue<string>("plot");
    var release_date = row.GetValue<DateTime>("release_date");
    Console.WriteLine($"{release_date}\t{title}\t{year}\n{plot}");
    Console.WriteLine(uiMethods.SepBar);
}

// Update the table schema
uiMethods.DisplayTitle("Update table schema");
```

```
        Console.WriteLine("Now we will update the table to add a boolean field
called watched.");

        // First save the current time as a UTC Date so the original
        // table can be restored later.
        var timeChanged = DateTime.UtcNow;

        // Now update the schema.
        var resourceArn = await keyspacesWrapper.UpdateTable(keyspaceName,
tableName);
        uiMethods.PressEnter();

        Console.WriteLine("Now let's mark some of the movies as watched.");

        // Pick some files to mark as watched.
        var movieToWatch = rows[2].GetValue<string>("title");
        var watchedMovieYear = rows[2].GetValue<int>("year");
        var changedRows = await cassandraWrapper.MarkMovieAsWatched(keyspaceName,
tableName, movieToWatch, watchedMovieYear);

        movieToWatch = rows[6].GetValue<string>("title");
        watchedMovieYear = rows[6].GetValue<int>("year");
        changedRows = await cassandraWrapper.MarkMovieAsWatched(keyspaceName,
tableName, movieToWatch, watchedMovieYear);

        movieToWatch = rows[9].GetValue<string>("title");
        watchedMovieYear = rows[9].GetValue<int>("year");
        changedRows = await cassandraWrapper.MarkMovieAsWatched(keyspaceName,
tableName, movieToWatch, watchedMovieYear);

        movieToWatch = rows[10].GetValue<string>("title");
        watchedMovieYear = rows[10].GetValue<int>("year");
        changedRows = await cassandraWrapper.MarkMovieAsWatched(keyspaceName,
tableName, movieToWatch, watchedMovieYear);

        movieToWatch = rows[13].GetValue<string>("title");
        watchedMovieYear = rows[13].GetValue<int>("year");
        changedRows = await cassandraWrapper.MarkMovieAsWatched(keyspaceName,
tableName, movieToWatch, watchedMovieYear);

        uiMethods.DisplayTitle("Watched movies");
        Console.WriteLine("These movies have been marked as watched:");
        rows = await cassandraWrapper.GetWatchedMovies(keyspaceName, tableName);
        foreach (var row in rows)
```

```
{
    var title = row.GetValue<string>("title");
    var year = row.GetValue<int>("year");
    Console.WriteLine($"{title,-40}\t{year,8}");
}
uiMethods.PressEnter();

Console.WriteLine("We can restore the table to its previous state but that
can take up to 20 minutes to complete.");
string answer;
do
{
    Console.WriteLine("Do you want to restore the table? (y/n)");
    answer = Console.ReadLine();
} while (answer.ToLower() != "y" && answer.ToLower() != "n");

if (answer == "y")
{
    var restoredTableName = $"{tableName}_restored";
    var restoredTableArn = await keyspacesWrapper.RestoreTable(
        keyspaceName,
        tableName,
        restoredTableName,
        timeChanged);
    // Loop and call GetTable until the table is gone. Once it has been
    // deleted completely, GetTable will raise a ResourceNotFoundException.
    bool wasRestored = false;

    try
    {
        do
        {
            var resp = await keyspacesWrapper.GetTable(keyspaceName,
restoredTableName);
            wasRestored = (resp.Status == TableStatus.ACTIVE);
        } while (!wasRestored);
    }
    catch (ResourceNotFoundException)
    {
        // If the restored table raised an error, it isn't
        // ready yet.
        Console.Write(".");
    }
}
```

```

        uiMethods.DisplayTitle("Clean up resources.");

        // Delete the table.
        success = await keyspacesWrapper.DeleteTable(keyspaceName, tableName);

        Console.WriteLine($"Table {tableName} successfully deleted from
{keyspaceName}.");
        Console.WriteLine("Waiting for the table to be removed completely. ");

        // Loop and call GetTable until the table is gone. Once it has been
        // deleted completely, GetTable will raise a ResourceNotFoundException.
        bool wasDeleted = false;

        try
        {
            do
            {
                var resp = await keyspacesWrapper.GetTable(keyspaceName, tableName);
            } while (!wasDeleted);
        }
        catch (ResourceNotFoundException ex)
        {
            wasDeleted = true;
            Console.WriteLine($"{ex.Message} indicates that the table has been
deleted.");
        }

        // Delete the keyspace.
        success = await keyspacesWrapper.DeleteKeyspace(keyspaceName);
        Console.WriteLine("The keyspace has been deleted and the demo is now
complete.");
    }
}

```

```
namespace KeyspacesActions;
```

```

/// <summary>
/// Performs Amazon Keyspaces (for Apache Cassandra) actions.
/// </summary>
public class KeyspacesWrapper

```

```

{
    private readonly IAmazonKeyspaces _amazonKeyspaces;

    /// <summary>
    /// Constructor for the KeyspaceWrapper.
    /// </summary>
    /// <param name="amazonKeyspaces">An Amazon Keyspaces client object.</param>
    public KeyspacesWrapper(IAmazonKeyspaces amazonKeyspaces)
    {
        _amazonKeyspaces = amazonKeyspaces;
    }

    /// <summary>
    /// Create a new keyspace.
    /// </summary>
    /// <param name="keyspaceName">The name for the new keyspace.</param>
    /// <returns>The Amazon Resource Name (ARN) of the new keyspace.</returns>
    public async Task<string> CreateKeyspace(string keyspaceName)
    {
        var response =
            await _amazonKeyspaces.CreateKeyspaceAsync(
                new CreateKeyspaceRequest { KeyspaceName = keyspaceName });
        return response.ResourceArn;
    }

    /// <summary>
    /// Create a new Amazon Keyspaces table.
    /// </summary>
    /// <param name="keyspaceName">The keyspace where the table will be created.</
param>
    /// <param name="schema">The schema for the new table.</param>
    /// <param name="tableName">The name of the new table.</param>
    /// <returns>The Amazon Resource Name (ARN) of the new table.</returns>
    public async Task<string> CreateTable(string keyspaceName, SchemaDefinition
schema, string tableName)
    {
        var request = new CreateTableRequest
        {
            KeyspaceName = keyspaceName,
            SchemaDefinition = schema,
            TableName = tableName,
            PointInTimeRecovery = new PointInTimeRecovery { Status =
PointInTimeRecoveryStatus.ENABLED }

```

```

    };

    var response = await _amazonKeyspaces.CreateTableAsync(request);
    return response.ResourceArn;
}

/// <summary>
/// Delete an existing keyspace.
/// </summary>
/// <param name="keyspaceName"></param>
/// <returns>A Boolean value indicating the success of the action.</returns>
public async Task<bool> DeleteKeyspace(string keyspaceName)
{
    var response = await _amazonKeyspaces.DeleteKeyspaceAsync(
        new DeleteKeyspaceRequest { KeyspaceName = keyspaceName });
    return response.HttpStatusCode == HttpStatusCode.OK;
}

/// <summary>
/// Delete an Amazon Keyspaces table.
/// </summary>
/// <param name="keyspaceName">The keyspace containing the table.</param>
/// <param name="tableName">The name of the table to delete.</param>
/// <returns>A Boolean value indicating the success of the action.</returns>
public async Task<bool> DeleteTable(string keyspaceName, string tableName)
{
    var response = await _amazonKeyspaces.DeleteTableAsync(
        new DeleteTableRequest { KeyspaceName = keyspaceName, TableName =
tableName });
    return response.HttpStatusCode == HttpStatusCode.OK;
}

/// <summary>
/// Get data about a keyspace.
/// </summary>
/// <param name="keyspaceName">The name of the keyspace.</param>
/// <returns>The Amazon Resource Name (ARN) of the keyspace.</returns>
public async Task<string> GetKeyspace(string keyspaceName)
{
    var response = await _amazonKeyspaces.GetKeyspaceAsync(
        new GetKeyspaceRequest { KeyspaceName = keyspaceName });

```

```

        return response.ResourceArn;
    }

    /// <summary>
    /// Get information about an Amazon Keyspaces table.
    /// </summary>
    /// <param name="keyspaceName">The keyspace containing the table.</param>
    /// <param name="tableName">The name of the Amazon Keyspaces table.</param>
    /// <returns>The response containing data about the table.</returns>
    public async Task<GetTableResponse> GetTable(string keyspaceName, string
tableName)
    {
        var response = await _amazonKeyspaces.GetTableAsync(
            new GetTableRequest { KeyspaceName = keyspaceName, TableName =
tableName });
        return response;
    }

    /// <summary>
    /// Lists all keyspaces for the account.
    /// </summary>
    /// <returns>Async task.</returns>
    public async Task ListKeyspaces()
    {
        var paginator = _amazonKeyspaces.Paginators.ListKeyspaces(new
ListKeyspacesRequest());

        Console.WriteLine("{0, -30}\t{1}", "Keyspace name", "Keyspace ARN");
        Console.WriteLine(new string('-', Console.WindowWidth));
        await foreach (var keyspace in paginator.Keyspaces)
        {
            Console.WriteLine($"{keyspace.KeyspaceName, -30}\t{keyspace.ResourceArn}");
        }
    }

    /// <summary>
    /// Lists the Amazon Keyspaces tables in a keyspace.
    /// </summary>
    /// <param name="keyspaceName">The name of the keyspace.</param>
    /// <returns>A list of TableSummary objects.</returns>

```



```

    public async Task<List<TableSummary>> ListTables(string keyspaceName)
    {
        var response = await _amazonKeyspaces.ListTablesAsync(new ListTablesRequest
        { KeyspaceName = keyspaceName });
        response.Tables.ForEach(table =>
        {

Console.WriteLine($"{table.KeyspaceName}\t{table.TableName}\t{table.ResourceArn}");
        });

        return response.Tables;
    }

    /// <summary>
    /// Restores the specified table to the specified point in time.
    /// </summary>
    /// <param name="keyspaceName">The keyspace containing the table.</param>
    /// <param name="tableName">The name of the table to restore.</param>
    /// <param name="timestamp">The time to which the table will be restored.</
param>
    /// <returns>The Amazon Resource Name (ARN) of the restored table.</returns>
    public async Task<string> RestoreTable(string keyspaceName, string tableName,
string restoredTableName, DateTime timestamp)
    {
        var request = new RestoreTableRequest
        {
            RestoreTimestamp = timestamp,
            SourceKeyspaceName = keyspaceName,
            SourceTableName = tableName,
            TargetKeyspaceName = keyspaceName,
            TargetTableName = restoredTableName
        };

        var response = await _amazonKeyspaces.RestoreTableAsync(request);
        return response.RestoredTableARN;
    }

    /// <summary>
    /// Updates the movie table to add a boolean column named watched.
    /// </summary>
    /// <param name="keyspaceName">The keyspace containing the table.</param>
    /// <param name="tableName">The name of the table to change.</param>

```

```

    /// <returns>The Amazon Resource Name (ARN) of the updated table.</returns>
    public async Task<string> UpdateTable(string keyspaceName, string tableName)
    {
        var newColumn = new ColumnDefinition { Name = "watched", Type = "boolean" };
        var request = new UpdateTableRequest
        {
            KeyspaceName = keyspaceName,
            TableName = tableName,
            AddColumns = new List<ColumnDefinition> { newColumn }
        };
        var response = await _amazonKeyspaces.UpdateTableAsync(request);
        return response.ResourceArn;
    }
}

```

```

using System.Net;
using Cassandra;

namespace KeyspacesScenario;

/// <summary>
/// Class to perform CRUD methods on an Amazon Keyspaces (for Apache Cassandra)
/// database.
///
/// NOTE: This sample uses a plain text authenticator for example purposes only.
/// Recommended best practice is to use a SigV4 authentication plugin, if available.
/// </summary>
public class CassandraWrapper
{
    private readonly IConfiguration _configuration;
    private readonly string _localPathToFile;
    private const string _certLocation = "https://certs.secureserver.net/repository/
sf-class2-root.crt";
    private const string _certFileName = "sf-class2-root.crt";
    private readonly X509Certificate2Collection _certCollection;
    private X509Certificate2 _amazoncert;
    private Cluster _cluster;

    // User name and password for the service.
    private string _userName = null!;

```

```
private string _pwd = null!;

public CassandraWrapper()
{
    _configuration = new ConfigurationBuilder()
        .SetBasePath(Directory.GetCurrentDirectory())
        .AddJsonFile("settings.json") // Load test settings from .json file.
        .AddJsonFile("settings.local.json",
            true) // Optionally load local settings.
        .Build();

    _localPathToFile = Path.GetTempPath();

    // Get the Starfield digital certificate and save it locally.
    var client = new WebClient();
    client.DownloadFile(_certLocation, $"{_localPathToFile}/{_certFileName}");

    //var httpClient = new HttpClient();
    //var httpResult = httpClient.Get(fileUrl);
    //using var resultStream = await httpResult.Content.ReadAsStreamAsync();
    //using var fileStream = File.Create(pathToSave);
    //resultStream.CopyTo(fileStream);

    _certCollection = new X509Certificate2Collection();
    _amazoncert = new X509Certificate2($"{_localPathToFile}/{_certFileName}");

    // Get the user name and password stored in the configuration file.
    _userName = _configuration["UserName"]!;
    _pwd = _configuration["Password"]!;

    // For a list of Service Endpoints for Amazon Keyspaces, see:
    // https://docs.aws.amazon.com/keyspaces/latest/devguide/
    programmatic.endpoints.html
    var awsEndpoint = _configuration["ServiceEndpoint"];

    _cluster = Cluster.Builder()
        .AddContactPoints(awsEndpoint)
        .WithPort(9142)
        .WithAuthProvider(new PlainTextAuthProvider(_userName, _pwd))
        .WithSSL(new SSLOptions().SetCertificateCollection(_certCollection))
        .WithQueryOptions(
            new QueryOptions()
                .SetConsistencyLevel(ConsistencyLevel.LocalQuorum)
                .SetSerialConsistencyLevel(ConsistencyLevel.LocalSerial))
}
```

```

        .Build();
    }

    /// <summary>
    /// Loads the contents of a JSON file into a list of movies to be
    /// added to the Apache Cassandra table.
    /// </summary>
    /// <param name="movieFileName">The full path to the JSON file.</param>
    /// <returns>A list of movie objects.</returns>
    public List<Movie> ImportMoviesFromJson(string movieFileName, int numToImport =
0)
    {
        if (!File.Exists(movieFileName))
        {
            return null!;
        }

        using var sr = new StreamReader(movieFileName);
        string json = sr.ReadToEnd();

        var allMovies = JsonConvert.DeserializeObject<List<Movie>>(json);

        // If numToImport = 0, return all movies in the collection.
        if (numToImport == 0)
        {
            // Now return the entire list of movies.
            return allMovies;
        }
        else
        {
            // Now return the first numToImport entries.
            return allMovies.GetRange(0, numToImport);
        }
    }

    /// <summary>
    /// Insert movies into the movie table.
    /// </summary>
    /// <param name="keyspaceName">The keyspace containing the table.</param>
    /// <param name="movieTableName">The Amazon Keyspaces table.</param>
    /// <param name="movieFilePath">The path to the resource file containing
    /// movie data to insert into the table.</param>
    /// <returns>A Boolean value indicating the success of the action.</returns>

```

```

public async Task<bool> InsertIntoMovieTable(string keyspaceName, string
movieTableName, string movieFilePath, int numToImport = 20)
{
    // Get some movie data from the movies.json file
    var movies = ImportMoviesFromJson(movieFilePath, numToImport);

    var session = _cluster.Connect(keyspaceName);

    string insertCql;

    RowSet rs;

    // Now we insert the numToImport movies into the table.
    foreach (var movie in movies)
    {
        // Escape single quote characters in the plot.
        insertCql = $"INSERT INTO {keyspaceName}.{movieTableName}
(title, year, release_date, plot) values(${movie.Title}$, {movie.Year},
'{movie.Info.Release_Date.ToString("yyyy-MM-dd")}', ${movie.Info.Plot}$)";
        rs = await session.ExecuteAsync(new SimpleStatement(insertCql));
    }

    return true;
}

/// <summary>
/// Gets all of the movies in the movies table.
/// </summary>
/// <param name="keyspaceName">The keyspace containing the table.</param>
/// <param name="tableName">The name of the table.</param>
/// <returns>A list of row objects containing movie data.</returns>
public async Task<List<Row>> GetMovies(string keyspaceName, string tableName)
{
    var session = _cluster.Connect();
    RowSet rs;
    try
    {
        rs = await session.ExecuteAsync(new SimpleStatement($"SELECT * FROM
{keyspaceName}.{tableName}"));

        // Extract the row data from the returned RowSet.
        var rows = rs.GetRows().ToList();
        return rows;
    }
}

```

```

        catch (Exception ex)
        {
            Console.WriteLine(ex.Message);
            return null!;
        }
    }

    /// <summary>
    /// Mark a movie in the movie table as watched.
    /// </summary>
    /// <param name="keyspaceName">The keyspace containing the table.</param>
    /// <param name="tableName">The name of the table.</param>
    /// <param name="title">The title of the movie to mark as watched.</param>
    /// <param name="year">The year the movie was released.</param>
    /// <returns>A set of rows containing the changed data.</returns>
    public async Task<List<Row>> MarkMovieAsWatched(string keyspaceName, string
tableName, string title, int year)
    {
        var session = _cluster.Connect();
        string updateCql = $"UPDATE {keyspaceName}.{tableName} SET watched=true
WHERE title = ${title} AND year = {year}";
        var rs = await session.ExecuteAsync(new SimpleStatement(updateCql));
        var rows = rs.GetRows().ToList();
        return rows;
    }

    /// <summary>
    /// Retrieve the movies in the movies table where watched is true.
    /// </summary>
    /// <param name="keyspaceName">The keyspace containing the table.</param>
    /// <param name="tableName">The name of the table.</param>
    /// <returns>A list of row objects containing information about movies
    /// where watched is true.</returns>
    public async Task<List<Row>> GetWatchedMovies(string keyspaceName, string
tableName)
    {
        var session = _cluster.Connect();
        RowSet rs;
        try
        {
            rs = await session.ExecuteAsync(new SimpleStatement($"SELECT title,
year, plot FROM {keyspaceName}.{tableName} WHERE watched = true ALLOW FILTERING"));

            // Extract the row data from the returned RowSet.

```

```
        var rows = rs.GetRows().ToList();
        return rows;
    }
    catch (Exception ex)
    {
        Console.WriteLine(ex.Message);
        return null!;
    }
}
```

• 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的下列主題。

- [CreateKeyspace](#)
- [CreateTable](#)
- [DeleteKeyspace](#)
- [DeleteTable](#)
- [GetKeyspace](#)
- [GetTable](#)
- [ListKeyspaces](#)
- [ListTables](#)
- [RestoreTable](#)
- [UpdateTable](#)

動作

CreateKeyspace

以下程式碼範例顯示如何使用 CreateKeyspace。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```

/// <summary>
/// Create a new keyspace.
/// </summary>
/// <param name="keyspaceName">The name for the new keyspace.</param>
/// <returns>The Amazon Resource Name (ARN) of the new keyspace.</returns>
public async Task<string> CreateKeyspace(string keyspaceName)
{
    var response =
        await _amazonKeyspaces.CreateKeyspaceAsync(
            new CreateKeyspaceRequest { KeyspaceName = keyspaceName });
    return response.ResourceArn;
}

```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [CreateKeyspace](#)。

CreateTable

以下程式碼範例顯示如何使用 CreateTable。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```

/// <summary>
/// Create a new Amazon Keyspaces table.
/// </summary>
/// <param name="keyspaceName">The keyspace where the table will be created.</param>
/// <param name="schema">The schema for the new table.</param>
/// <param name="tableName">The name of the new table.</param>
/// <returns>The Amazon Resource Name (ARN) of the new table.</returns>
public async Task<string> CreateTable(string keyspaceName, SchemaDefinition
schema, string tableName)
{
    var request = new CreateTableRequest

```



```

    {
        KeyspaceName = keyspaceName,
        SchemaDefinition = schema,
        TableName = tableName,
        PointInTimeRecovery = new PointInTimeRecovery { Status =
PointInTimeRecoveryStatus.ENABLED }
    };

    var response = await _amazonKeyspaces.CreateTableAsync(request);
    return response.ResourceArn;
}

```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [CreateTable](#)。

DeleteKeyspace

以下程式碼範例顯示如何使用 DeleteKeyspace。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```

/// <summary>
/// Delete an existing keyspace.
/// </summary>
/// <param name="keyspaceName"></param>
/// <returns>A Boolean value indicating the success of the action.</returns>
public async Task<bool> DeleteKeyspace(string keyspaceName)
{
    var response = await _amazonKeyspaces.DeleteKeyspaceAsync(
        new DeleteKeyspaceRequest { KeyspaceName = keyspaceName });
    return response.HttpStatusCode == HttpStatusCode.OK;
}

```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [DeleteKeyspace](#)。

DeleteTable

以下程式碼範例顯示如何使用 DeleteTable。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Delete an Amazon Keyspaces table.
/// </summary>
/// <param name="keyspaceName">The keyspace containing the table.</param>
/// <param name="tableName">The name of the table to delete.</param>
/// <returns>A Boolean value indicating the success of the action.</returns>
public async Task<bool> DeleteTable(string keyspaceName, string tableName)
{
    var response = await _amazonKeyspaces.DeleteTableAsync(
        new DeleteTableRequest { KeyspaceName = keyspaceName, TableName =
tableName });
    return response.HttpStatusCode == HttpStatusCode.OK;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [DeleteTable](#)。

GetKeyspace

以下程式碼範例顯示如何使用 GetKeyspace。

適用於 .NET 的 SDK

 Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Get data about a keyspace.
/// </summary>
/// <param name="keyspaceName">The name of the keyspace.</param>
/// <returns>The Amazon Resource Name (ARN) of the keyspace.</returns>
public async Task<string> GetKeyspace(string keyspaceName)
{
    var response = await _amazonKeyspaces.GetKeyspaceAsync(
        new GetKeyspaceRequest { KeyspaceName = keyspaceName });
    return response.ResourceArn;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [GetKeyspace](#)。

GetTable

以下程式碼範例顯示如何使用 GetTable。

適用於 .NET 的 SDK

 Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Get information about an Amazon Keyspaces table.
/// </summary>
/// <param name="keyspaceName">The keyspace containing the table.</param>
```

```

    /// <param name="tableName">The name of the Amazon Keyspaces table.</param>
    /// <returns>The response containing data about the table.</returns>
    public async Task<GetTableResponse> GetTable(string keyspaceName, string
tableName)
    {
        var response = await _amazonKeyspaces.GetTableAsync(
            new GetTableRequest { KeyspaceName = keyspaceName, TableName =
tableName });
        return response;
    }

```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [GetTable](#)。

ListKeyspaces

以下程式碼範例顯示如何使用 ListKeyspaces。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```

    /// <summary>
    /// Lists all keyspaces for the account.
    /// </summary>
    /// <returns>Async task.</returns>
    public async Task ListKeyspaces()
    {
        var paginator = _amazonKeyspaces.Paginators.ListKeyspaces(new
ListKeyspacesRequest());

        Console.WriteLine("{0, -30}\t{1}", "Keyspace name", "Keyspace ARN");
        Console.WriteLine(new string('-', Console.WindowWidth));
        await foreach (var keyspace in paginator.Keyspaces)
        {
            Console.WriteLine($"{keyspace.KeyspaceName, -30}\t{keyspace.ResourceArn}");
        }
    }

```

```
}  
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [ListKeyspaces](#)。

ListTables

以下程式碼範例顯示如何使用 ListTables。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>  
/// Lists the Amazon Keyspaces tables in a keyspace.  
/// </summary>  
/// <param name="keyspaceName">The name of the keyspace.</param>  
/// <returns>A list of TableSummary objects.</returns>  
public async Task<List<TableSummary>> ListTables(string keyspaceName)  
{  
    var response = await _amazonKeyspaces.ListTablesAsync(new ListTablesRequest  
{ KeyspaceName = keyspaceName });  
    response.Tables.ForEach(table =>  
    {  
        Console.WriteLine($"{table.KeyspaceName}\t{table.TableName}\t{table.ResourceArn}");  
    });  
    return response.Tables;  
}
```

- 如需 API 詳細資訊，請參閱 適用於 .NET 的 AWS SDK API 參考中的 [ListTables](#)。

RestoreTable

以下程式碼範例顯示如何使用 RestoreTable。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Restores the specified table to the specified point in time.
/// </summary>
/// <param name="keyspaceName">The keyspace containing the table.</param>
/// <param name="tableName">The name of the table to restore.</param>
/// <param name="timestamp">The time to which the table will be restored.</
param>
/// <returns>The Amazon Resource Name (ARN) of the restored table.</returns>
public async Task<string> RestoreTable(string keyspaceName, string tableName,
string restoredTableName, DateTime timestamp)
{
    var request = new RestoreTableRequest
    {
        RestoreTimestamp = timestamp,
        SourceKeyspaceName = keyspaceName,
        SourceTableName = tableName,
        TargetKeyspaceName = keyspaceName,
        TargetTableName = restoredTableName
    };

    var response = await _amazonKeyspaces.RestoreTableAsync(request);
    return response.RestoredTableARN;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [RestoreTable](#)。

UpdateTable

以下程式碼範例顯示如何使用 UpdateTable。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Updates the movie table to add a boolean column named watched.
/// </summary>
/// <param name="keyspaceName">The keyspace containing the table.</param>
/// <param name="tableName">The name of the table to change.</param>
/// <returns>The Amazon Resource Name (ARN) of the updated table.</returns>
public async Task<string> UpdateTable(string keyspaceName, string tableName)
{
    var newColumn = new ColumnDefinition { Name = "watched", Type = "boolean" };
    var request = new UpdateTableRequest
    {
        KeyspaceName = keyspaceName,
        TableName = tableName,
        AddColumns = new List<ColumnDefinition> { newColumn }
    };
    var response = await _amazonKeyspaces.UpdateTableAsync(request);
    return response.ResourceArn;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [UpdateTable](#)。

使用的 Kinesis 範例 適用於 .NET 的 SDK

下列程式碼範例示範如何使用 適用於 .NET 的 AWS SDK 搭配 Kinesis 執行動作和實作常見案例。

Actions 是大型程式的程式碼摘錄，必須在內容中執行。雖然動作會告訴您如何呼叫個別服務函數，但您可以在其相關情境中查看內容中的動作。

每個範例均包含完整原始碼的連結，您可在連結中找到如何設定和執行內容中程式碼的相關指示。

主題

- [動作](#)
- [無伺服器範例](#)

動作

AddTagsToStream

以下程式碼範例顯示如何使用 AddTagsToStream。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
using System;
using System.Collections.Generic;
using System.Threading.Tasks;
using Amazon.Kinesis;
using Amazon.Kinesis.Model;

/// <summary>
/// This example shows how to apply key/value pairs to an Amazon Kinesis
/// stream.
/// </summary>
public class TagStream
{
    public static async Task Main()
    {
        IAmazonKinesis client = new AmazonKinesisClient();

        string streamName = "AmazonKinesisStream";
        var tags = new Dictionary<string, string>
        {
            { "Project", "Sample Kinesis Project" },
            { "Application", "Sample Kinesis App" },
        }
```



```

    };

    var success = await ApplyTagsToStreamAsync(client, streamName, tags);

    if (success)
    {
        Console.WriteLine($"Tags successfully added to {streamName}.");
    }
    else
    {
        Console.WriteLine("Tags were not added to the stream.");
    }
}

/// <summary>
/// Applies the set of tags to the named Kinesis stream.
/// </summary>
/// <param name="client">The initialized Kinesis client.</param>
/// <param name="streamName">The name of the Kinesis stream to which
/// the tags will be attached.</param>
/// <param name="tags">A dictionary containing key/value pairs which
/// will be used to create the Kinesis tags.</param>
/// <returns>A Boolean value which represents the success or failure
/// of AddTagsToStreamAsync.</returns>
public static async Task<bool> ApplyTagsToStreamAsync(
    IAmazonKinesis client,
    string streamName,
    Dictionary<string, string> tags)
{
    var request = new AddTagsToStreamRequest
    {
        StreamName = streamName,
        Tags = tags,
    };

    var response = await client.AddTagsToStreamAsync(request);

    return response.HttpStatusCode == System.Net.HttpStatusCode.OK;
}
}

```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [AddTagsToStream](#)。

CreateStream

以下程式碼範例顯示如何使用 CreateStream。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
using System;
using System.Threading.Tasks;
using Amazon.Kinesis;
using Amazon.Kinesis.Model;

/// <summary>
/// This example shows how to create a new Amazon Kinesis stream.
/// </summary>
public class CreateStream
{
    public static async Task Main()
    {
        IAmazonKinesis client = new AmazonKinesisClient();

        string streamName = "AmazonKinesisStream";
        int shardCount = 1;

        var success = await CreateNewStreamAsync(client, streamName,
shardCount);
        if (success)
        {
            Console.WriteLine($"The stream, {streamName} successfully
created.");
        }
    }

    /// <summary>
    /// Creates a new Kinesis stream.
    /// </summary>
    /// <param name="client">An initialized Kinesis client.</param>
    /// <param name="streamName">The name for the new stream.</param>
```

```
/// <param name="shardCount">The number of shards the new stream will
/// use. The throughput of the stream is a function of the number of
/// shards; more shards are required for greater provisioned
/// throughput.</param>
/// <returns>A Boolean value indicating whether the stream was created.</
returns>
    public static async Task<bool> CreateNewStreamAsync(IAmazonKinesis client,
        string streamName, int shardCount)
    {
        var request = new CreateStreamRequest
        {
            StreamName = streamName,
            ShardCount = shardCount,
        };

        var response = await client.CreateStreamAsync(request);

        return response.HttpStatusCode == System.Net.HttpStatusCode.OK;
    }
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [CreateStream](#)。

DeleteStream

以下程式碼範例顯示如何使用 DeleteStream。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
using System;
using System.Threading.Tasks;
using Amazon.Kinesis;
using Amazon.Kinesis.Model;
```

```

    /// <summary>
    /// Shows how to delete an Amazon Kinesis stream.
    /// </summary>
    public class DeleteStream
    {
        public static async Task Main()
        {
            IAmazonKinesis client = new AmazonKinesisClient();
            string streamName = "AmazonKinesisStream";

            var success = await DeleteStreamAsync(client, streamName);

            if (success)
            {
                Console.WriteLine($"Stream, {streamName} successfully deleted.");
            }
            else
            {
                Console.WriteLine("Stream not deleted.");
            }
        }

        /// <summary>
        /// Deletes a Kinesis stream.
        /// </summary>
        /// <param name="client">An initialized Kinesis client object.</param>
        /// <param name="streamName">The name of the string to delete.</param>
        /// <returns>A Boolean value representing the success of the operation.</
returns>
        public static async Task<bool> DeleteStreamAsync(IAmazonKinesis client,
string streamName)
        {
            // If EnforceConsumerDeletion is true, any consumers
            // of this stream will also be deleted. If it is set
            // to false and this stream has any consumers, the
            // call will fail with a ResourceInUseException.
            var request = new DeleteStreamRequest
            {
                StreamName = streamName,
                EnforceConsumerDeletion = true,
            };

            var response = await client.DeleteStreamAsync(request);

```

```
        return response.HttpStatusCode == System.Net.HttpStatusCode.OK;
    }
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [DeleteStream](#)。

DeregisterStreamConsumer

以下程式碼範例顯示如何使用 DeregisterStreamConsumer。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
using System;
using System.Threading.Tasks;
using Amazon.Kinesis;
using Amazon.Kinesis.Model;

/// <summary>
/// Shows how to deregister a consumer from an Amazon Kinesis stream.
/// </summary>
public class DeregisterConsumer
{
    public static async Task Main(string[] args)
    {
        IAmazonKinesis client = new AmazonKinesisClient();

        string streamARN = "arn:aws:kinesis:us-west-2:000000000000:stream/AmazonKinesisStream";
        string consumerName = "CONSUMER_NAME";
        string consumerARN = "arn:aws:kinesis:us-west-2:000000000000:stream/AmazonKinesisStream/consumer/CONSUMER_NAME:000000000000";

        var success = await DeregisterConsumerAsync(client, streamARN,
            consumerARN, consumerName);
    }
}
```

```

        if (success)
        {
            Console.WriteLine($"{consumerName} successfully deregistered.");
        }
        else
        {
            Console.WriteLine($"{consumerName} was not successfully
deregistered.");
        }
    }

    /// <summary>
    /// Deregisters a consumer from a Kinesis stream.
    /// </summary>
    /// <param name="client">An initialized Kinesis client object.</param>
    /// <param name="streamARN">The ARN of a Kinesis stream.</param>
    /// <param name="consumerARN">The ARN of the consumer.</param>
    /// <param name="consumerName">The name of the consumer.</param>
    /// <returns>A Boolean value representing the success of the operation.</
returns>
    public static async Task<bool> DeregisterConsumerAsync(
        IAmazonKinesis client,
        string streamARN,
        string consumerARN,
        string consumerName)
    {
        var request = new DeregisterStreamConsumerRequest
        {
            StreamARN = streamARN,
            ConsumerARN = consumerARN,
            ConsumerName = consumerName,
        };

        var response = await client.DeregisterStreamConsumerAsync(request);

        return response.HttpStatusCode == System.Net.HttpStatusCode.OK;
    }
}

```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [DeregisterStreamConsumer](#)。

ListStreamConsumers

以下程式碼範例顯示如何使用 ListStreamConsumers。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
using System;
using System.Collections.Generic;
using System.Threading.Tasks;
using Amazon.Kinesis;
using Amazon.Kinesis.Model;

/// <summary>
/// List the consumers of an Amazon Kinesis stream.
/// </summary>
public class ListConsumers
{
    public static async Task Main()
    {
        IAmazonKinesis client = new AmazonKinesisClient();

        string streamARN = "arn:aws:kinesis:us-east-2:000000000000:stream/AmazonKinesisStream";
        int maxResults = 10;

        var consumers = await ListConsumersAsync(client, streamARN, maxResults);

        if (consumers.Count > 0)
        {
            consumers
                .ForEach(c => Console.WriteLine($"Name: {c.ConsumerName} ARN: {c.ConsumerARN}"));
        }
    }
}
```

```

        else
        {
            Console.WriteLine("No consumers found.");
        }
    }

    /// <summary>
    /// Retrieve a list of the consumers for a Kinesis stream.
    /// </summary>
    /// <param name="client">An initialized Kinesis client object.</param>
    /// <param name="streamARN">The ARN of the stream for which we want to
    /// retrieve a list of clients.</param>
    /// <param name="maxResults">The maximum number of results to return.</
param>
    /// <returns>A list of Consumer objects.</returns>
    public static async Task<List<Consumer>> ListConsumersAsync(IAmazonKinesis
client, string streamARN, int maxResults)
    {
        var request = new ListStreamConsumersRequest
        {
            StreamARN = streamARN,
            MaxResults = maxResults,
        };

        var response = await client.ListStreamConsumersAsync(request);

        return response.Consumers;
    }
}

```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [ListStreamConsumers](#)。

ListStreams

以下程式碼範例顯示如何使用 ListStreams。

適用於 .NET 的 SDK

 Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
using System;
using System.Collections.Generic;
using System.Threading.Tasks;
using Amazon.Kinesis;
using Amazon.Kinesis.Model;

/// <summary>
/// Retrieves and displays a list of existing Amazon Kinesis streams.
/// </summary>
public class ListStreams
{
    public static async Task Main(string[] args)
    {
        IAmazonKinesis client = new AmazonKinesisClient();
        var response = await client.ListStreamsAsync(new ListStreamsRequest());

        List<string> streamNames = response.StreamNames;

        if (streamNames.Count > 0)
        {
            streamNames
                .ForEach(s => Console.WriteLine($"Stream name: {s}"));
        }
        else
        {
            Console.WriteLine("No streams were found.");
        }
    }
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [ListStreams](#)。

ListTagsForStream

以下程式碼範例顯示如何使用 ListTagsForStream。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
using System;
using System.Collections.Generic;
using System.Threading.Tasks;
using Amazon.Kinesis;
using Amazon.Kinesis.Model;

/// <summary>
/// Shows how to list the tags that have been attached to an Amazon Kinesis
/// stream.
/// </summary>
public class ListTags
{
    public static async Task Main()
    {
        IAmazonKinesis client = new AmazonKinesisClient();
        string streamName = "AmazonKinesisStream";

        await ListTagsAsync(client, streamName);
    }

    /// <summary>
    /// List the tags attached to a Kinesis stream.
    /// </summary>
    /// <param name="client">An initialized Kinesis client object.</param>
    /// <param name="streamName">The name of the Kinesis stream for which you
    /// wish to display tags.</param>
    public static async Task ListTagsAsync(IAmazonKinesis client, string
streamName)
    {
        var request = new ListTagsForStreamRequest
        {
```

```

        StreamName = streamName,
        Limit = 10,
    };

    var response = await client.ListTagsForStreamAsync(request);
    DisplayTags(response.Tags);

    while (response.HasMoreTags)
    {
        request.ExclusiveStartTagKey = response.Tags[response.Tags.Count -
1].Key;
        response = await client.ListTagsForStreamAsync(request);
    }
}

/// <summary>
/// Displays the items in a list of Kinesis tags.
/// </summary>
/// <param name="tags">A list of the Tag objects to be displayed.</param>
public static void DisplayTags(List<Tag> tags)
{
    tags
        .ForEach(t => Console.WriteLine($"Key: {t.Key} Value: {t.Value}"));
}
}

```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [ListTagsForStream](#)。

RegisterStreamConsumer

以下程式碼範例顯示如何使用 RegisterStreamConsumer。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```

using System;
using System.Threading.Tasks;
using Amazon.Kinesis;
using Amazon.Kinesis.Model;

/// <summary>
/// This example shows how to register a consumer to an Amazon Kinesis
/// stream.
/// </summary>
public class RegisterConsumer
{
    public static async Task Main()
    {
        IAmazonKinesis client = new AmazonKinesisClient();
        string consumerName = "NEW_CONSUMER_NAME";
        string streamARN = "arn:aws:kinesis:us-east-2:000000000000:stream/
AmazonKinesisStream";

        var consumer = await RegisterConsumerAsync(client, consumerName,
streamARN);

        if (consumer is not null)
        {
            Console.WriteLine($"{consumer.ConsumerName}");
        }
    }

    /// <summary>
    /// Registers the consumer to a Kinesis stream.
    /// </summary>
    /// <param name="client">The initialized Kinesis client object.</param>
    /// <param name="consumerName">A string representing the consumer.</param>
    /// <param name="streamARN">The ARN of the stream.</param>
    /// <returns>A Consumer object that contains information about the
consumer.</returns>
    public static async Task<Consumer> RegisterConsumerAsync(IAmazonKinesis
client, string consumerName, string streamARN)
    {
        var request = new RegisterStreamConsumerRequest
        {
            ConsumerName = consumerName,
            StreamARN = streamARN,
        };
    }
}

```

```

        var response = await client.RegisterStreamConsumerAsync(request);
        return response.Consumer;
    }
}

```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [RegisterStreamConsumer](#)。

無伺服器範例

使用 Kinesis 觸發條件調用 Lambda 函數

以下程式碼範例示範如何實作 Lambda 函式，該函式會透過接收 Kinesis 串流的記錄來接收所觸發的事件。此函數會擷取 Kinesis 承載、從 Base64 解碼，並記錄記錄內容。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在[無伺服器範例](#)儲存庫中設定和執行。

使用 .NET 搭配 Lambda 來使用 Kinesis 事件。

```

// Copyright Amazon.com, Inc. or its affiliates. All Rights Reserved.
// SPDX-License-Identifier: Apache-2.0
using System.Text;
using Amazon.Lambda.Core;
using Amazon.Lambda.KinesisEvents;
using AWS.Lambda.Powertools.Logging;

// Assembly attribute to enable the Lambda function's JSON input to be converted
// into a .NET class.
[assembly:
    LambdaSerializer(typeof(Amazon.Lambda.Serialization.SystemTextJson.DefaultLambdaJsonSerializer))]

namespace KinesisIntegrationSampleCode;

```

```

public class Function
{
    // Powertools Logger requires an environment variables against your function
    // POWERTOOLS_SERVICE_NAME
    [Logging(LogEvent = true)]
    public async Task FunctionHandler(KinesisEvent evnt, ILambdaContext context)
    {
        if (evnt.Records.Count == 0)
        {
            Logger.LogInformation("Empty Kinesis Event received");
            return;
        }

        foreach (var record in evnt.Records)
        {
            try
            {
                Logger.LogInformation($"Processed Event with EventId:
{record.EventId}");
                string data = await GetRecordDataAsync(record.Kinesis, context);
                Logger.LogInformation($"Data: {data}");
                // TODO: Do interesting work based on the new data
            }
            catch (Exception ex)
            {
                Logger.LogError($"An error occurred {ex.Message}");
                throw;
            }
        }
        Logger.LogInformation($"Successfully processed {evnt.Records.Count}
records.");
    }

    private async Task<string> GetRecordDataAsync(KinesisEvent.Record record,
ILambdaContext context)
    {
        byte[] bytes = record.Data.ToArray();
        string data = Encoding.UTF8.GetString(bytes);
        await Task.CompletedTask; //Placeholder for actual async work
        return data;
    }
}

```

使用 Kinesis 觸發條件報告 Lambda 函數的批次項目失敗

下列程式碼範例示範如何針對接收來自 Kinesis 串流之事件的 Lambda 函式，實作部分批次回應。此函數會在回應中報告批次項目失敗，指示 Lambda 稍後重試這些訊息。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在[無伺服器範例](#)儲存庫中設定和執行。

使用 .NET 搭配 Lambda 報告 Kinesis 批次項目失敗。

```
// Copyright Amazon.com, Inc. or its affiliates. All Rights Reserved.
// SPDX-License-Identifier: Apache-2.0
using System.Text;
using System.Text.Json.Serialization;
using Amazon.Lambda.Core;
using Amazon.Lambda.KinesisEvents;
using AWS.Lambda.Powertools.Logging;

// Assembly attribute to enable the Lambda function's JSON input to be converted
// into a .NET class.
[assembly:
    LambdaSerializer(typeof(Amazon.Lambda.Serialization.SystemTextJson.DefaultLambdaJsonSerializer))]

namespace KinesisIntegration;

public class Function
{
    // Powertools Logger requires an environment variables against your function
    // POWERTOOLS_SERVICE_NAME
    [Logging(LogEvent = true)]
    public async Task<StreamsEventResponse> FunctionHandler(KinesisEvent evnt,
        ILambdaContext context)
    {
        if (evnt.Records.Count == 0)
        {
            Logger.LogInformation("Empty Kinesis Event received");
            return new StreamsEventResponse();
        }
    }
}
```

```

        foreach (var record in evnt.Records)
        {
            try
            {
                Logger.LogInformation($"Processed Event with EventId:
{record.EventId}");
                string data = await GetRecordDataAsync(record.Kinesis, context);
                Logger.LogInformation($"Data: {data}");
                // TODO: Do interesting work based on the new data
            }
            catch (Exception ex)
            {
                Logger.LogError($"An error occurred {ex.Message}");
                /* Since we are working with streams, we can return the failed item
immediately.
                Lambda will immediately begin to retry processing from this
failed item onwards. */
                return new StreamsEventResponse
                {
                    BatchItemFailures = new
List<StreamsEventResponse.BatchItemFailure>
                    {
                        new StreamsEventResponse.BatchItemFailure { ItemIdentifier =
record.Kinesis.SequenceNumber }
                    }
                };
            }
            Logger.LogInformation($"Successfully processed {evnt.Records.Count}
records.");
            return new StreamsEventResponse();
        }

        private async Task<string> GetRecordDataAsync(KinesisEvent.Record record,
ILambdaContext context)
        {
            byte[] bytes = record.Data.ToArray();
            string data = Encoding.UTF8.GetString(bytes);
            await Task.CompletedTask; //Placeholder for actual async work
            return data;
        }
    }

```



```
public class StreamsEventResponse
{
    [JsonPropertyName("batchItemFailures")]
    public IList<BatchItemFailure> BatchItemFailures { get; set; }
    public class BatchItemFailure
    {
        [JsonPropertyName("itemIdentifier")]
        public string ItemIdentifier { get; set; }
    }
}
```

AWS KMS 使用的範例 適用於 .NET 的 SDK

下列程式碼範例示範如何使用 適用於 .NET 的 AWS SDK 搭配 來執行動作和實作常見案例 AWS KMS。

Actions 是大型程式的程式碼摘錄，必須在內容中執行。雖然動作會告訴您如何呼叫個別服務函數，但您可以在其相關情境中查看內容中的動作。

每個範例均包含完整原始碼的連結，您可在連結中找到如何設定和執行內容中程式碼的相關指示。

主題

- [動作](#)

動作

CreateAlias

以下程式碼範例顯示如何使用 CreateAlias。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
using System;
```

```
using System.Threading.Tasks;
using Amazon.KeyManagementService;
using Amazon.KeyManagementService.Model;

/// <summary>
/// Creates an alias for an AWS Key Management Service (AWS KMS) key.
/// </summary>
public class CreateAlias
{
    public static async Task Main()
    {
        var client = new AmazonKeyManagementServiceClient();

        // The alias name must start with alias/ and can be
        // up to 256 alphanumeric characters long.
        var aliasName = "alias/ExampleAlias";

        // The value supplied as the TargetKeyId can be either
        // the key ID or key Amazon Resource Name (ARN) of the
        // AWS KMS key.
        var keyId = "1234abcd-12ab-34cd-56ef-1234567890ab";

        var request = new CreateAliasRequest
        {
            AliasName = aliasName,
            TargetKeyId = keyId,
        };

        var response = await client.CreateAliasAsync(request);

        if (response.HttpStatusCode == System.Net.HttpStatusCode.OK)
        {
            Console.WriteLine($"Alias, {aliasName}, successfully created.");
        }
        else
        {
            Console.WriteLine($"Could not create alias.");
        }
    }
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [CreateAlias](#)。

CreateGrant

以下程式碼範例顯示如何使用 CreateGrant。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
public static async Task Main()
{
    var client = new AmazonKeyManagementServiceClient();

    // The identity that is given permission to perform the operations
    // specified in the grant.
    var grantee = "arn:aws:iam::111122223333:role/ExampleRole";

    // The identifier of the AWS KMS key to which the grant applies. You
    // can use the key ID or the Amazon Resource Name (ARN) of the KMS key.
    var keyId = "7c9eccc2-38cb-4c4f-9db3-766ee8dd3ad4";

    var request = new CreateGrantRequest
    {
        GranteePrincipal = grantee,
        KeyId = keyId,

        // A list of operations that the grant allows.
        Operations = new List<string>
        {
            "Encrypt",
            "Decrypt",
        },
    };

    var response = await client.CreateGrantAsync(request);

    string grantId = response.GrantId; // The unique identifier of the
grant.
    string grantToken = response.GrantToken; // The grant token.
```

```
        Console.WriteLine($"Id: {grantId}, Token: {grantToken}");
    }
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [CreateGrant](#)。

CreateKey

以下程式碼範例顯示如何使用 CreateKey。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
using System;
using System.Threading.Tasks;
using Amazon.KeyManagementService;
using Amazon.KeyManagementService.Model;

/// <summary>
/// Shows how to create a new AWS Key Management Service (AWS KMS)
/// key.
/// </summary>
public class CreateKey
{
    public static async Task Main()
    {
        // Note that if you need to create a Key in an AWS Region
        // other than the Region defined for the default user, you need to
        // pass the Region to the client constructor.
        var client = new AmazonKeyManagementServiceClient();

        // The call to CreateKeyAsync will create a symmetrical AWS KMS
        // key. For more information about symmetrical and asymmetrical
        // keys, see:
        //
```

```
        // https://docs.aws.amazon.com/kms/latest/developerguide/symm-asym-
choose.html
        var response = await client.CreateKeyAsync(new CreateKeyRequest());

        // The KeyMetadata object contains information about the new AWS KMS
key.
        KeyMetadata keyMetadata = response.KeyMetadata;

        if (keyMetadata is not null)
        {
            Console.WriteLine($"KMS Key: {keyMetadata.KeyId} was successfully
created.");
        }
        else
        {
            Console.WriteLine("Could not create KMS Key.");
        }
    }
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [CreateKey](#)。

DescribeKey

以下程式碼範例顯示如何使用 DescribeKey。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
using System;
using System.Threading.Tasks;
using Amazon.KeyManagementService;
using Amazon.KeyManagementService.Model;
```

```
/// <summary>
/// Retrieve information about an AWS Key Management Service (AWS KMS) key.
/// You can supply either the key Id or the key Amazon Resource Name (ARN)
/// to the DescribeKeyRequest KeyId property.
/// </summary>
public class DescribeKey
{
    public static async Task Main()
    {
        var keyId = "7c9eccc2-38cb-4c4f-9db3-766ee8dd3ad4";
        var request = new DescribeKeyRequest
        {
            KeyId = keyId,
        };

        var client = new AmazonKeyManagementServiceClient();

        var response = await client.DescribeKeyAsync(request);
        var metadata = response.KeyMetadata;

        Console.WriteLine($"{metadata.KeyId} created on:
{metadata.CreationDate}");
        Console.WriteLine($"State: {metadata.KeyState}");
        Console.WriteLine($"{metadata.Description}");
    }
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [DescribeKey](#)。

DisableKey

以下程式碼範例顯示如何使用 DisableKey。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```

using System;
using System.Threading.Tasks;
using Amazon.KeyManagementService;
using Amazon.KeyManagementService.Model;

/// <summary>
/// Disable an AWS Key Management Service (AWS KMS) key and then retrieve
/// the key's status to show that it has been disabled.
/// </summary>
public class DisableKey
{
    public static async Task Main()
    {
        var client = new AmazonKeyManagementServiceClient();

        // The identifier of the AWS KMS key to disable. You can use the
        // key Id or the Amazon Resource Name (ARN) of the AWS KMS key.
        var keyId = "1234abcd-12ab-34cd-56ef-1234567890ab";

        var request = new DisableKeyRequest
        {
            KeyId = keyId,
        };

        var response = await client.DisableKeyAsync(request);

        if (response.HttpStatusCode == System.Net.HttpStatusCode.OK)
        {
            // Retrieve information about the key to show that it has now
            // been disabled.
            var describeResponse = await client.DescribeKeyAsync(new
DescribeKeyRequest
            {
                KeyId = keyId,
            });
            Console.WriteLine($"{describeResponse.KeyMetadata.KeyId} - state:
{describeResponse.KeyMetadata.KeyState}");
        }
    }
}

```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [DisableKey](#)。

EnableKey

以下程式碼範例顯示如何使用 EnableKey。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
using System;
using System.Threading.Tasks;
using Amazon.KeyManagementService;
using Amazon.KeyManagementService.Model;

/// <summary>
/// Enable an AWS Key Management Service (AWS KMS) key.
/// </summary>
public class EnableKey
{
    public static async Task Main()
    {
        var client = new AmazonKeyManagementServiceClient();

        // The identifier of the AWS KMS key to enable. You can use the
        // key Id or the Amazon Resource Name (ARN) of the AWS KMS key.
        var keyId = "1234abcd-12ab-34cd-56ef-1234567890ab";

        var request = new EnableKeyRequest
        {
            KeyId = keyId,
        };

        var response = await client.EnableKeyAsync(request);
        if (response.HttpStatusCode == System.Net.HttpStatusCode.OK)
        {
            // Retrieve information about the key to show that it has now
            // been enabled.
        }
    }
}
```



```

        var describeResponse = await client.DescribeKeyAsync(new
DescribeKeyRequest
        {
            KeyId = keyId,
        });
        Console.WriteLine($"{describeResponse.KeyMetadata.KeyId} - state:
{describeResponse.KeyMetadata.KeyState}");
    }
}
}

```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [EnableKey](#)。

ListAliases

以下程式碼範例顯示如何使用 ListAliases。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```

using System;
using System.Threading.Tasks;
using Amazon.KeyManagementService;
using Amazon.KeyManagementService.Model;

/// <summary>
/// List the AWS Key Management Service (AWS KMS) aliases that have been defined
for
/// the keys in the same AWS Region as the default user. If you want to list
/// the aliases in a different Region, pass the Region to the client
/// constructor.
/// </summary>
public class ListAliases
{

```

```
public static async Task Main()
{
    var client = new AmazonKeyManagementServiceClient();
    var request = new ListAliasesRequest();
    var response = new ListAliasesResponse();

    do
    {
        response = await client.ListAliasesAsync(request);

        response.Aliases.ForEach(alias =>
        {
            Console.WriteLine($"Created: {alias.CreationDate} Last Update:
{alias.LastUpdatedDate} Name: {alias.AliasName}");
        });

        request.Marker = response.NextMarker;
    }
    while (response.Truncated);
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [ListAliases](#)。

ListGrants

以下程式碼範例顯示如何使用 ListGrants。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
using System;
using System.Threading.Tasks;
using Amazon.KeyManagementService;
using Amazon.KeyManagementService.Model;
```

```
/// <summary>
/// List the AWS Key Management Service (AWS KMS) grants that are associated
with
/// a specific key.
/// </summary>
public class ListGrants
{
    public static async Task Main()
    {
        // The identifier of the AWS KMS key to disable. You can use the
        // key Id or the Amazon Resource Name (ARN) of the AWS KMS key.
        var keyId = "1234abcd-12ab-34cd-56ef-1234567890ab";
        var client = new AmazonKeyManagementServiceClient();
        var request = new ListGrantsRequest
        {
            KeyId = keyId,
        };

        var response = new ListGrantsResponse();

        do
        {
            response = await client.ListGrantsAsync(request);

            response.Grants.ForEach(grant =>
            {
                Console.WriteLine($"{grant.GrantId}");
            });

            request.Marker = response.NextMarker;
        }
        while (response.Truncated);
    }
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [ListGrants](#)。

ListKeys

以下程式碼範例顯示如何使用 ListKeys。

適用於 .NET 的 SDK

 Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
using System;
using System.Threading.Tasks;
using Amazon.KeyManagementService;
using Amazon.KeyManagementService.Model;

/// <summary>
/// List the AWS Key Managements Service (AWS KMS) keys for the AWS Region
/// of the default user. To list keys in another AWS Region, supply the Region
/// as a parameter to the client constructor.
/// </summary>
public class ListKeys
{
    public static async Task Main()
    {
        var client = new AmazonKeyManagementServiceClient();
        var request = new ListKeysRequest();
        var response = new ListKeysResponse();

        do
        {
            response = await client.ListKeysAsync(request);

            response.Keys.ForEach(key =>
            {
                Console.WriteLine($"ID: {key.KeyId}, {key.KeyArn}");
            });

            // Set the Marker property when response.Truncated is true
            // in order to get the next keys.
            request.Marker = response.NextMarker;
        }
        while (response.Truncated);
    }
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [ListKeys](#)。

使用的 Lambda 範例 適用於 .NET 的 SDK

下列程式碼範例示範如何使用 適用於 .NET 的 AWS SDK 搭配 Lambda 執行動作和實作常見案例。

基本概念是程式碼範例，這些範例說明如何在服務內執行基本操作。

Actions 是大型程式的程式碼摘錄，必須在內容中執行。雖然動作會告訴您如何呼叫個別服務函數，但您可以在其相關情境中查看內容中的動作。

案例是向您展示如何呼叫服務中的多個函數或與其他 AWS 服務組合來完成特定任務的程式碼範例。

AWS 社群貢獻是由多個團隊所建立和維護的範例 AWS。若要提供意見回饋，請使用連結儲存庫中提供的機制。

每個範例均包含完整原始碼的連結，您可在連結中找到如何設定和執行內容中程式碼的相關指示。

主題

- [開始使用](#)
- [基本概念](#)
- [動作](#)
- [案例](#)
- [無伺服器範例](#)
- [AWS 社群貢獻](#)

開始使用

Hello Lambda

下列程式碼範例示範如何開始使用 Lambda。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
namespace LambdaActions;

using Amazon.Lambda;

public class HelloLambda
{
    static async Task Main(string[] args)
    {
        var lambdaClient = new AmazonLambdaClient();

        Console.WriteLine("Hello AWS Lambda");
        Console.WriteLine("Let's get started with AWS Lambda by listing your existing Lambda functions:");

        var response = await lambdaClient.ListFunctionsAsync();
        response.Functions.ForEach(function =>
        {
            Console.WriteLine($"{function.FunctionName}\t{function.Description}");
        });
    }
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [ListFunctions](#)。

基本概念

了解基本概念

以下程式碼範例顯示做法：

- 建立 IAM 角色和 Lambda 函數，然後上傳處理常式程式碼。

- 調用具有單一參數的函數並取得結果。
- 更新函數程式碼並使用環境變數進行設定。
- 調用具有新參數的函數並取得結果。顯示傳回的執行日誌。
- 列出您帳戶的函數，然後清理相關資源。

如需詳細資訊，請參閱[使用主控台建立 Lambda 函數](#)。

適用於 .NET 的 SDK

 Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

建立執行 Lambda 動作的方法。

```
namespace LambdaActions;

using Amazon.Lambda;
using Amazon.Lambda.Model;

/// <summary>
/// A class that implements AWS Lambda methods.
/// </summary>
public class LambdaWrapper
{
    private readonly IAmazonLambda _lambdaService;

    /// <summary>
    /// Constructor for the LambdaWrapper class.
    /// </summary>
    /// <param name="lambdaService">An initialized Lambda service client.</param>
    public LambdaWrapper(IAmazonLambda lambdaService)
    {
        _lambdaService = lambdaService;
    }

    /// <summary>
    /// Creates a new Lambda function.
    /// </summary>
```

```

/// <param name="functionName">The name of the function.</param>
/// <param name="s3Bucket">The Amazon Simple Storage Service (Amazon S3)
/// bucket where the zip file containing the code is located.</param>
/// <param name="s3Key">The Amazon S3 key of the zip file.</param>
/// <param name="role">The Amazon Resource Name (ARN) of a role with the
/// appropriate Lambda permissions.</param>
/// <param name="handler">The name of the handler function.</param>
/// <returns>The Amazon Resource Name (ARN) of the newly created
/// Lambda function.</returns>
public async Task<string> CreateLambdaFunctionAsync(
    string functionName,
    string s3Bucket,
    string s3Key,
    string role,
    string handler)
{
    // Defines the location for the function code.
    // S3Bucket - The S3 bucket where the file containing
    //           the source code is stored.
    // S3Key     - The name of the file containing the code.
    var functionCode = new FunctionCode
    {
        S3Bucket = s3Bucket,
        S3Key = s3Key,
    };

    var createFunctionRequest = new CreateFunctionRequest
    {
        FunctionName = functionName,
        Description = "Created by the Lambda .NET API",
        Code = functionCode,
        Handler = handler,
        Runtime = Runtime.Dotnet6,
        Role = role,
    };

    var reponse = await
_lambdaService.CreateFunctionAsync(createFunctionRequest);
    return reponse.FunctionArn;
}

/// <summary>
/// Delete an AWS Lambda function.

```



```
/// </summary>
/// <param name="functionName">The name of the Lambda function to
/// delete.</param>
/// <returns>A Boolean value that indicates the success of the action.</returns>
public async Task<bool> DeleteFunctionAsync(string functionName)
{
    var request = new DeleteFunctionRequest
    {
        FunctionName = functionName,
    };

    var response = await _lambdaService.DeleteFunctionAsync(request);

    // A return value of NoContent means that the request was processed.
    // In this case, the function was deleted, and the return value
    // is intentionally blank.
    return response.HttpStatusCode == System.Net.HttpStatusCode.NoContent;
}

/// <summary>
/// Gets information about a Lambda function.
/// </summary>
/// <param name="functionName">The name of the Lambda function for
/// which to retrieve information.</param>
/// <returns>Async Task.</returns>
public async Task<FunctionConfiguration> GetFunctionAsync(string functionName)
{
    var functionRequest = new GetFunctionRequest
    {
        FunctionName = functionName,
    };

    var response = await _lambdaService.GetFunctionAsync(functionRequest);
    return response.Configuration;
}

/// <summary>
/// Invoke a Lambda function.
/// </summary>
/// <param name="functionName">The name of the Lambda function to
/// invoke.</param>
```

```
/// <param name="parameters">The parameter values that will be passed to the
function.</param>
/// <returns>A System Threading Task.</returns>
public async Task<string> InvokeFunctionAsync(
    string functionName,
    string parameters)
{
    var payload = parameters;
    var request = new InvokeRequest
    {
        FunctionName = functionName,
        Payload = payload,
    };

    var response = await _lambdaService.InvokeAsync(request);
    MemoryStream stream = response.Payload;
    string returnValue = System.Text.Encoding.UTF8.GetString(stream.ToArray());
    return returnValue;
}

/// <summary>
/// Get a list of Lambda functions.
/// </summary>
/// <returns>A list of FunctionConfiguration objects.</returns>
public async Task<List<FunctionConfiguration>> ListFunctionsAsync()
{
    var functionList = new List<FunctionConfiguration>();

    var functionPaginator =
        _lambdaService.Paginators.ListFunctions(new ListFunctionsRequest());
    await foreach (var function in functionPaginator.Functions)
    {
        functionList.Add(function);
    }

    return functionList;
}

/// <summary>
/// Update an existing Lambda function.
/// </summary>
```

```

    /// <param name="functionName">The name of the Lambda function to update.</
param>
    /// <param name="bucketName">The bucket where the zip file containing
    /// the Lambda function code is stored.</param>
    /// <param name="key">The key name of the source code file.</param>
    /// <returns>Async Task.</returns>
    public async Task UpdateFunctionCodeAsync(
        string functionName,
        string bucketName,
        string key)
    {
        var functionCodeRequest = new UpdateFunctionCodeRequest
        {
            FunctionName = functionName,
            Publish = true,
            S3Bucket = bucketName,
            S3Key = key,
        };

        var response = await
_lambdaService.UpdateFunctionCodeAsync(functionCodeRequest);
        Console.WriteLine($"The Function was last modified at
{response.LastModified}.");
    }

    /// <summary>
    /// Update the code of a Lambda function.
    /// </summary>
    /// <param name="functionName">The name of the function to update.</param>
    /// <param name="functionHandler">The code that performs the function's
actions.</param>
    /// <param name="environmentVariables">A dictionary of environment variables.</
param>
    /// <returns>A Boolean value indicating the success of the action.</returns>
    public async Task<bool> UpdateFunctionConfigurationAsync(
        string functionName,
        string functionHandler,
        Dictionary<string, string> environmentVariables)
    {
        var request = new UpdateFunctionConfigurationRequest
        {
            Handler = functionHandler,
            FunctionName = functionName,

```

```
        Environment = new Amazon.Lambda.Model.Environment { Variables =
environmentVariables },
    };

    var response = await
_lambdaService.UpdateFunctionConfigurationAsync(request);

    Console.WriteLine(response.LastModified);

    return response.HttpStatusCode == System.Net.HttpStatusCode.OK;
}

}
```

建立可執行該案例的函數。

```
global using System.Threading.Tasks;
global using Amazon.IdentityManagement;
global using Amazon.Lambda;
global using LambdaActions;
global using LambdaScenarioCommon;
global using Microsoft.Extensions.DependencyInjection;
global using Microsoft.Extensions.Hosting;
global using Microsoft.Extensions.Logging;
global using Microsoft.Extensions.Logging.Console;
global using Microsoft.Extensions.Logging.Debug;

using Amazon.Lambda.Model;
using Microsoft.Extensions.Configuration;

namespace LambdaBasics;

public class LambdaBasics
{
    private static ILogger logger = null!;

    static async Task Main(string[] args)
    {
        // Set up dependency injection for the Amazon service.
```

```

using var host = Host.CreateDefaultBuilder(args)
    .ConfigureLogging(logging =>
        logging.AddFilter("System", LogLevel.Debug)
            .AddFilter<DebugLoggerProvider>("Microsoft",
LogLevel.Information)
            .AddFilter<ConsoleLoggerProvider>("Microsoft", LogLevel.Trace))
    .ConfigureServices((_, services) =>
        services.AddAWSService<IAmazonLambda>()
        .AddAWSService<IAmazonIdentityManagementService>()
        .AddTransient<LambdaWrapper>()
        .AddTransient<LambdaRoleWrapper>()
        .AddTransient<UIWrapper>()
    )
    .Build();

var configuration = new ConfigurationBuilder()
    .SetBasePath(Directory.GetCurrentDirectory())
    .AddJsonFile("settings.json") // Load test settings from .json file.
    .AddJsonFile("settings.local.json",
        true) // Optionally load local settings.
    .Build();

logger = LoggerFactory.Create(builder => { builder.AddConsole(); })
    .CreateLogger<LambdaBasics>();

var lambdaWrapper = host.Services.GetRequiredService<LambdaWrapper>();
var lambdaRoleWrapper =
host.Services.GetRequiredService<LambdaRoleWrapper>();
var uiWrapper = host.Services.GetRequiredService<UIWrapper>();

string functionName = configuration["FunctionName"]!;
string roleName = configuration["RoleName"]!;
string policyDocument = "{" +
    "  \"Version\": \"2012-10-17\", " +
    "  \"Statement\": [ " +
    "    { " +
    "      \"Effect\": \"Allow\", " +
    "      \"Principal\": { " +
    "        \"Service\": \"lambda.amazonaws.com\" " +
    "      }, " +
    "      \"Action\": \"sts:AssumeRole\" " +
    "    } " +
    "  ]" +

```

```
    "});

    var incrementHandler = configuration["IncrementHandler"];
    var calculatorHandler = configuration["CalculatorHandler"];
    var bucketName = configuration["BucketName"];
    var incrementKey = configuration["IncrementKey"];
    var calculatorKey = configuration["CalculatorKey"];
    var policyArn = configuration["PolicyArn"];

    uiWrapper.DisplayLambdaBasicsOverview();

    // Create the policy to use with the AWS Lambda functions and then attach
the
    // policy to a new role.
    var roleArn = await lambdaRoleWrapper.CreateLambdaRoleAsync(roleName,
policyDocument);

    Console.WriteLine("Waiting for role to become active.");
    uiWrapper.WaitABit(15, "Wait until the role is active before trying to use
it.");

    // Attach the appropriate AWS Identity and Access Management (IAM) role
policy to the new role.
    var success = await lambdaRoleWrapper.AttachLambdaRolePolicyAsync(policyArn,
roleName);
    uiWrapper.WaitABit(10, "Allow time for the IAM policy to be attached to the
role.");

    // Create the Lambda function using a zip file stored in an Amazon Simple
Storage Service
    // (Amazon S3) bucket.
    uiWrapper.DisplayTitle("Create Lambda Function");
    Console.WriteLine($"Creating the AWS Lambda function: {functionName}.");
    var lambdaArn = await lambdaWrapper.CreateLambdaFunctionAsync(
        functionName,
        bucketName,
        incrementKey,
        roleArn,
        incrementHandler);

    Console.WriteLine("Waiting for the new function to be available.");
    Console.WriteLine($"The AWS Lambda ARN is {lambdaArn}");

    // Get the Lambda function.
```

```
Console.WriteLine($"Getting the {functionName} AWS Lambda function.");
FunctionConfiguration config;
do
{
    config = await lambdaWrapper.GetFunctionAsync(functionName);
    Console.Write(".");
}
while (config.State != State.Active);

Console.WriteLine($"
The function, {functionName} has been created.");
Console.WriteLine($"The runtime of this Lambda function is
{config.Runtime}.");

uiWrapper.PressEnter();

// List the Lambda functions.
uiWrapper.DisplayTitle("Listing all Lambda functions.");
var functions = await lambdaWrapper.ListFunctionsAsync();
DisplayFunctionList(functions);

uiWrapper.DisplayTitle("Invoke increment function");
Console.WriteLine("Now that it has been created, invoke the Lambda increment
function.");
string? value;
do
{
    Console.Write("Enter a value to increment: ");
    value = Console.ReadLine();
}
while (string.IsNullOrEmpty(value));

string functionParameters = "{" +
    "\"action\": \"increment\", " +
    "\"x\": \"" + value + "\"" +
    "}";
var answer = await lambdaWrapper.InvokeFunctionAsync(functionName,
functionParameters);
Console.WriteLine($"{value} + 1 = {answer}.");

uiWrapper.DisplayTitle("Update function");
Console.WriteLine("Now update the Lambda function code.");
await lambdaWrapper.UpdateFunctionCodeAsync(functionName, bucketName,
calculatorKey);
```

```
do
{
    config = await lambdaWrapper.GetFunctionAsync(functionName);
    Console.WriteLine(".");
}
while (config.LastUpdateStatus == LastUpdateStatus.InProgress);

await lambdaWrapper.UpdateFunctionConfigurationAsync(
    functionName,
    calculatorHandler,
    new Dictionary<string, string> { { "LOG_LEVEL", "DEBUG" } });

do
{
    config = await lambdaWrapper.GetFunctionAsync(functionName);
    Console.WriteLine(".");
}
while (config.LastUpdateStatus == LastUpdateStatus.InProgress);

uiWrapper.DisplayTitle("Call updated function");
Console.WriteLine("Now call the updated function...");

bool done = false;

do
{
    string? opSelected;

    Console.WriteLine("Select the operation to perform:");
    Console.WriteLine("\t1. add");
    Console.WriteLine("\t2. subtract");
    Console.WriteLine("\t3. multiply");
    Console.WriteLine("\t4. divide");
    Console.WriteLine("\t0r enter \"q\" to quit.");
    Console.WriteLine("Enter the number (1, 2, 3, 4, or q) of the operation you want to perform: ");
    do
    {
        Console.Write("Your choice? ");
        opSelected = Console.ReadLine();
    }
    while (opSelected == string.Empty);

    var operation = (opSelected) switch
```



```
{
    "1" => "add",
    "2" => "subtract",
    "3" => "multiply",
    "4" => "divide",
    "q" => "quit",
    _ => "add",
};

if (operation == "quit")
{
    done = true;
}
else
{
    // Get two numbers and an action from the user.
    value = string.Empty;
    do
    {
        Console.Write("Enter the first value: ");
        value = Console.ReadLine();
    }
    while (value == string.Empty);

    string? value2;
    do
    {
        Console.Write("Enter a second value: ");
        value2 = Console.ReadLine();
    }
    while (value2 == string.Empty);

    functionParameters = "{" +
        "\"action\": \"" + operation + "\", " +
        "\"x\": \"" + value + "\", " +
        "\"y\": \"" + value2 + "\"" +
        "}";

    answer = await lambdaWrapper.InvokeFunctionAsync(functionName,
functionParameters);
    Console.WriteLine($"The answer when we {operation} the two numbers
is: {answer}.");
}
```

```
        uiWrapper.PressEnter();
    } while (!done);

    // Delete the function created earlier.

    uiWrapper.DisplayTitle("Clean up resources");
    // Detach the IAM policy from the IAM role.
    Console.WriteLine("First detach the IAM policy from the role.");
    success = await lambdaRoleWrapper.DetachLambdaRolePolicyAsync(policyArn,
roleName);
    uiWrapper.WaitABit(15, "Let's wait for the policy to be fully detached from
the role.");

    Console.WriteLine("Delete the AWS Lambda function.");
    success = await lambdaWrapper.DeleteFunctionAsync(functionName);
    if (success)
    {
        Console.WriteLine($"The {functionName} function was deleted.");
    }
    else
    {
        Console.WriteLine($"Could not remove the function {functionName}");
    }

    // Now delete the IAM role created for use with the functions
    // created by the application.
    Console.WriteLine("Now we can delete the role that we created.");
    success = await lambdaRoleWrapper.DeleteLambdaRoleAsync(roleName);
    if (success)
    {
        Console.WriteLine("The role has been successfully removed.");
    }
    else
    {
        Console.WriteLine("Couldn't delete the role.");
    }

    Console.WriteLine("The Lambda Scenario is now complete.");
    uiWrapper.PressEnter();

    // Displays a formatted list of existing functions returned by the
    // LambdaMethods.ListFunctions.
    void DisplayFunctionList(List<FunctionConfiguration> functions)
    {
```

```

        functions.ForEach(functionConfig =>
        {

            Console.WriteLine($"{functionConfig.FunctionName}\t{functionConfig.Description}");
        });
    }
}

namespace LambdaActions;

using Amazon.IdentityManagement;
using Amazon.IdentityManagement.Model;

public class LambdaRoleWrapper
{
    private readonly IAmazonIdentityManagementService _lambdaRoleService;

    public LambdaRoleWrapper(IAmazonIdentityManagementService lambdaRoleService)
    {
        _lambdaRoleService = lambdaRoleService;
    }

    /// <summary>
    /// Attach an AWS Identity and Access Management (IAM) role policy to the
    /// IAM role to be assumed by the AWS Lambda functions created for the scenario.
    /// </summary>
    /// <param name="policyArn">The Amazon Resource Name (ARN) of the IAM policy.</
param>
    /// <param name="roleName">The name of the IAM role to attach the IAM policy
to.</param>
    /// <returns>A Boolean value indicating the success of the action.</returns>
    public async Task<bool> AttachLambdaRolePolicyAsync(string policyArn, string
roleName)
    {
        var response = await _lambdaRoleService.AttachRolePolicyAsync(new
AttachRolePolicyRequest { PolicyArn = policyArn, RoleName = roleName });
        return response.HttpStatusCode == System.Net.HttpStatusCode.OK;
    }

    /// <summary>
    /// Create a new IAM role.
    /// </summary>

```

```

    /// <param name="roleName">The name of the IAM role to create.</param>
    /// <param name="policyDocument">The policy document for the new IAM role.</
param>
    /// <returns>A string representing the ARN for newly created role.</returns>
    public async Task<string> CreateLambdaRoleAsync(string roleName, string
policyDocument)
    {
        var request = new CreateRoleRequest
        {
            AssumeRolePolicyDocument = policyDocument,
            RoleName = roleName,
        };

        var response = await _lambdaRoleService.CreateRoleAsync(request);
        return response.Role.Arn;
    }

    /// <summary>
    /// Deletes an IAM role.
    /// </summary>
    /// <param name="roleName">The name of the role to delete.</param>
    /// <returns>A Boolean value indicating the success of the operation.</returns>
    public async Task<bool> DeleteLambdaRoleAsync(string roleName)
    {
        var request = new DeleteRoleRequest
        {
            RoleName = roleName,
        };

        var response = await _lambdaRoleService.DeleteRoleAsync(request);
        return response.HttpStatusCode == System.Net.HttpStatusCode.OK;
    }

    public async Task<bool> DetachLambdaRolePolicyAsync(string policyArn, string
roleName)
    {
        var response = await _lambdaRoleService.DetachRolePolicyAsync(new
DetachRolePolicyRequest { PolicyArn = policyArn, RoleName = roleName });
        return response.HttpStatusCode == System.Net.HttpStatusCode.OK;
    }
}

namespace LambdaScenarioCommon;

```

```
public class UIWrapper
{
    public readonly string SepBar = new('-', Console.WindowWidth);

    /// <summary>
    /// Show information about the AWS Lambda Basics scenario.
    /// </summary>
    public void DisplayLambdaBasicsOverview()
    {
        Console.Clear();

        DisplayTitle("Welcome to AWS Lambda Basics");
        Console.WriteLine("This example application does the following:");
        Console.WriteLine("\t1. Creates an AWS Identity and Access Management (IAM)
role that will be assumed by the functions we create.");
        Console.WriteLine("\t2. Attaches an IAM role policy that has Lambda
permissions.");
        Console.WriteLine("\t3. Creates a Lambda function that increments the value
passed to it.");
        Console.WriteLine("\t4. Calls the increment function and passes a value.");
        Console.WriteLine("\t5. Updates the code so that the function is a simple
calculator.");
        Console.WriteLine("\t6. Calls the calculator function with the values
entered.");
        Console.WriteLine("\t7. Deletes the Lambda function.");
        Console.WriteLine("\t7. Detaches the IAM role policy.");
        Console.WriteLine("\t8. Deletes the IAM role.");
        PressEnter();
    }

    /// <summary>
    /// Display a message and wait until the user presses enter.
    /// </summary>
    public void PressEnter()
    {
        Console.Write("\nPress <Enter> to continue. ");
        _ = Console.ReadLine();
        Console.WriteLine();
    }

    /// <summary>
    /// Pad a string with spaces to center it on the console display.
    /// </summary>
```

```
/// <param name="strToCenter">The string to be centered.</param>
/// <returns>The padded string.</returns>
public string CenterString(string strToCenter)
{
    var padAmount = (Console.WindowWidth - strToCenter.Length) / 2;
    var leftPad = new string(' ', padAmount);
    return $"{leftPad}{strToCenter}";
}

/// <summary>
/// Display a line of hyphens, the centered text of the title and another
/// line of hyphens.
/// </summary>
/// <param name="strTitle">The string to be displayed.</param>
public void DisplayTitle(string strTitle)
{
    Console.WriteLine(SepBar);
    Console.WriteLine(CenterString(strTitle));
    Console.WriteLine(SepBar);
}

/// <summary>
/// Display a countdown and wait for a number of seconds.
/// </summary>
/// <param name="numSeconds">The number of seconds to wait.</param>
public void WaitABit(int numSeconds, string msg)
{
    Console.WriteLine(msg);

    // Wait for the requested number of seconds.
    for (int i = numSeconds; i > 0; i--)
    {
        System.Threading.Thread.Sleep(1000);
        Console.Write($"{i}...");
    }

    PressEnter();
}
}
```

定義增量一個數字的 Lambda 處理常式。

```

using Amazon.Lambda.Core;

// Assembly attribute to enable the Lambda function's JSON input to be converted
// into a .NET class.
[assembly:
    LambdaSerializer(typeof(Amazon.Lambda.Serialization.SystemTextJson.DefaultLambdaJsonSerializer))]

namespace LambdaIncrement;

public class Function
{
    /// <summary>
    /// A simple function increments the integer parameter.
    /// </summary>
    /// <param name="input">A JSON string containing an action, which must be
    /// "increment" and a string representing the value to increment.</param>
    /// <param name="context">The context object passed by Lambda containing
    /// information about invocation, function, and execution environment.</param>
    /// <returns>A string representing the incremented value of the parameter.</
returns>
    public int FunctionHandler(Dictionary<string, string> input, ILambdaContext
context)
    {
        if (input["action"] == "increment")
        {
            int inputValue = Convert.ToInt32(input["x"]);
            return inputValue + 1;
        }
        else
        {
            return 0;
        }
    }
}

```

定義可執行算術運算的第二個 Lambda 處理常式。

```

using Amazon.Lambda.Core;

```

```
// Assembly attribute to enable the Lambda function's JSON input to be converted
// into a .NET class.
[assembly:
    LambdaSerializer(typeof(Amazon.Lambda.Serialization.SystemTextJson.DefaultLambdaJsonSerializer))]

namespace LambdaCalculator;

public class Function
{
    /// <summary>
    /// A simple function that takes two number in string format and performs
    /// the requested arithmetic function.
    /// </summary>
    /// <param name="input">JSON data containing an action, and x and y values.
    /// Valid actions include: add, subtract, multiply, and divide.</param>
    /// <param name="context">The context object passed by Lambda containing
    /// information about invocation, function, and execution environment.</param>
    /// <returns>A string representing the results of the calculation.</returns>
    public int FunctionHandler(Dictionary<string, string> input, ILambdaContext
context)
    {
        var action = input["action"];
        int x = Convert.ToInt32(input["x"]);
        int y = Convert.ToInt32(input["y"]);
        int result;
        switch (action)
        {
            case "add":
                result = x + y;
                break;
            case "subtract":
                result = x - y;
                break;
            case "multiply":
                result = x * y;
                break;
            case "divide":
                if (y == 0)
                {
                    Console.Error.WriteLine("Divide by zero error.");
                    result = 0;
                }
                else
```



```
        result = x / y;
        break;
    default:
        Console.Error.WriteLine($"{action} is not a valid operation.");
        result = 0;
        break;
    }
    return result;
}
}
```

• 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的下列主題。

- [CreateFunction](#)
- [DeleteFunction](#)
- [GetFunction](#)
- [Invoke](#)
- [ListFunctions](#)
- [UpdateFunctionCode](#)
- [UpdateFunctionConfiguration](#)

動作

CreateFunction

以下程式碼範例顯示如何使用 CreateFunction。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Creates a new Lambda function.
```

```
/// </summary>
/// <param name="functionName">The name of the function.</param>
/// <param name="s3Bucket">The Amazon Simple Storage Service (Amazon S3)
/// bucket where the zip file containing the code is located.</param>
/// <param name="s3Key">The Amazon S3 key of the zip file.</param>
/// <param name="role">The Amazon Resource Name (ARN) of a role with the
/// appropriate Lambda permissions.</param>
/// <param name="handler">The name of the handler function.</param>
/// <returns>The Amazon Resource Name (ARN) of the newly created
/// Lambda function.</returns>
public async Task<string> CreateLambdaFunctionAsync(
    string functionName,
    string s3Bucket,
    string s3Key,
    string role,
    string handler)
{
    // Defines the location for the function code.
    // S3Bucket - The S3 bucket where the file containing
    //           the source code is stored.
    // S3Key - The name of the file containing the code.
    var functionCode = new FunctionCode
    {
        S3Bucket = s3Bucket,
        S3Key = s3Key,
    };

    var createFunctionRequest = new CreateFunctionRequest
    {
        FunctionName = functionName,
        Description = "Created by the Lambda .NET API",
        Code = functionCode,
        Handler = handler,
        Runtime = Runtime.Dotnet6,
        Role = role,
    };

    var reponse = await
_lambdaService.CreateFunctionAsync(createFunctionRequest);
    return reponse.FunctionArn;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的「[CreateFunction](#)」。

DeleteFunction

以下程式碼範例顯示如何使用 DeleteFunction。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Delete an AWS Lambda function.
/// </summary>
/// <param name="functionName">The name of the Lambda function to
/// delete.</param>
/// <returns>A Boolean value that indicates the success of the action.</returns>
public async Task<bool> DeleteFunctionAsync(string functionName)
{
    var request = new DeleteFunctionRequest
    {
        FunctionName = functionName,
    };

    var response = await _lambdaService.DeleteFunctionAsync(request);

    // A return value of NoContent means that the request was processed.
    // In this case, the function was deleted, and the return value
    // is intentionally blank.
    return response.HttpStatusCode == System.Net.HttpStatusCode.NoContent;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [DeleteFunction](#)。

GetFunction

以下程式碼範例顯示如何使用 `GetFunction`。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Gets information about a Lambda function.
/// </summary>
/// <param name="functionName">The name of the Lambda function for
/// which to retrieve information.</param>
/// <returns>Async Task.</returns>
public async Task<FunctionConfiguration> GetFunctionAsync(string functionName)
{
    var functionRequest = new GetFunctionRequest
    {
        FunctionName = functionName,
    };

    var response = await _lambdaService.GetFunctionAsync(functionRequest);
    return response.Configuration;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [GetFunction](#)。

Invoke

以下程式碼範例顯示如何使用 `Invoke`。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Invoke a Lambda function.
/// </summary>
/// <param name="functionName">The name of the Lambda function to
/// invoke.</param>
/// <param name="parameters">The parameter values that will be passed to the
function.</param>
/// <returns>A System Threading Task.</returns>
public async Task<string> InvokeFunctionAsync(
    string functionName,
    string parameters)
{
    var payload = parameters;
    var request = new InvokeRequest
    {
        FunctionName = functionName,
        Payload = payload,
    };

    var response = await _lambdaService.InvokeAsync(request);
    MemoryStream stream = response.Payload;
    string returnValue = System.Text.Encoding.UTF8.GetString(stream.ToArray());
    return returnValue;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [Invoke](#)。

ListFunctions

以下程式碼範例顯示如何使用 ListFunctions。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Get a list of Lambda functions.
/// </summary>
/// <returns>A list of FunctionConfiguration objects.</returns>
public async Task<List<FunctionConfiguration>> ListFunctionsAsync()
{
    var functionList = new List<FunctionConfiguration>();

    var functionPaginator =
        _lambdaService.Paginators.ListFunctions(new ListFunctionsRequest());
    await foreach (var function in functionPaginator.Functions)
    {
        functionList.Add(function);
    }

    return functionList;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [ListFunctions](#)。

UpdateFunctionCode

以下程式碼範例顯示如何使用 UpdateFunctionCode。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Update an existing Lambda function.
/// </summary>
/// <param name="functionName">The name of the Lambda function to update.</
param>
/// <param name="bucketName">The bucket where the zip file containing
/// the Lambda function code is stored.</param>
/// <param name="key">The key name of the source code file.</param>
/// <returns>Async Task.</returns>
public async Task UpdateFunctionCodeAsync(
    string functionName,
    string bucketName,
    string key)
{
    var functionCodeRequest = new UpdateFunctionCodeRequest
    {
        FunctionName = functionName,
        Publish = true,
        S3Bucket = bucketName,
        S3Key = key,
    };

    var response = await
_lambdaService.UpdateFunctionCodeAsync(functionCodeRequest);
    Console.WriteLine($"The Function was last modified at
{response.LastModified}.");
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [UpdateFunctionCode](#)。

UpdateFunctionConfiguration

以下程式碼範例顯示如何使用 UpdateFunctionConfiguration。

適用於 .NET 的 SDK

 Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Update the code of a Lambda function.
/// </summary>
/// <param name="functionName">The name of the function to update.</param>
/// <param name="functionHandler">The code that performs the function's
actions.</param>
/// <param name="environmentVariables">A dictionary of environment variables.</
param>
/// <returns>A Boolean value indicating the success of the action.</returns>
public async Task<bool> UpdateFunctionConfigurationAsync(
    string functionName,
    string functionHandler,
    Dictionary<string, string> environmentVariables)
{
    var request = new UpdateFunctionConfigurationRequest
    {
        Handler = functionHandler,
        FunctionName = functionName,
        Environment = new Amazon.Lambda.Model.Environment { Variables =
environmentVariables },
    };

    var response = await
_lambdaService.UpdateFunctionConfigurationAsync(request);

    Console.WriteLine(response.LastModified);

    return response.HttpStatusCode == System.Net.HttpStatusCode.OK;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [UpdateFunctionConfiguration](#)。

案例

建立無伺服器應用程式來管理相片

下列程式碼範例示範如何建立無伺服器應用程式，讓使用者以標籤管理相片。

適用於 .NET 的 SDK

顯示如何開發照片資產管理應用程式，以便使用 Amazon Rekognition 偵測圖片中的標籤，並將其儲存以供日後擷取。

如需完整的原始碼和如何設定及執行的指示，請參閱 [GitHub](#) 上的完整範例。

如要深入探索此範例的來源，請參閱 [AWS 社群](#) 上的文章。

此範例中使用的服務

- API Gateway
- DynamoDB
- Lambda
- Amazon Rekognition
- Amazon S3
- Amazon SNS

建立應用程式以分析客戶意見回饋

下列程式碼範例會示範如何建立可分析客戶評論卡、從其原始語言進行翻譯、判斷對方情緒，以及透過翻譯後的文字產生音訊檔案的應用程式。

適用於 .NET 的 SDK

此範例應用程式會分析和存儲客戶的意見回饋卡。具體來說，它滿足了紐約市一家虛構飯店的需求。飯店以實體評論卡的形式收到賓客以各種語言撰寫的意見回饋。這些意見回饋透過 Web 用戶端上傳至應用程式。評論卡的影像上傳後，系統會執行下列步驟：

- 文字內容是使用 Amazon Textract 從影像中擷取。
- Amazon Comprehend 會決定擷取文字及其用語的情感。
- 擷取的文字內容會使用 Amazon Translate 翻譯成英文。
- Amazon Polly 會使用擷取的文字內容合成音訊檔案。

完整的應用程式可透過 AWS CDK 部署。如需原始程式碼和部署的說明，請參閱 [GitHub](#) 中的專案。

此範例中使用的服務

- Amazon Comprehend
- Lambda
- Amazon Polly
- Amazon Textract
- Amazon Translate

使用 S3 Object Lambda 轉換資料

下列程式碼範例示範如何使用 S3 Object Lambda 轉換應用程式的資料。

適用於 .NET 的 SDK

展示如何將自訂程式碼新增至標準 S3 GET 請求，以修改從 S3 擷取的請求物件，如此一來，物件方能符合請求用戶端或應用程式的需求。

如需完整的原始碼和如何設定及執行的指示，請參閱 [GitHub](#) 上的完整範例。

此範例中使用的服務

- Lambda
- Amazon S3

無伺服器範例

連線至 Lambda 函數中的 Amazon RDS 資料庫

以下程式碼範例示範如何實作連線至 RDS 資料庫的 Lambda 函式。該函數會提出簡單的資料庫請求並傳回結果。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在[無伺服器範例](#)儲存庫中設定和執行。

使用 .NET 連線至 Lambda 函式中的 Amazon RDS 資料庫。

```
using System.Data;
using System.Text.Json;
using Amazon.Lambda.APIGatewayEvents;
using Amazon.Lambda.Core;
using MySql.Data.MySqlClient;

// Assembly attribute to enable the Lambda function's JSON input to be converted
// into a .NET class.
[assembly:
    LambdaSerializer(typeof(Amazon.Lambda.Serialization.SystemTextJson.DefaultLambdaJsonSerializer))]

namespace aws_rds;

public class InputModel
{
    public string key1 { get; set; }
    public string key2 { get; set; }
}

public class Function
{
    /// <summary>
    /// Handles the Lambda function execution for connecting to RDS using IAM
    authentication.
    /// </summary>
    /// <param name="input">The input event data passed to the Lambda function</
    param>
    /// <param name="context">The Lambda execution context that provides runtime
    information</param>
    /// <returns>A response object containing the execution result</returns>

    public async Task<APIGatewayProxyResponse>
    FunctionHandler(APIGatewayProxyRequest request, ILambdaContext context)
    {
        // Sample Input: {"body": "{\"key1\":\"20\", \"key2\":\"25\"}"}
        var input = JsonSerializer.Deserialize<InputModel>(request.Body);

        /// Obtain authentication token
        var authToken = RDSAuthTokenGenerator.GenerateAuthToken(
            Environment.GetEnvironmentVariable("RDS_ENDPOINT"),
            Convert.ToInt32(Environment.GetEnvironmentVariable("RDS_PORT")),
            Environment.GetEnvironmentVariable("RDS_USERNAME")
        );
    }
}
```

```

    );

    /// Build the Connection String with the Token
    string connectionString =
    $"Server={Environment.GetEnvironmentVariable("RDS_ENDPOINT")};" +

    $"Port={Environment.GetEnvironmentVariable("RDS_PORT")};" +

    $"Uid={Environment.GetEnvironmentVariable("RDS_USERNAME")};" +
        $"Pwd={authToken}";

    try
    {
        await using var connection = new MySqlConnection(connectionString);
        await connection.OpenAsync();

        const string sql = "SELECT @param1 + @param2 AS Sum";

        await using var command = new MySqlCommand(sql, connection);
        command.Parameters.AddWithValue("@param1", int.Parse(input.key1 ??
"0"));
        command.Parameters.AddWithValue("@param2", int.Parse(input.key2 ??
"0"));

        await using var reader = await command.ExecuteReaderAsync();
        if (await reader.ReadAsync())
        {
            int result = reader.GetInt32("Sum");

            //Sample Response: {"statusCode":200,"body":{"\message\":"The sum
is: 45\"},"isBase64Encoded":false}
            return new APIGatewayProxyResponse
            {
                StatusCode = 200,
                Body = JsonSerializer.Serialize(new { message = $"The sum is:
{result}" })
            };
        }
    }
    catch (Exception ex)
    {
        Console.WriteLine($"Error: {ex.Message}");
    }

```

```

    }

    return new APIGatewayProxyResponse
    {
        StatusCode = 500,
        Body = JsonSerializer.Serialize(new { error = "Internal server error" });
    };
}
}

```

使用 Kinesis 觸發條件調用 Lambda 函數

以下程式碼範例示範如何實作 Lambda 函式，該函式會透過接收 Kinesis 串流的記錄來接收所觸發的事件。此函數會擷取 Kinesis 承載、從 Base64 解碼，並記錄記錄內容。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在[無伺服器範例](#)儲存庫中設定和執行。

使用 .NET 搭配 Lambda 來使用 Kinesis 事件。

```

// Copyright Amazon.com, Inc. or its affiliates. All Rights Reserved.
// SPDX-License-Identifier: Apache-2.0
using System.Text;
using Amazon.Lambda.Core;
using Amazon.Lambda.KinesisEvents;
using AWS.Lambda.Powertools.Logging;

// Assembly attribute to enable the Lambda function's JSON input to be converted
// into a .NET class.
[assembly:
    LambdaSerializer(typeof(Amazon.Lambda.Serialization.SystemTextJson.DefaultLambdaJsonSerializer))]

namespace KinesisIntegrationSampleCode;

public class Function
{

```

```

// Powertools Logger requires an environment variables against your function
// POWERTOOLS_SERVICE_NAME
[Logging(LogEvent = true)]
public async Task FunctionHandler(KinesisEvent evnt, ILambdaContext context)
{
    if (evnt.Records.Count == 0)
    {
        Logger.LogInformation("Empty Kinesis Event received");
        return;
    }

    foreach (var record in evnt.Records)
    {
        try
        {
            Logger.LogInformation($"Processed Event with EventId:
{record.EventId}");
            string data = await GetRecordDataAsync(record.Kinesis, context);
            Logger.LogInformation($"Data: {data}");
            // TODO: Do interesting work based on the new data
        }
        catch (Exception ex)
        {
            Logger.LogError($"An error occurred {ex.Message}");
            throw;
        }
    }
    Logger.LogInformation($"Successfully processed {evnt.Records.Count}
records.");
}

private async Task<string> GetRecordDataAsync(KinesisEvent.Record record,
ILambdaContext context)
{
    byte[] bytes = record.Data.ToArray();
    string data = Encoding.UTF8.GetString(bytes);
    await Task.CompletedTask; //Placeholder for actual async work
    return data;
}
}

```

使用 DynamoDB 觸發條件調用 Lambda 函式

以下程式碼範例示範如何實作 Lambda 函式，該函式會透過接收 DynamoDB 串流的記錄來接收所觸發的事件。函數會擷取 DynamoDB 承載並記下記錄內容。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在[無伺服器範例](#)儲存庫中設定和執行。

使用 .NET 搭配 Lambda 來使用 DynamoDB 事件。

```
// Copyright Amazon.com, Inc. or its affiliates. All Rights Reserved.
// SPDX-License-Identifier: Apache-2.0
using System.Text.Json;
using System.Text;
using Amazon.Lambda.Core;
using Amazon.Lambda.DynamoDBEvents;

// Assembly attribute to enable the Lambda function's JSON input to be converted
// into a .NET class.
[assembly: LambdaSerializer(typeof(Amazon.Lambda.Serialization.SystemTextJson.DefaultLambdaJsonSerializer))]

namespace AWSLambda_DDB;

public class Function
{
    public void FunctionHandler(DynamoDBEvent dynamoEvent, ILambdaContext context)
    {
        context.Logger.LogInformation($"Beginning to process
        {dynamoEvent.Records.Count} records...");

        foreach (var record in dynamoEvent.Records)
        {
            context.Logger.LogInformation($"Event ID: {record.EventID}");
            context.Logger.LogInformation($"Event Name: {record.EventName}");

            context.Logger.LogInformation(JsonSerializer.Serialize(record));
        }
    }
}
```

```

        context.Logger.LogInformation("Stream processing complete.");
    }
}

```

使用 Amazon DocumentDB 觸發條件調用 Lambda 函數

以下程式碼範例示範如何實作 Lambda 函式，該函式會透過接收 DocumentDB 變更串流的記錄來接收所觸發的事件。函數會擷取 DocumentDB 承載並記下記錄內容。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在[無伺服器範例](#)儲存庫中設定和執行。

使用 .NET 搭配 Lambda 使用 Amazon DocumentDB 事件。

```

using Amazon.Lambda.Core;
using System.Text.Json;
using System;
using System.Collections.Generic;
using System.Text.Json.Serialization;
//Assembly attribute to enable the Lambda function's JSON input to be converted into
a .NET class.
[assembly:
    LambdaSerializer(typeof(Amazon.Lambda.Serialization.SystemTextJson.DefaultLambdaJsonSerializer))]

namespace LambdaDocDb;

public class Function
{
    /// <summary>
    /// Lambda function entry point to process Amazon DocumentDB events.
    /// </summary>
    /// <param name="event">The Amazon DocumentDB event.</param>
    /// <param name="context">The Lambda context object.</param>
    /// <returns>A string to indicate successful processing.</returns>

```



```
public string FunctionHandler(Event evnt, ILambdaContext context)
{
    foreach (var record in evnt.Events)
    {
        ProcessDocumentDBEvent(record, context);
    }

    return "OK";
}

private void ProcessDocumentDBEvent(DocumentDBEventRecord record,
ILambdaContext context)
{
    var eventData = record.Event;
    var operationType = eventData.OperationType;
    var databaseName = eventData.Ns.Db;
    var collectionName = eventData.Ns.Coll;
    var fullDocument = JsonSerializer.Serialize(eventData.FullDocument, new
JsonSerializerOptions { WriteIndented = true });

    context.Logger.LogLine($"Operation type: {operationType}");
    context.Logger.LogLine($"Database: {databaseName}");
    context.Logger.LogLine($"Collection: {collectionName}");
    context.Logger.LogLine($"Full document:\n{fullDocument}");
}

public class Event
{
    [JsonPropertyName("eventSourceArn")]
    public string EventSourceArn { get; set; }

    [JsonPropertyName("events")]
    public List<DocumentDBEventRecord> Events { get; set; }

    [JsonPropertyName("eventSource")]
    public string EventSource { get; set; }
}

public class DocumentDBEventRecord
{

```

```
[JsonPropertyName("event")]
public EventData Event { get; set; }
}

public class EventData
{
    [JsonPropertyName("_id")]
    public IdData Id { get; set; }

    [JsonPropertyName("clusterTime")]
    public ClusterTime ClusterTime { get; set; }

    [JsonPropertyName("documentKey")]
    public DocumentKey DocumentKey { get; set; }

    [JsonPropertyName("fullDocument")]
    public Dictionary<string, object> FullDocument { get; set; }

    [JsonPropertyName("ns")]
    public Namespace Namespace { get; set; }

    [JsonPropertyName("operationType")]
    public string OperationType { get; set; }
}

public class IdData
{
    [JsonPropertyName("_data")]
    public string Data { get; set; }
}

public class ClusterTime
{
    [JsonPropertyName("$timestamp")]
    public Timestamp Timestamp { get; set; }
}

public class Timestamp
{
    [JsonPropertyName("t")]
    public long T { get; set; }

    [JsonPropertyName("i")]
    public int I { get; set; }
}
```

```
}

public class DocumentKey
{
    [JsonPropertyName("_id")]
    public Id Id { get; set; }
}

public class Id
{
    [JsonPropertyName("$oid")]
    public string Oid { get; set; }
}

public class Namespace
{
    [JsonPropertyName("db")]
    public string Db { get; set; }

    [JsonPropertyName("coll")]
    public string Coll { get; set; }
}
}
```

使用 Amazon MSK 觸發條件調用 Lambda 函數

以下程式碼範例示範如何實作 Lambda 函式，該函式會透過接收 Amazon MSK 叢集的記錄來接收所觸發的事件。函數會擷取 MSK 承載並記下記錄內容。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在[無伺服器範例](#)儲存庫中設定和執行。

使用 .NET 搭配 Lambda 來取用 Amazon MSK 事件。

```
using System.Text;
using Amazon.Lambda.Core;
```

```
using Amazon.Lambda.KafkaEvents;

// Assembly attribute to enable the Lambda function's JSON input to be converted
// into a .NET class.
[assembly:
    LambdaSerializer(typeof(Amazon.Lambda.Serialization.SystemTextJson.DefaultLambdaJsonSerializer))]

namespace MSKLambda;

public class Function
{
    /// <param name="input">The event for the Lambda function handler to process.</param>
    /// <param name="context">The ILambdaContext that provides methods for logging
    /// and describing the Lambda environment.</param>
    /// <returns></returns>
    public void FunctionHandler(KafkaEvent evnt, ILambdaContext context)
    {
        foreach (var record in evnt.Records)
        {
            Console.WriteLine("Key:" + record.Key);
            foreach (var eventRecord in record.Value)
            {
                var valueBytes = eventRecord.Value.ToArray();
                var valueText = Encoding.UTF8.GetString(valueBytes);

                Console.WriteLine("Message:" + valueText);
            }
        }
    }
}
```

使用 Amazon S3 觸發條件調用 Lambda 函數

下列程式碼範例示範如何實作 Lambda 函式，該函式接收透過上傳物件至 S3 儲存貯體時所觸發的事件。此函數會從事件參數擷取 S3 儲存貯體名稱和物件金鑰，並呼叫 Amazon S3 API 以擷取和記錄物件的內容類型。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在[無伺服器範例](#)儲存庫中設定和執行。

使用 .NET 搭配 Lambda 來使用 S3 事件。

```
// Copyright Amazon.com, Inc. or its affiliates. All Rights Reserved.
// SPDX-License-Identifier: Apache-2.0
using System.Threading.Tasks;
using Amazon.Lambda.Core;
using Amazon.S3;
using System;
using Amazon.Lambda.S3Events;
using System.Web;

// Assembly attribute to enable the Lambda function's JSON input to be converted
// into a .NET class.
[assembly: LambdaSerializer(typeof(Amazon.Lambda.Serialization.SystemTextJson.DefaultLambdaJsonSerializer))]

namespace S3Integration
{
    public class Function
    {
        private static AmazonS3Client _s3Client;
        public Function() : this(null)
        {
        }

        internal Function(AmazonS3Client s3Client)
        {
            _s3Client = s3Client ?? new AmazonS3Client();
        }
    }
}
```

```
    }

    public async Task<string> Handler(S3Event evt, ILambdaContext context)
    {
        try
        {
            if (evt.Records.Count <= 0)
            {
                context.Logger.LogLine("Empty S3 Event received");
                return string.Empty;
            }

            var bucket = evt.Records[0].S3.Bucket.Name;
            var key = HttpUtility.UrlDecode(evt.Records[0].S3.Object.Key);

            context.Logger.LogLine($"Request is for {bucket} and {key}");

            var objectResult = await _s3Client.GetObjectAsync(bucket, key);

            context.Logger.LogLine($"Returning {objectResult.Key}");

            return objectResult.Key;
        }
        catch (Exception e)
        {
            context.Logger.LogLine($"Error processing request - {e.Message}");

            return string.Empty;
        }
    }
}
```

使用 Amazon SNS 觸發條件調用 Lambda 函數

下列程式碼範例示範如何實作 Lambda 函式，該函式會透過接收 SNS 主題的訊息來接收所觸發的事件。函數會從事件參數擷取訊息，並記錄每一則訊息的內容。

適用於 .NET 的 SDK

 Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在[無伺服器範例](#)儲存庫中設定和執行。

使用 .NET 搭配 Lambda 來使用 SNS 事件。

```
// Copyright Amazon.com, Inc. or its affiliates. All Rights Reserved.
// SPDX-License-Identifier: Apache-2.0
using Amazon.Lambda.Core;
using Amazon.Lambda.SNSEvents;

// Assembly attribute to enable the Lambda function's JSON input to be converted
// into a .NET class.
[assembly:
    LambdaSerializer(typeof(Amazon.Lambda.Serialization.SystemTextJson.DefaultLambdaJsonSerializer))]

namespace SnsIntegration;

public class Function
{
    public async Task FunctionHandler(SNSEvent evnt, ILambdaContext context)
    {
        foreach (var record in evnt.Records)
        {
            await ProcessRecordAsync(record, context);
        }
        context.Logger.LogInformation("done");
    }

    private async Task ProcessRecordAsync(SNSEvent.SNSRecord record, ILambdaContext
context)
    {
        try
        {
            context.Logger.LogInformation($"Processed record {record.Sns.Message}");

            // TODO: Do interesting work based on the new message
            await Task.CompletedTask;
        }
    }
}
```

```

    }
    catch (Exception e)
    {
        //You can use Dead Letter Queue to handle failures. By configuring a
        Lambda DLQ.
        context.Logger.LogError($"An error occurred");
        throw;
    }
}
}

```

使用 Amazon SQS 觸發條件調用 Lambda 函數

下列程式碼範例示範如何實作 Lambda 函式，該函式會透過接收 SQS 佇列的訊息來接收所觸發的事件。函數會從事件參數擷取訊息，並記錄每一則訊息的內容。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在[無伺服器範例](#)儲存庫中設定和執行。

使用 .NET 搭配 Lambda 來使用 SQS 事件。

```

// Copyright Amazon.com, Inc. or its affiliates. All Rights Reserved.
// SPDX-License-Identifier: Apache-2.0
using Amazon.Lambda.Core;
using Amazon.Lambda.SQSEvents;

// Assembly attribute to enable the Lambda function's JSON input to be converted
// into a .NET class.
[assembly: LambdaSerializer(typeof(Amazon.Lambda.Serialization.SystemTextJson.DefaultLambdaJsonSerializer))]

namespace SqsIntegrationSampleCode
{
    public async Task FunctionHandler(SQSEvent evnt, ILambdaContext context)
    {

```



```
        foreach (var message in evnt.Records)
        {
            await ProcessMessageAsync(message, context);
        }

        context.Logger.LogInformation("done");
    }

    private async Task ProcessMessageAsync(SQSEvent.SQSMessage message,
        ILambdaContext context)
    {
        try
        {
            context.Logger.LogInformation($"Processed message {message.Body}");

            // TODO: Do interesting work based on the new message
            await Task.CompletedTask;
        }
        catch (Exception e)
        {
            //You can use Dead Letter Queue to handle failures. By configuring a
            //Lambda DLQ.
            context.Logger.LogError($"An error occurred");
            throw;
        }
    }
}
```

使用 Kinesis 觸發條件報告 Lambda 函數的批次項目失敗

下列程式碼範例示範如何針對接收來自 Kinesis 串流之事件的 Lambda 函式，實作部分批次回應。此函數會在回應中報告批次項目失敗，指示 Lambda 稍後重試這些訊息。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在[無伺服器範例](#)儲存庫中設定和執行。

使用 .NET 搭配 Lambda 報告 Kinesis 批次項目失敗。

```
// Copyright Amazon.com, Inc. or its affiliates. All Rights Reserved.
// SPDX-License-Identifier: Apache-2.0
using System.Text;
using System.Text.Json.Serialization;
using Amazon.Lambda.Core;
using Amazon.Lambda.KinesisEvents;
using AWS.Lambda.Powertools.Logging;

// Assembly attribute to enable the Lambda function's JSON input to be converted
// into a .NET class.
[assembly: LambdaSerializer(typeof(Amazon.Lambda.Serialization.SystemTextJson.DefaultLambdaJsonSerializer))]

namespace KinesisIntegration;

public class Function
{
    // Powertools Logger requires an environment variables against your function
    // POWERTOOLS_SERVICE_NAME
    [Logging(LogEvent = true)]
    public async Task<StreamsEventResponse> FunctionHandler(KinesisEvent evnt,
        ILambdaContext context)
    {
        if (evnt.Records.Count == 0)
        {
            Logger.LogInformation("Empty Kinesis Event received");
            return new StreamsEventResponse();
        }

        foreach (var record in evnt.Records)
        {
            try
            {
                Logger.LogInformation($"Processed Event with EventId:
{record.EventId}");
                string data = await GetRecordDataAsync(record.Kinesis, context);
                Logger.LogInformation($"Data: {data}");
                // TODO: Do interesting work based on the new data
            }
            catch (Exception ex)
            {
                Logger.LogError($"An error occurred {ex.Message}");
            }
        }
    }
}
```

```

        /* Since we are working with streams, we can return the failed item
        immediately.
        Lambda will immediately begin to retry processing from this
        failed item onwards. */
        return new StreamsEventResponse
        {
            BatchItemFailures = new
List<StreamsEventResponse.BatchItemFailure>
            {
                new StreamsEventResponse.BatchItemFailure { ItemIdentifier =
record.Kinesis.SequenceNumber }
            }
        };
    }
    }
    Logger.LogInformation($"Successfully processed {evnt.Records.Count}
records.");
    return new StreamsEventResponse();
}

private async Task<string> GetRecordDataAsync(KinesisEvent.Record record,
ILambdaContext context)
{
    byte[] bytes = record.Data.ToArray();
    string data = Encoding.UTF8.GetString(bytes);
    await Task.CompletedTask; //Placeholder for actual async work
    return data;
}
}

public class StreamsEventResponse
{
    [JsonPropertyName("batchItemFailures")]
    public IList<BatchItemFailure> BatchItemFailures { get; set; }
    public class BatchItemFailure
    {
        [JsonPropertyName("itemIdentifier")]
        public string ItemIdentifier { get; set; }
    }
}

```

使用 DynamoDB 觸發條件報告 Lambda 函式的批次項目失敗

下列程式碼範例示範如何針對接收來自 DynamoDB 串流之事件的 Lambda 函式，實作部分批次回應。此函數會在回應中報告批次項目失敗，指示 Lambda 稍後重試這些訊息。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在[無伺服器範例](#)儲存庫中設定和執行。

使用 .NET 搭配 Lambda 報告 DynamoDB 批次項目失敗。

```
// Copyright Amazon.com, Inc. or its affiliates. All Rights Reserved.
// SPDX-License-Identifier: Apache-2.0
using System.Text.Json;
using System.Text;
using Amazon.Lambda.Core;
using Amazon.Lambda.DynamoDBEvents;

// Assembly attribute to enable the Lambda function's JSON input to be converted
// into a .NET class.
[assembly:
    LambdaSerializer(typeof(Amazon.Lambda.Serialization.SystemTextJson.DefaultLambdaJsonSerializer))]

namespace AWSLambda_DDB;

public class Function
{
    public StreamsEventResponse FunctionHandler(DynamoDBEvent dynamoEvent,
        ILambdaContext context)
    {
        context.Logger.LogInformation($"Beginning to process
        {dynamoEvent.Records.Count} records...");
        List<StreamsEventResponse.BatchItemFailure> batchItemFailures = new
        List<StreamsEventResponse.BatchItemFailure>();
        StreamsEventResponse streamsEventResponse = new StreamsEventResponse();

        foreach (var record in dynamoEvent.Records)
        {
```

```

        try
        {
            var sequenceNumber = record.Dynamodb.SequenceNumber;
            context.Logger.LogInformation(sequenceNumber);
        }
        catch (Exception ex)
        {
            context.Logger.LogError(ex.Message);
            batchItemFailures.Add(new StreamsEventResponse.BatchItemFailure()
            { ItemIdentifier = record.Dynamodb.SequenceNumber });
        }

        if (batchItemFailures.Count > 0)
        {
            streamsEventResponse.BatchItemFailures = batchItemFailures;
        }

        context.Logger.LogInformation("Stream processing complete.");
        return streamsEventResponse;
    }
}

```

使用 Amazon SQS 觸發條件報告 Lambda 函數的批次項目失敗

下列程式碼範例示範如何為接收從 SQS 佇列接收事件的 Lambda 函式，實作部分批次回應。此函數會在回應中報告批次項目失敗，指示 Lambda 稍後重試這些訊息。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在[無伺服器範例](#)儲存庫中設定和執行。

使用 .NET 搭配 Lambda 報告 SQS 批次項目失敗。

```

// Copyright Amazon.com, Inc. or its affiliates. All Rights Reserved.
// SPDX-License-Identifier: Apache-2.0
using Amazon.Lambda.Core;
using Amazon.Lambda.SQSEvents;

```

```
// Assembly attribute to enable the Lambda function's JSON input to be converted
// into a .NET class.
[assembly:
    LambdaSerializer(typeof(Amazon.Lambda.Serialization.SystemTextJson.DefaultLambdaJsonSerializer))]
namespace sqsSample;

public class Function
{
    public async Task<SQSBatchResponse> FunctionHandler(SQSEvent evnt,
        ILambdaContext context)
    {
        List<SQSBatchResponse.BatchItemFailure> batchItemFailures = new
        List<SQSBatchResponse.BatchItemFailure>();
        foreach (var message in evnt.Records)
        {
            try
            {
                //process your message
                await ProcessMessageAsync(message, context);
            }
            catch (System.Exception)
            {
                //Add failed message identifier to the batchItemFailures list
                batchItemFailures.Add(new
                SQSBatchResponse.BatchItemFailure{ItemIdentifier=message.MessageId});
            }
        }
        return new SQSBatchResponse(batchItemFailures);
    }

    private async Task ProcessMessageAsync(SQSEvent.SQSMessage message,
        ILambdaContext context)
    {
        if (String.IsNullOrEmpty(message.Body))
        {
            throw new Exception("No Body in SQS Message.");
        }
        context.Logger.LogInformation($"Processed message {message.Body}");
        // TODO: Do interesting work based on the new message
        await Task.CompletedTask;
    }
}
```

AWS 社群貢獻

建置和測試無伺服器應用程式

下列程式碼範例示範如何搭配 Lambda 和 DynamoDB 使用 API Gateway，建置和測試無伺服器應用程式。

適用於 .NET 的 SDK

示範如何使用 .NET SDK 建置和測試無伺服器應用程式，而該應用程式是由具有 Lambda 和 DynamoDB 的 API Gateway 組成。

如需完整的原始碼和如何設定及執行的指示，請參閱 [GitHub](#) 上的完整範例。

此範例中使用的服務

- API Gateway
- DynamoDB
- Lambda

使用的 MediaConvert 範例 適用於 .NET 的 SDK

下列程式碼範例示範如何使用 適用於 .NET 的 AWS SDK 搭配 MediaConvert 來執行動作和實作常見案例。

Actions 是大型程式的程式碼摘錄，必須在內容中執行。雖然動作會告訴您如何呼叫個別服務函數，但您可以在其相關情境中查看內容中的動作。

每個範例均包含完整原始碼的連結，您可在連結中找到如何設定和執行內容中程式碼的相關指示。

主題

- [開始使用](#)
- [動作](#)

開始使用

Hello MediaConvert

下列程式碼範例示範如何開始使用 AWS Elemental MediaConvert。

適用於 .NET 的 SDK

 Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
using Amazon.MediaConvert;
using Amazon.MediaConvert.Model;

namespace MediaConvertActions;

public static class HelloMediaConvert
{
    static async Task Main(string[] args)
    {
        // Create the client using the default profile.
        var mediaConvertClient = new AmazonMediaConvertClient();

        Console.WriteLine($"Hello AWS Elemental MediaConvert! Your MediaConvert Jobs are:");
        Console.WriteLine();

        // You can use await and any of the async methods to get a response.
        // Let's get some MediaConvert jobs.
        var response = await mediaConvertClient.ListJobsAsync(
            new ListJobsRequest()
            {
                MaxResults = 10
            }
        );

        foreach (var job in response.Jobs)
        {
            Console.WriteLine($"\\tJob: {job.Id} status {job.Status}");
            Console.WriteLine();
        }
    }
}
```


- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [DescribeEndpoints](#)。

動作

CreateJob

以下程式碼範例顯示如何使用 CreateJob。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

設定檔案位置、用戶端和包裝函式。

```
// MediaConvert role Amazon Resource Name (ARN).
// For information on creating this role, see
// https://docs.aws.amazon.com/mediaconvert/latest/ug/creating-the-iam-role-
in-mediaconvert-configured.html.
var mediaConvertRole = _configuration["mediaConvertRoleARN"];

// Include the file input and output locations in settings.json or
settings.local.json.
var fileInput = _configuration["fileInput"];
var fileOutput = _configuration["fileOutput"];

AmazonMediaConvertClient mcClient = new AmazonMediaConvertClient();

var wrapper = new MediaConvertWrapper(mcClient);
```

```
Console.WriteLine(new string('-', 80));
Console.WriteLine($"Creating job for input file {fileInput}.");
var jobId = await wrapper.CreateJob(mediaConvertRole!, fileInput!,
fileOutput!);
Console.WriteLine($"Created job with Job ID: {jobId}");
Console.WriteLine(new string('-', 80));
```

使用包裝函式方法建立任務，並傳回任務 ID。

```
/// <summary>
/// Create a job to convert a media file.
/// </summary>
/// <param name="mediaConvertRole">The Amazon Resource Name (ARN) of the media
convert role, as specified here:
/// https://docs.aws.amazon.com/mediaconvert/latest/ug/creating-the-iam-role-in-mediaconvert-configured.html</param>
/// <param name="fileInput">The Amazon Simple Storage Service (Amazon S3)
location of the input media file.</param>
/// <param name="fileOutput">The Amazon S3 location for the output media file.</
param>
/// <returns>The ID of the new job.</returns>
public async Task<string> CreateJob(string mediaConvertRole, string fileInput,
    string fileOutput)
{
    CreateJobRequest createJobRequest = new CreateJobRequest
    {
        Role = mediaConvertRole
    };

    createJobRequest.UserMetadata.Add("Customer", "Amazon");

    JobSettings jobSettings = new JobSettings
    {
        AdAvailOffset = 0,
        TimecodeConfig = new TimecodeConfig
        {
            Source = TimecodeSource.EMBEDDED
        }
    };
    createJobRequest.Settings = jobSettings;

    #region OutputGroup

    OutputGroup ofg = new OutputGroup
    {
        Name = "File Group",
        OutputGroupSettings = new OutputGroupSettings
```

```
        {
            Type = OutputGroupType.FILE_GROUP_SETTINGS,
            FileGroupSettings = new FileGroupSettings
            {
                Destination = fileOutput
            }
        }
    };

    Output output = new Output
    {
        NameModifier = "_1"
    };

    #region VideoDescription

    VideoDescription vdes = new VideoDescription
    {
        ScalingBehavior = ScalingBehavior.DEFAULT,
        TimecodeInsertion = VideoTimecodeInsertion.DISABLED,
        AntiAlias = AntiAlias.ENABLED,
        Sharpness = 50,
        AfdSignaling = AfdSignaling.NONE,
        DropFrameTimecode = DropFrameTimecode.ENABLED,
        RespondToAfd = RespondToAfd.NONE,
        ColorMetadata = ColorMetadata.INSERT,
        CodecSettings = new VideoCodecSettings
        {
            Codec = VideoCodec.H_264
        }
    };
    output.VideoDescription = vdes;

    H264Settings h264 = new H264Settings
    {
        InterlaceMode = H264InterlaceMode.PROGRESSIVE,
        NumberReferenceFrames = 3,
        Syntax = H264Syntax.DEFAULT,
        Softness = 0,
        GopClosedCadence = 1,
        GopSize = 90,
        Slices = 1,
        GopBReference = H264GopBReference.DISABLED,
        SlowPal = H264SlowPal.DISABLED,
```

```

        SpatialAdaptiveQuantization = H264SpatialAdaptiveQuantization.ENABLED,
        TemporalAdaptiveQuantization = H264TemporalAdaptiveQuantization.ENABLED,
        FlickerAdaptiveQuantization = H264FlickerAdaptiveQuantization.DISABLED,
        EntropyEncoding = H264EntropyEncoding.CABAC,
        Bitrate = 5000000,
        FramerateControl = H264FramerateControl.SPECIFIED,
        RateControlMode = H264RateControlMode.CBR,
        CodecProfile = H264CodecProfile.MAIN,
        Telecine = H264Telecine.NONE,
        MinIInterval = 0,
        AdaptiveQuantization = H264AdaptiveQuantization.HIGH,
        CodecLevel = H264CodecLevel.AUTO,
        FieldEncoding = H264FieldEncoding.PAFF,
        SceneChangeDetect = H264SceneChangeDetect.ENABLED,
        QualityTuningLevel = H264QualityTuningLevel.SINGLE_PASS,
        FramerateConversionAlgorithm =
            H264FramerateConversionAlgorithm.DUPLICATE_DROP,
        UnregisteredSeiTimecode = H264UnregisteredSeiTimecode.DISABLED,
        GopSizeUnits = H264GopSizeUnits.FRAMES,
        ParControl = H264ParControl.SPECIFIED,
        NumberBFramesBetweenReferenceFrames = 2,
        RepeatPps = H264RepeatPps.DISABLED,
        FramerateNumerator = 30,
        FramerateDenominator = 1,
        ParNumerator = 1,
        ParDenominator = 1
    };
    output.VideoDescription.CodecSettings.H264Settings = h264;

#endregion VideoDescription

#region AudioDescription

AudioDescription ades = new AudioDescription
{
    LanguageCodeControl = AudioLanguageCodeControl.FOLLOW_INPUT,
    // This name matches one specified in the following Inputs.
    AudioSourceName = "Audio Selector 1",
    CodecSettings = new AudioCodecSettings
    {
        Codec = AudioCodec.AAC
    }
};

```

```

        AacSettings aac = new AacSettings
        {
            AudioDescriptionBroadcasterMix =
AacAudioDescriptionBroadcasterMix.NORMAL,
            RateControlMode = AacRateControlMode.CBR,
            CodecProfile = AacCodecProfile.LC,
            CodingMode = AacCodingMode.CODING_MODE_2_0,
            RawFormat = AacRawFormat.NONE,
            SampleRate = 48000,
            Specification = AacSpecification.MPEG4,
            Bitrate = 64000
        };
        ades.CodecSettings.AacSettings = aac;
        output.AudioDescriptions.Add(ades);

#endregion AudioDescription

#region Mp4 Container

output.ContainerSettings = new ContainerSettings
{
    Container = ContainerType.MP4
};
Mp4Settings mp4 = new Mp4Settings
{
    CslgAtom = Mp4CslgAtom.INCLUDE,
    FreeSpaceBox = Mp4FreeSpaceBox.EXCLUDE,
    MoovPlacement = Mp4MoovPlacement.PROGRESSIVE_DOWNLOAD
};
output.ContainerSettings.Mp4Settings = mp4;

#endregion Mp4 Container

ofg.Outputs.Add(output);
createJobRequest.Settings.OutputGroups.Add(ofg);

#endregion OutputGroup

#region Input

Input input = new Input
{
    FilterEnable = InputFilterEnable.AUTO,
    PsiControl = InputPsiControl.USE_PSI,

```

```
        FilterStrength = 0,
        DeblockFilter = InputDeblockFilter.DISABLED,
        DenoiseFilter = InputDenoiseFilter.DISABLED,
        TimecodeSource = InputTimecodeSource.EMBEDDED,
        FileInput = fileInput
    };

    AudioSelector audsel = new AudioSelector
    {
        Offset = 0,
        DefaultSelection = AudioDefaultSelection.NOT_DEFAULT,
        ProgramSelection = 1,
        SelectorType = AudioSelectorType.TRACK
    };
    audsel.Tracks.Add(1);
    input.AudioSelectors.Add("Audio Selector 1", audsel);

    input.VideoSelector = new VideoSelector
    {
        ColorSpace = ColorSpace.FOLLOW
    };

    createJobRequest.Settings.Inputs.Add(input);

    #endregion Input

    CreateJobResponse createJobResponse =
        await _amazonMediaConvert.CreateJobAsync(createJobRequest);

    var jobId = createJobResponse.Job.Id;

    return jobId;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [CreateJob](#)。

GetJob

以下程式碼範例顯示如何使用 GetJob。

適用於 .NET 的 SDK

 Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

設定檔案位置、用戶端和包裝函式。

```
// MediaConvert role Amazon Resource Name (ARN).
// For information on creating this role, see
// https://docs.aws.amazon.com/mediaconvert/latest/ug/creating-the-iam-role-
in-mediaconvert-configured.html.
var mediaConvertRole = _configuration["mediaConvertRoleARN"];

// Include the file input and output locations in settings.json or
settings.local.json.
var fileInput = _configuration["fileInput"];
var fileOutput = _configuration["fileOutput"];

AmazonMediaConvertClient mcClient = new AmazonMediaConvertClient();

var wrapper = new MediaConvertWrapper(mcClient);
```

依任務 ID 取得任務。

```
Console.WriteLine(new string('-', 80));
Console.WriteLine($"Getting job information for Job ID {jobId}");
var job = await wrapper.GetJobById(jobId);
Console.WriteLine($"Job {job.Id} created on {job.CreatedAt:d} has status
{job.Status}.");
Console.WriteLine(new string('-', 80));
```

```
/// <summary>
/// Get the job information for a job by its ID.
/// </summary>
/// <param name="jobId">The ID of the job.</param>
```

```
/// <returns>The Job object.</returns>
public async Task<Job> GetJobById(string jobId)
{
    var jobResponse = await _amazonMediaConvert.GetJobAsync(
        new GetJobRequest
        {
            Id = jobId
        });

    return jobResponse.Job;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [GetJob](#)。

ListJobs

以下程式碼範例顯示如何使用 ListJobs。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

設定檔案位置、用戶端和包裝函式。

```
// MediaConvert role Amazon Resource Name (ARN).
// For information on creating this role, see
// https://docs.aws.amazon.com/mediaconvert/latest/ug/creating-the-iam-role-
in-mediaconvert-configured.html.
var mediaConvertRole = _configuration["mediaConvertRoleARN"];

// Include the file input and output locations in settings.json or
settings.local.json.
var fileInput = _configuration["fileInput"];
var fileOutput = _configuration["fileOutput"];

AmazonMediaConvertClient mcClient = new AmazonMediaConvertClient();
```



```
var wrapper = new MediaConvertWrapper(mcClient);
```

列出具有特定狀態的任務。

```
Console.WriteLine(new string('-', 80));
Console.WriteLine($"Listing all complete jobs.");
var completeJobs = await wrapper.ListAllJobsByStatus(JobStatus.COMPLETE);
completeJobs.ForEach(j =>
{
    Console.WriteLine($"Job {j.Id} created on {j.CreatedAt:d} has status {j.Status}.");
});
```

使用分頁器列出任務。

```
/// <summary>
/// List all of the jobs with a particular status using a paginator.
/// </summary>
/// <param name="status">The status to use when listing jobs.</param>
/// <returns>The list of jobs matching the status.</returns>
public async Task<List<Job>> ListAllJobsByStatus(JobStatus? status = null)
{
    var returnedJobs = new List<Job>();

    var paginatedJobs = _amazonMediaConvert.Paginators.ListJobs(
        new ListJobsRequest
        {
            Status = status
        });

    // Get the entire list using the paginator.
    await foreach (var job in paginatedJobs.Jobs)
    {
        returnedJobs.Add(job);
    }

    return returnedJobs;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [ListJobs](#)。

使用的 Amazon MSK 範例 適用於 .NET 的 SDK

下列程式碼範例示範如何使用 適用於 .NET 的 AWS SDK 搭配 Amazon MSK 執行動作和實作常見案例。

每個範例均包含完整原始碼的連結，您可在連結中找到如何設定和執行內容中程式碼的相關指示。

主題

- [無伺服器範例](#)

無伺服器範例

使用 Amazon MSK 觸發條件調用 Lambda 函數

以下程式碼範例示範如何實作 Lambda 函式，該函式會透過接收 Amazon MSK 叢集的記錄來接收所觸發的事件。函數會擷取 MSK 承載並記下記錄內容。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在[無伺服器範例](#)儲存庫中設定和執行。

使用 .NET 搭配 Lambda 來取用 Amazon MSK 事件。

```
using System.Text;
using Amazon.Lambda.Core;
using Amazon.Lambda.KafkaEvents;

// Assembly attribute to enable the Lambda function's JSON input to be converted
// into a .NET class.
[assembly:
    LambdaSerializer(typeof(Amazon.Lambda.Serialization.SystemTextJson.DefaultLambdaJsonSerializer))]

namespace MSKLambda;
```

```
public class Function
{

    /// <param name="input">The event for the Lambda function handler to process.</param>
    /// <param name="context">The ILambdaContext that provides methods for logging and describing the Lambda environment.</param>
    /// <returns></returns>
    public void FunctionHandler(KafkaEvent evnt, ILambdaContext context)
    {

        foreach (var record in evnt.Records)
        {
            Console.WriteLine("Key:" + record.Key);
            foreach (var eventRecord in record.Value)
            {
                var valueBytes = eventRecord.Value.ToArray();
                var valueText = Encoding.UTF8.GetString(valueBytes);

                Console.WriteLine("Message:" + valueText);
            }
        }
    }
}
```

使用的組織範例 適用於 .NET 的 SDK

下列程式碼範例示範如何使用 適用於 .NET 的 AWS SDK 搭配 Organizations 執行動作和實作常見案例。

Actions 是大型程式的程式碼摘錄，必須在內容中執行。雖然動作會告訴您如何呼叫個別服務函數，但您可以在其相關情境中查看內容中的動作。

每個範例均包含完整原始碼的連結，您可在連結中找到如何設定和執行內容中程式碼的相關指示。

主題

- [動作](#)

動作

AttachPolicy

以下程式碼範例顯示如何使用 AttachPolicy。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
using System;
using System.Threading.Tasks;
using Amazon.Organizations;
using Amazon.Organizations.Model;

/// <summary>
/// Shows how to attach an AWS Organizations policy to an organization,
/// an organizational unit, or an account.
/// </summary>
public class AttachPolicy
{
    /// <summary>
    /// Initializes the Organizations client object and then calls the
    /// AttachPolicyAsync method to attach the policy to the root
    /// organization.
    /// </summary>
    public static async Task Main()
    {
        IAmazonOrganizations client = new AmazonOrganizationsClient();
        var policyId = "p-000000000";
        var targetId = "r-0000";

        var request = new AttachPolicyRequest
        {
            PolicyId = policyId,
            TargetId = targetId,
        };
    }
}
```

```
var response = await client.AttachPolicyAsync(request);

if (response.HttpStatusCode == System.Net.HttpStatusCode.OK)
{
    Console.WriteLine($"Successfully attached Policy ID {policyId} to
Target ID: {targetId}.");
}
else
{
    Console.WriteLine("Was not successful in attaching the policy.");
}
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [AttachPolicy](#)。

CreateAccount

以下程式碼範例顯示如何使用 CreateAccount。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
using System;
using System.Threading.Tasks;
using Amazon.Organizations;
using Amazon.Organizations.Model;

/// <summary>
/// Creates a new AWS Organizations account.
/// </summary>
public class CreateAccount
{
    /// <summary>
    /// Initializes an Organizations client object and uses it to create
```

```
/// the new account with the name specified in accountName.
/// </summary>
public static async Task Main()
{
    IAmazonOrganizations client = new AmazonOrganizationsClient();
    var accountName = "ExampleAccount";
    var email = "someone@example.com";

    var request = new CreateAccountRequest
    {
        AccountName = accountName,
        Email = email,
    };

    var response = await client.CreateAccountAsync(request);
    var status = response.CreateAccountStatus;

    Console.WriteLine($"The status of {status.AccountName} is
{status.State}.");
}
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [CreateAccount](#)。

CreateOrganization

以下程式碼範例顯示如何使用 CreateOrganization。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
using System;
using System.Threading.Tasks;
using Amazon.Organizations;
using Amazon.Organizations.Model;
```

```

    /// <summary>
    /// Creates an organization in AWS Organizations.
    /// </summary>
    public class CreateOrganization
    {
        /// <summary>
        /// Creates an Organizations client object and then uses it to create
        /// a new organization with the default user as the administrator, and
        /// then displays information about the new organization.
        /// </summary>
        public static async Task Main()
        {
            IAmazonOrganizations client = new AmazonOrganizationsClient();

            var response = await client.CreateOrganizationAsync(new
CreateOrganizationRequest
            {
                FeatureSet = "ALL",
            });

            Organization newOrg = response.Organization;

            Console.WriteLine($"Organization: {newOrg.Id} Main Account:
{newOrg.MasterAccountId}");
        }
    }

```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [CreateOrganization](#)。

CreateOrganizationalUnit

以下程式碼範例顯示如何使用 CreateOrganizationalUnit。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
using System;
using System.Threading.Tasks;
using Amazon.Organizations;
using Amazon.Organizations.Model;

/// <summary>
/// Creates a new organizational unit in AWS Organizations.
/// </summary>
public class CreateOrganizationalUnit
{
    /// <summary>
    /// Initializes an Organizations client object and then uses it to call
    /// the CreateOrganizationalUnit method. If the call succeeds, it
    /// displays information about the new organizational unit.
    /// </summary>
    public static async Task Main()
    {
        // Create the client object using the default account.
        IAmazonOrganizations client = new AmazonOrganizationsClient();

        var orgUnitName = "ProductDevelopmentUnit";

        var request = new CreateOrganizationalUnitRequest
        {
            Name = orgUnitName,
            ParentId = "r-0000",
        };

        var response = await client.CreateOrganizationalUnitAsync(request);

        if (response.HttpStatusCode == System.Net.HttpStatusCode.OK)
        {
            Console.WriteLine($"Successfully created organizational unit:
{orgUnitName}.");
            Console.WriteLine($"Organizational unit {orgUnitName} Details");
            Console.WriteLine($"ARN: {response.OrganizationalUnit.Arn} Id:
{response.OrganizationalUnit.Id}");
        }
        else
        {
            Console.WriteLine("Could not create new organizational unit.");
        }
    }
}
```



```
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [CreateOrganizationalUnit](#)。

CreatePolicy

以下程式碼範例顯示如何使用 CreatePolicy。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
using System;
using System.Threading.Tasks;
using Amazon.Organizations;
using Amazon.Organizations.Model;

/// <summary>
/// Creates a new AWS Organizations Policy.
/// </summary>
public class CreatePolicy
{
    /// <summary>
    /// Initializes the AWS Organizations client object, uses it to
    /// create a new Organizations Policy, and then displays information
    /// about the newly created Policy.
    /// </summary>
    public static async Task Main()
    {
        IAmazonOrganizations client = new AmazonOrganizationsClient();
        var policyContent = "{" +
            "  \"Version\": \"2012-10-17\", \" +
            "  \"Statement\" : [{\" +
            "    \"Action\" : [\"s3:*\"], \" +
```

```

        " \\"Effect\\" : \\"Allow\\"," +
        " \\"Resource\\" : \\"*\\" +
        "]]" +
    "});

    try
    {
        var response = await client.CreatePolicyAsync(new
CreatePolicyRequest
        {
            Content = policyContent,
            Description = "Enables admins of attached accounts to delegate
all Amazon S3 permissions",
            Name = "AllowAllS3Actions",
            Type = "SERVICE_CONTROL_POLICY",
        });

        Policy policy = response.Policy;
        Console.WriteLine($"{policy.PolicySummary.Name} has the following
content: {policy.Content}");
    }
    catch (Exception ex)
    {
        Console.WriteLine(ex.Message);
    }
}
}

```

- 如需 API 詳細資訊，請參閱 適用於 .NET 的 AWS SDK API Reference 中的 [CreatePolicy](#)。

DeleteOrganization

以下程式碼範例顯示如何使用 DeleteOrganization。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
using System;
using System.Threading.Tasks;
using Amazon.Organizations;
using Amazon.Organizations.Model;

/// <summary>
/// Shows how to delete an existing organization using the AWS
/// Organizations Service.
/// </summary>
public class DeleteOrganization
{
    /// <summary>
    /// Initializes the Organizations client and then calls
    /// DeleteOrganizationAsync to delete the organization.
    /// </summary>
    public static async Task Main()
    {
        // Create the client object using the default account.
        IAmazonOrganizations client = new AmazonOrganizationsClient();

        var response = await client.DeleteOrganizationAsync(new
DeleteOrganizationRequest());

        if (response.HttpStatusCode == System.Net.HttpStatusCode.OK)
        {
            Console.WriteLine("Successfully deleted organization.");
        }
        else
        {
            Console.WriteLine("Could not delete organization.");
        }
    }
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [DeleteOrganization](#)。

DeleteOrganizationalUnit

以下程式碼範例顯示如何使用 DeleteOrganizationalUnit。

適用於 .NET 的 SDK

 Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
using System;
using System.Threading.Tasks;
using Amazon.Organizations;
using Amazon.Organizations.Model;

/// <summary>
/// Shows how to delete an existing AWS Organizations organizational unit.
/// </summary>
public class DeleteOrganizationalUnit
{
    /// <summary>
    /// Initializes the Organizations client object and calls
    /// DeleteOrganizationalUnitAsync to delete the organizational unit
    /// with the selected ID.
    /// </summary>
    public static async Task Main()
    {
        // Create the client object using the default account.
        IAmazonOrganizations client = new AmazonOrganizationsClient();

        var orgUnitId = "ou-0000-000000000";

        var request = new DeleteOrganizationalUnitRequest
        {
            OrganizationalUnitId = orgUnitId,
        };

        var response = await client.DeleteOrganizationalUnitAsync(request);

        if (response.HttpStatusCode == System.Net.HttpStatusCode.OK)
        {
            Console.WriteLine($"Successfully deleted the organizational unit
with ID: {orgUnitId}.");
        }
    }
}
```

```
        else
        {
            Console.WriteLine($"Could not delete the organizational unit with
ID: {orgUnitId}.");
        }
    }
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [DeleteOrganizationalUnit](#)。

DeletePolicy

以下程式碼範例顯示如何使用 DeletePolicy。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
using System;
using System.Threading.Tasks;
using Amazon.Organizations;
using Amazon.Organizations.Model;

/// <summary>
/// Deletes an existing AWS Organizations policy.
/// </summary>
public class DeletePolicy
{
    /// <summary>
    /// Initializes the Organizations client object and then uses it to
    /// delete the policy with the specified policyId.
    /// </summary>
    public static async Task Main()
    {

```

```
// Create the client object using the default account.
IAmazonOrganizations client = new AmazonOrganizationsClient();

var policyId = "p-000000000";

var request = new DeletePolicyRequest
{
    PolicyId = policyId,
};

var response = await client.DeletePolicyAsync(request);

if (response.HttpStatusCode == System.Net.HttpStatusCode.OK)
{
    Console.WriteLine($"Successfully deleted Policy: {policyId}.");
}
else
{
    Console.WriteLine($"Could not delete Policy: {policyId}.");
}
}
```

- 如需 API 詳細資訊，請參閱 適用於 .NET 的 AWS SDK API Reference 中的 [DeletePolicy](#)。

DetachPolicy

以下程式碼範例顯示如何使用 DetachPolicy。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
using System;
using System.Threading.Tasks;
```

```
using Amazon.Organizations;
using Amazon.Organizations.Model;

/// <summary>
/// Shows how to detach a policy from an AWS Organizations organization,
/// organizational unit, or account.
/// </summary>
public class DetachPolicy
{
    /// <summary>
    /// Initializes the Organizations client object and uses it to call
    /// DetachPolicyAsync to detach the policy.
    /// </summary>
    public static async Task Main()
    {
        // Create the client object using the default account.
        IAmazonOrganizations client = new AmazonOrganizationsClient();

        var policyId = "p-000000000";
        var targetId = "r-0000";

        var request = new DetachPolicyRequest
        {
            PolicyId = policyId,
            TargetId = targetId,
        };

        var response = await client.DetachPolicyAsync(request);

        if (response.HttpStatusCode == System.Net.HttpStatusCode.OK)
        {
            Console.WriteLine($"Successfully detached policy with Policy Id:
{policyId}.");
        }
        else
        {
            Console.WriteLine("Could not detach the policy.");
        }
    }
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [DetachPolicy](#)。

ListAccounts

以下程式碼範例顯示如何使用 ListAccounts。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
using System;
using System.Threading.Tasks;
using Amazon.Organizations;
using Amazon.Organizations.Model;

/// <summary>
/// Uses the AWS Organizations service to list the accounts associated
/// with the default account.
/// </summary>
public class ListAccounts
{
    /// <summary>
    /// Creates the Organizations client and then calls its
    /// ListAccountsAsync method.
    /// </summary>
    public static async Task Main()
    {
        // Create the client object using the default account.
        IAmazonOrganizations client = new AmazonOrganizationsClient();

        var request = new ListAccountsRequest
        {
            MaxResults = 5,
        };

        var response = new ListAccountsResponse();
        try
        {
            do
            {
                response = await client.ListAccountsAsync(request);
            }
        }
    }
}
```



```

        response.Accounts.ForEach(a => DisplayAccounts(a));
        if (response.NextToken is not null)
        {
            request.NextToken = response.NextToken;
        }
    }
    while (response.NextToken is not null);
}
catch (AWSOrganizationsNotInUseException ex)
{
    Console.WriteLine(ex.Message);
}
}

/// <summary>
/// Displays information about an Organizations account.
/// </summary>
/// <param name="account">An Organizations account for which to display
/// information on the console.</param>
private static void DisplayAccounts(Account account)
{
    string accountInfo = $"{account.Id} {account.Name}\t{account.Status}";

    Console.WriteLine(accountInfo);
}
}

```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [ListAccounts](#)。

ListOrganizationalUnitsForParent

以下程式碼範例顯示如何使用 ListOrganizationalUnitsForParent。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
using System;
using System.Threading.Tasks;
using Amazon.Organizations;
using Amazon.Organizations.Model;

/// <summary>
/// Lists the AWS Organizations organizational units that belong to an
/// organization.
/// </summary>
public class ListOrganizationalUnitsForParent
{
    /// <summary>
    /// Initializes the Organizations client object and then uses it to
    /// call the ListOrganizationalUnitsForParentAsync method to retrieve
    /// the list of organizational units.
    /// </summary>
    public static async Task Main()
    {
        // Create the client object using the default account.
        IAmazonOrganizations client = new AmazonOrganizationsClient();

        var parentId = "r-0000";

        var request = new ListOrganizationalUnitsForParentRequest
        {
            ParentId = parentId,
            MaxResults = 5,
        };

        var response = new ListOrganizationalUnitsForParentResponse();
        try
        {
            do
            {
                response = await
client.ListOrganizationalUnitsForParentAsync(request);
                response.OrganizationalUnits.ForEach(u =>
DisplayOrganizationalUnit(u));
                if (response.NextToken is not null)
                {
                    request.NextToken = response.NextToken;
                }
            }
        }
```

```
        while (response.NextToken is not null);
    }
    catch (Exception ex)
    {
        Console.WriteLine(ex.Message);
    }
}

/// <summary>
/// Displays information about an Organizations organizational unit.
/// </summary>
/// <param name="unit">The OrganizationalUnit for which to display
/// information.</param>
public static void DisplayOrganizationalUnit(OrganizationalUnit unit)
{
    string accountInfo = $"{unit.Id} {unit.Name}\t{unit.Arn}";

    Console.WriteLine(accountInfo);
}
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [ListOrganizationalUnitsForParent](#)。

ListPolicies

以下程式碼範例顯示如何使用 ListPolicies。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
using System;
using System.Threading.Tasks;
using Amazon.Organizations;
```

```
using Amazon.Organizations.Model;

/// <summary>
/// Shows how to list the AWS Organizations policies associated with an
/// organization.
/// </summary>
public class ListPolicies
{
    /// <summary>
    /// Initializes an Organizations client object, and then calls its
    /// ListPoliciesAsync method.
    /// </summary>
    public static async Task Main()
    {
        // Create the client object using the default account.
        IAmazonOrganizations client = new AmazonOrganizationsClient();

        // The value for the Filter parameter is required and must be
        // one of the following:
        //     AISERVICES_OPT_OUT_POLICY
        //     BACKUP_POLICY
        //     SERVICE_CONTROL_POLICY
        //     TAG_POLICY
        var request = new ListPoliciesRequest
        {
            Filter = "SERVICE_CONTROL_POLICY",
            MaxResults = 5,
        };

        var response = new ListPoliciesResponse();
        try
        {
            do
            {
                response = await client.ListPoliciesAsync(request);
                response.Policies.ForEach(p => DisplayPolicies(p));
                if (response.NextToken is not null)
                {
                    request.NextToken = response.NextToken;
                }
            }
            while (response.NextToken is not null);
        }
        catch (AWSOrganizationsNotInUseException ex)
```

```
        {
            Console.WriteLine(ex.Message);
        }
    }

    /// <summary>
    /// Displays information about the Organizations policies associated
    /// with an organization.
    /// </summary>
    /// <param name="policy">An Organizations policy summary to display
    /// information on the console.</param>
    private static void DisplayPolicies(PolicySummary policy)
    {
        string policyInfo = $"{policy.Id} {policy.Name}\t{policy.Description}";

        Console.WriteLine(policyInfo);
    }
}
```

- 如需 API 詳細資訊，請參閱 適用於 .NET 的 AWS SDK API Reference 中的 [ListPolicies](#)。

使用的 Partner Central 範例 適用於 .NET 的 SDK

下列程式碼範例示範如何使用 適用於 .NET 的 AWS SDK 搭配 Partner Central 來執行動作和實作常見案例。

Actions 是大型程式的程式碼摘錄，必須在內容中執行。雖然動作會告訴您如何呼叫個別服務函數，但您可以在其相關情境中查看內容中的動作。

每個範例均包含完整原始碼的連結，您可在連結中找到如何設定和執行內容中程式碼的相關指示。

主題

- [動作](#)

動作

CreateOpportunity

以下程式碼範例顯示如何使用 CreateOpportunity。

適用於 .NET 的 SDK

建立機會。

```
// Copyright Amazon.com, Inc. or its affiliates. All Rights Reserved.
// PDX-License-Identifier: Apache-2.0

using System;
using Newtonsoft.Json;
using Amazon;
using Amazon.Runtime;
using Amazon.PartnerCentralSelling;
using Amazon.PartnerCentralSelling.Model;

namespace AWSExample
{
    class Program
    {
        static readonly string catalogToUse = "AWS";
        static async Task Main(string[] args)
        {
            // Initialize credentials from .aws/credentials file
            var credentials = new
Amazon.Runtime.CredentialManagement.SharedCredentialsFile();
            if (credentials.TryGetProfile("default", out var profile))
            {
                AWSCredentials awsCredentials =
profile.GetAWSCredentials(credentials);

                var client = new AmazonPartnerCentralSellingClient(awsCredentials);

                var request = new CreateOpportunityRequest
                {
                    Catalog = catalogToUse,
                    Origin = "Partner Referral",
                    Customer = new Customer
                    {
                        Account = new Account
                        {
                            Address = new Address
                            {
                                CountryCode = "US",
                                PostalCode = "99502",
                                StateOrRegion = "Alaska"
                            }
                        }
                    }
                }
            }
        }
    }
}
```

```

        },
        CompanyName = "TestCompanyName",
        Duns = "123456789",
        WebsiteUrl = "www.test.io",
        Industry = "Automotive"
    },
    Contacts = new List<Contact>
    {
        new Contact
        {
            Email = "test@test.io",
            FirstName = "John ",
            LastName = "Doe",
            Phone = "+144444444444",
            BusinessTitle = "test title"
        }
    }
},
LifeCycle = new LifeCycle
{
    ReviewStatus = "Submitted",
    TargetCloseDate = "2024-12-30"
},
Marketing = new Marketing
{
    Source = "None"
},
OpportunityType = "Net New Business",
PrimaryNeedsFromAws = new List<string> { "Co-Sell -
Architectural Validation" },
Project = new Project
{
    Title = "Moin Test UUID",
    CustomerBusinessProblem = "Sandbox is not working as
expected",

    CustomerUseCase = "AI Machine Learning and Analytics",
    DeliveryModels = new List<string> { "SaaS or PaaS" },
    ExpectedCustomerSpend = new List<ExpectedCustomerSpend>
    {
        new ExpectedCustomerSpend
        {
            Amount = "2000.0",
            CurrencyCode = "USD",
            Frequency = "Monthly",

```

```

        TargetCompany = "Ibexlabs"
    }
},
    SalesActivities = new List<string> { "Initialized
discussions with customer" }
}
};

try
{
    var response = await client.CreateOpportunityAsync(request);
    Console.WriteLine(response.HttpStatusCode);
    string formattedJson = JsonConvert.SerializeObject(response,
Formatting.Indented);
    Console.WriteLine(formattedJson);
}
catch (ValidationException ex)
{
    Console.WriteLine("Validation error: " + ex.Message);
}
catch (AmazonPartnerCentralSellingException e)
{
    Console.WriteLine("Failed:");
    Console.WriteLine(e.RequestId);
    Console.WriteLine(e.ErrorCode);
    Console.WriteLine(e.Message);
}
}
else
{
    Console.WriteLine("Profile not found.");
}
}
}
}
}

```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [CreateOpportunity](#)。

GetOpportunity

以下程式碼範例顯示如何使用 GetOpportunity。

適用於 .NET 的 SDK

取得機會。

```
// Copyright Amazon.com, Inc. or its affiliates. All Rights Reserved.
// PDX-License-Identifier: Apache-2.0

using System;
using Newtonsoft.Json;
using Amazon;
using Amazon.Runtime;
using Amazon.PartnerCentralSelling;
using Amazon.PartnerCentralSelling.Model;

namespace AWSExample
{
    class Program
    {
        static readonly string catalogToUse = "AWS";
        static readonly string identifier = "01111111";
        static async Task Main(string[] args)
        {
            // Initialize credentials from .aws/credentials file
            var credentials = new
Amazon.Runtime.CredentialManagement.SharedCredentialsFile();
            if (credentials.TryGetProfile("default", out var profile))
            {
                AWSCredentials awsCredentials =
profile.GetAWSCredentials(credentials);

                var client = new AmazonPartnerCentralSellingClient(awsCredentials);

                var request = new GetOpportunityRequest
                {
                    Catalog = catalogToUse,
                    Identifier = identifier
                };

                try {
                    var response = await client.GetOpportunityAsync(request);
                    Console.WriteLine(response.HttpStatusCode);
                    string formattedJson = JsonConvert.SerializeObject(response,
Formatting.Indented);
                    Console.WriteLine(formattedJson);
                }
            }
        }
    }
}
```

```
        } catch (ValidationException ex) {
            Console.WriteLine("Validation error: " + ex.Message);
        } catch (AmazonPartnerCentralSellingException e) {
            Console.WriteLine("Failed:");
            Console.WriteLine(e.RequestId);
            Console.WriteLine(e.ErrorCode);
            Console.WriteLine(e.Message);
        }
    }
    else
    {
        Console.WriteLine("Profile not found.");
    }
}
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [GetOpportunity](#)。

ListOpportunities

以下程式碼範例顯示如何使用 ListOpportunities。

適用於 .NET 的 SDK

列出機會。

```
// Copyright Amazon.com, Inc. or its affiliates. All Rights Reserved.
// PDX-License-Identifier: Apache-2.0

using System;
using Newtonsoft.Json;
using Amazon;
using Amazon.Runtime;
using Amazon.PartnerCentralSelling;
using Amazon.PartnerCentralSelling.Model;

namespace AWSExample
{
    class Program
    {
        static readonly string catalogToUse = "Sandbox";
```

```

static async Task Main(string[] args)
{
    // Initialize credentials from .aws/credentials file
    var credentials = new
Amazon.Runtime.CredentialManagement.SharedCredentialsFile();
    if (credentials.TryGetProfile("default", out var profile))
    {
        AWSCredentials awsCredentials =
profile.GetAWSCredentials(credentials);

        //var config = new AmazonPartnerCentralSellingConfig()
        //{
        //    ServiceURL = "https://partnercentral-selling.us-
east-1.api.aws",
        //};
        //var client = new AmazonPartnerCentralSellingClient(awsCredentials,
config);

        var client = new AmazonPartnerCentralSellingClient(awsCredentials);
        var request = new ListOpportunitiesRequest
        {
            Catalog = catalogToUse,
            MaxResults = 2
        };

        try {
            var response = await client.ListOpportunitiesAsync(request);
            Console.WriteLine(response.HttpStatusCode);
            foreach (var opportunity in response.OpportunitySummaries)
            {
                Console.WriteLine("Opportunity id: " + opportunity.Id);
            }
            string formattedJson =
JsonConvert.SerializeObject(response.OpportunitySummaries, Formatting.Indented);
            Console.WriteLine(formattedJson);
        } catch (ValidationException ex) {
            Console.WriteLine("Validation error: " + ex.Message);
        } catch (AmazonPartnerCentralSellingException e) {
            Console.WriteLine("Failed:");
            Console.WriteLine(e.RequestId);
            Console.WriteLine(e.ErrorCode);
            Console.WriteLine(e.Message);
        }
    }
    else

```

```
        {  
            Console.WriteLine("Profile not found.");  
        }  
    }  
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [ListOpportunities](#)。

使用的 Amazon Pinpoint 範例 適用於 .NET 的 SDK

下列程式碼範例示範如何使用 適用於 .NET 的 AWS SDK 搭配 Amazon Pinpoint 執行動作和實作常見案例。

Actions 是大型程式的程式碼摘錄，必須在內容中執行。雖然動作會告訴您如何呼叫個別服務函數，但您可以在其相關情境中查看內容中的動作。

每個範例均包含完整原始碼的連結，您可在連結中找到如何設定和執行內容中程式碼的相關指示。

主題

- [動作](#)

動作

SendMessage

以下程式碼範例顯示如何使用 SendMessage。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

傳送電子郵件訊息。

```
using Amazon;
using Amazon.Pinpoint;
using Amazon.Pinpoint.Model;
using Microsoft.Extensions.Configuration;

namespace SendEmailMessage;

public class SendEmailMainClass
{
    public static async Task Main(string[] args)
    {
        var configuration = new ConfigurationBuilder()
            .SetBasePath(Directory.GetCurrentDirectory())
            .AddJsonFile("settings.json") // Load test settings from .json file.
            .AddJsonFile("settings.local.json",
                true) // Optionally load local settings.
            .Build();

        // The AWS Region that you want to use to send the email. For a list of
        // AWS Regions where the Amazon Pinpoint API is available, see
        // https://docs.aws.amazon.com/pinpoint/latest/apireference/
        string region = "us-east-1";

        // The "From" address. This address has to be verified in Amazon Pinpoint
        // in the region you're using to send email.
        string senderAddress = configuration["SenderAddress"]!;

        // The address on the "To" line. If your Amazon Pinpoint account is in
        // the sandbox, this address also has to be verified.
        string toAddress = configuration["ToAddress"]!;

        // The Amazon Pinpoint project/application ID to use when you send this
        message.
        // Make sure that the SMS channel is enabled for the project or application
        // that you choose.
        string appId = configuration["AppId"]!;

        try
        {
            await SendEmailMessage(region, appId, toAddress, senderAddress);
        }
        catch (Exception ex)
        {
        }
```

```

        Console.WriteLine("The message wasn't sent. Error message: " +
ex.Message);
    }
}

public static async Task<MessageResponse> SendEmailMessage(
    string region, string appId, string toAddress, string senderAddress)
{
    var client = new
AmazonPinpointClient(RegionEndpoint.GetBySystemName(region));

    // The subject line of the email.
    string subject = "Amazon Pinpoint Email test";

    // The body of the email for recipients whose email clients don't
    // support HTML content.
    string textBody = @"Amazon Pinpoint Email Test (.NET)"
        + "\n-----"
        + "\nThis email was sent using the Amazon Pinpoint API
using the AWS SDK for .NET.";

    // The body of the email for recipients whose email clients support
    // HTML content.
    string htmlBody = @"<html>"
        + "\n<head></head>"
        + "\n<body>"
        + "\n  <h1>Amazon Pinpoint Email Test (AWS SDK for .NET)</
h1>"
        + "\n  <p>This email was sent using the "
        + "\n    <a href='https://aws.amazon.com/pinpoint/'>Amazon
Pinpoint</a> API "
        + "\n    using the <a href='https://aws.amazon.com/sdk-
for-net/'>AWS SDK for .NET</a>"
        + "\n  </p>"
        + "\n</body>"
        + "\n</html>";

    // The character encoding the you want to use for the subject line and
    // message body of the email.
    string charset = "UTF-8";

    var sendRequest = new SendMessagesRequest
    {
        ApplicationId = appId,

```

```
MessageRequest = new MessageRequest
{
    Addresses = new Dictionary<string, AddressConfiguration>
    {
        {
            toAddress,
            new AddressConfiguration
            {
                ChannelType = ChannelType.EMAIL
            }
        }
    },
    MessageConfiguration = new DirectMessageConfiguration
    {
        EmailMessage = new EmailMessage
        {
            FromAddress = senderAddress,
            SimpleEmail = new SimpleEmail
            {
                HtmlPart = new SimpleEmailPart
                {
                    Charset = charset,
                    Data = htmlBody
                },
                TextPart = new SimpleEmailPart
                {
                    Charset = charset,
                    Data = textBody
                },
                Subject = new SimpleEmailPart
                {
                    Charset = charset,
                    Data = subject
                }
            }
        }
    }
};
Console.WriteLine("Sending message...");
SendMessageResponse response = await client.SendMessagesAsync(sendRequest);
Console.WriteLine("Message sent!");
return response.MessageResponse;
}
```

```
}
```

傳送一則 SMS 訊息。

```
using Amazon;
using Amazon.Pinpoint;
using Amazon.Pinpoint.Model;
using Microsoft.Extensions.Configuration;

namespace SendSmsMessage;

public class SendSmsMessageMainClass
{
    public static async Task Main(string[] args)
    {
        var configuration = new ConfigurationBuilder()
            .SetBasePath(Directory.GetCurrentDirectory())
            .AddJsonFile("settings.json") // Load test settings from .json file.
            .AddJsonFile("settings.local.json",
                true) // Optionally load local settings.
            .Build();

        // The AWS Region that you want to use to send the message. For a list of
        // AWS Regions where the Amazon Pinpoint API is available, see
        // https://docs.aws.amazon.com/pinpoint/latest/apireference/
        string region = "us-east-1";

        // The phone number or short code to send the message from. The phone number
        // or short code that you specify has to be associated with your Amazon
        Pinpoint
        // account. For best results, specify long codes in E.164 format.
        string originationNumber = configuration["OriginationNumber"]!;

        // The recipient's phone number. For best results, you should specify the
        // phone number in E.164 format.
        string destinationNumber = configuration["DestinationNumber"]!;

        // The Pinpoint project/ application ID to use when you send this message.
        // Make sure that the SMS channel is enabled for the project or application
        // that you choose.
```



```

        string appId = configuration["AppId"]!;

        // The type of SMS message that you want to send. If you plan to send
        // time-sensitive content, specify TRANSACTIONAL. If you plan to send
        // marketing-related content, specify PROMOTIONAL.
        MessageType messageType = MessageType.TRANSACTIONAL;

        // The registered keyword associated with the originating short code.
        string? registeredKeyword = configuration["RegisteredKeyword"];

        // The sender ID to use when sending the message. Support for sender ID
        // varies by country or region. For more information, see
        // https://docs.aws.amazon.com/pinpoint/latest/userguide/channels-sms-
        countries.html
        string? senderId = configuration["SenderId"];

        try
        {
            var response = await SendSmsMessage(region, appId, destinationNumber,
                originationNumber, registeredKeyword, senderId, messageType);
            Console.WriteLine($"Message sent to
{response.MessageResponse.Result.Count} recipient(s).");
            foreach (var messageResultValue in
                response.MessageResponse.Result.Select(r => r.Value))
            {
                Console.WriteLine($"{{messageResultValue.MessageId}} Status:
{messageResultValue.DeliveryStatus}");
            }
        }
        catch (Exception ex)
        {
            Console.WriteLine("The message wasn't sent. Error message: " +
ex.Message);
        }
    }

    public static async Task<SendMessagesResponse> SendSmsMessage(
        string region, string appId, string destinationNumber, string
        originationNumber,
        string? keyword, string? senderId, MessageType messageType)
    {

        // The content of the SMS message.
        string message = "This message was sent through Amazon Pinpoint using" +

```

```

        " the AWS SDK for .NET. Reply STOP to opt out.";

        var client = new
AmazonPinpointClient(RegionEndpoint.GetBySystemName(region));

        SendMessagesRequest sendRequest = new SendMessagesRequest
        {
            ApplicationId = appId,
            MessageRequest = new MessageRequest
            {
                Addresses =
                    new Dictionary<string, AddressConfiguration>
                    {
                        {
                            destinationNumber,
                            new AddressConfiguration { ChannelType =
ChannelType.SMS }
                        },
                    },
                MessageConfiguration = new DirectMessageConfiguration
                {
                    SMSMessage = new SMSMessage
                    {
                        Body = message,
                        MessageType = MessageType.TRANSACTIONAL,
                        OriginationNumber = originationNumber,
                        SenderId = senderId,
                        Keyword = keyword
                    }
                }
            }
        };
        SendMessagesResponse response = await client.SendMessagesAsync(sendRequest);
        return response;
    }
}

```

- 如需 API 詳細資訊，請參閱 適用於 .NET 的 AWS SDK API 參考中的 [SendMessages](#)。

使用的 Amazon Polly 範例 適用於 .NET 的 SDK

下列程式碼範例示範如何使用 適用於 .NET 的 AWS SDK 搭配 Amazon Polly 執行動作和實作常見案例。

Actions 是大型程式的程式碼摘錄，必須在內容中執行。雖然動作會告訴您如何呼叫個別服務函數，但您可以在其相關情境中查看內容中的動作。

案例是向您展示如何呼叫服務中的多個函數或與其他 AWS 服務組合來完成特定任務的程式碼範例。

每個範例均包含完整原始碼的連結，您可在連結中找到如何設定和執行內容中程式碼的相關指示。

主題

- [動作](#)
- [案例](#)

動作

DeleteLexicon

以下程式碼範例顯示如何使用 DeleteLexicon。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
using System;
using System.Threading.Tasks;
using Amazon.Polly;
using Amazon.Polly.Model;

/// <summary>
/// Deletes an existing Amazon Polly lexicon using the AWS SDK for .NET.
/// </summary>
public class DeleteLexicon
{
```

```

public static async Task Main()
{
    string lexiconName = "SampleLexicon";

    var client = new AmazonPollyClient();

    var success = await DeletePollyLexiconAsync(client, lexiconName);

    if (success)
    {
        Console.WriteLine($"Successfully deleted {lexiconName}.");
    }
    else
    {
        Console.WriteLine($"Could not delete {lexiconName}.");
    }
}

/// <summary>
/// Deletes the named Amazon Polly lexicon.
/// </summary>
/// <param name="client">The initialized Amazon Polly client object.</param>
/// <param name="lexiconName">The name of the Amazon Polly lexicon to
/// delete.</param>
/// <returns>A Boolean value indicating the success of the operation.</
returns>
public static async Task<bool> DeletePollyLexiconAsync(
    AmazonPollyClient client,
    string lexiconName)
{
    var deleteLexiconRequest = new DeleteLexiconRequest()
    {
        Name = lexiconName,
    };

    var response = await client.DeleteLexiconAsync(deleteLexiconRequest);

    return response.HttpStatusCode == System.Net.HttpStatusCode.OK;
}
}

```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [DeleteLexicon](#)。

DescribeVoices

以下程式碼範例顯示如何使用 DescribeVoices。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
using System;
using System.Threading.Tasks;
using Amazon.Polly;
using Amazon.Polly.Model;

public class DescribeVoices
{
    public static async Task Main()
    {
        var client = new AmazonPollyClient();

        var allVoicesRequest = new DescribeVoicesRequest();
        var enUsVoicesRequest = new DescribeVoicesRequest()
        {
            LanguageCode = "en-US",
        };

        try
        {
            string nextToken;
            do
            {
                var allVoicesResponse = await
client.DescribeVoicesAsync(allVoicesRequest);
                nextToken = allVoicesResponse.NextToken;
                allVoicesRequest.NextToken = nextToken;

                Console.WriteLine("\nAll voices: ");
                allVoicesResponse.Voices.ForEach(voice =>
                {
                    DisplayVoiceInfo(voice);
                });
            } while (nextToken != null);
        }
        catch { }
    }
}
```

```

        });
    }
    while (nextToken is not null);

    do
    {
        var enUsVoicesResponse = await
client.DescribeVoicesAsync(enUsVoicesRequest);
        nextToken = enUsVoicesResponse.NextToken;
        enUsVoicesRequest.NextToken = nextToken;

        Console.WriteLine("\nen-US voices: ");
        enUsVoicesResponse.Voices.ForEach(voice =>
        {
            DisplayVoiceInfo(voice);
        });
    }
    while (nextToken is not null);
}
catch (Exception ex)
{
    Console.WriteLine("Exception caught: " + ex.Message);
}

}

public static void DisplayVoiceInfo(Voice voice)
{
    Console.WriteLine($" Name: {voice.Name}\tGender:
{voice.Gender}\tLanguageName: {voice.LanguageName}");
}
}

```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [DescribeVoices](#)。

GetLexicon

以下程式碼範例顯示如何使用 GetLexicon。

適用於 .NET 的 SDK

 Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
using System;
using System.Threading.Tasks;
using Amazon.Polly;
using Amazon.Polly.Model;

/// <summary>
/// Retrieves information about a specific Amazon Polly lexicon.
/// </summary>
public class GetLexicon
{
    public static async Task Main(string[] args)
    {
        string lexiconName = "SampleLexicon";

        var client = new AmazonPollyClient();

        await GetPollyLexiconAsync(client, lexiconName);
    }

    public static async Task GetPollyLexiconAsync(AmazonPollyClient client,
string lexiconName)
    {
        var getLexiconRequest = new GetLexiconRequest()
        {
            Name = lexiconName,
        };

        try
        {
            var response = await client.GetLexiconAsync(getLexiconRequest);
            Console.WriteLine($"Lexicon:\n Name: {response.Lexicon.Name}");
            Console.WriteLine($"Content: {response.Lexicon.Content}");
        }
        catch (Exception ex)
```

```
        {  
            Console.WriteLine("Error: " + ex.Message);  
        }  
    }  
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [GetLexicon](#)。

ListLexicons

以下程式碼範例顯示如何使用 ListLexicons。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
using System;  
using System.Threading.Tasks;  
using Amazon.Polly;  
using Amazon.Polly.Model;  
  
/// <summary>  
/// Lists the Amazon Polly lexicons that have been defined. By default,  
/// lists the lexicons that are defined in the same AWS Region as the default  
/// user. To view Amazon Polly lexicons that are defined in a different AWS  
/// Region, supply it as a parameter to the Amazon Polly constructor.  
/// </summary>  
public class ListLexicons  
{  
    public static async Task Main()  
    {  
        var client = new AmazonPollyClient();  
        var request = new ListLexiconsRequest();  
  
        try
```



```
{
    Console.WriteLine("All voices: ");

    do
    {
        var response = await client.ListLexiconsAsync(request);
        request.NextToken = response.NextToken;

        response.Lexicons.ForEach(lexicon =>
        {
            var attributes = lexicon.Attributes;
            Console.WriteLine($"Name: {lexicon.Name}");
            Console.WriteLine($"\\tAlphabet: {attributes.Alphabet}");
            Console.WriteLine($"\\tLanguageCode:
{attributes.LanguageCode}");
            Console.WriteLine($"\\tLastModified:
{attributes.LastModified}");
            Console.WriteLine($"\\tLexemesCount:
{attributes.LexemesCount}");
            Console.WriteLine($"\\tLexiconArn: {attributes.LexiconArn}");
            Console.WriteLine($"\\tSize: {attributes.Size}");
        });
    }
    while (request.NextToken is not null);
}
catch (Exception ex)
{
    Console.WriteLine($"Error: {ex.Message}");
}
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [ListLexicons](#)。

PutLexicon

以下程式碼範例顯示如何使用 PutLexicon。

適用於 .NET 的 SDK

 Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
using System;
using System.Threading.Tasks;
using Amazon.Polly;
using Amazon.Polly.Model;

/// <summary>
/// Creates a new Amazon Polly lexicon using the AWS SDK for .NET.
/// </summary>
public class PutLexicon
{
    public static async Task Main()
    {
        string lexiconContent = "<?xml version=\"1.0\" encoding=\"UTF-8\"?>" +
            "<lexicon version=\"1.0\" xmlns=\"http://www.w3.org/2005/01/" +
            "pronunciation-lexicon\" xmlns:xsi=\"http://www.w3.org/2001/XMLSchema-instance\" " +
            "xsi:schemaLocation=\"http://www.w3.org/2005/01/pronunciation-" +
            "lexicon http://www.w3.org/TR/2007/CR-pronunciation-lexicon-20071212/pls.xsd\" " +
            "alphabet=\"ipa\" xml:lang=\"en-US\">" +
            "<lexeme><grapheme>test1</grapheme><alias>test2</alias></lexeme>" +
            "</lexicon>";
        string lexiconName = "SampleLexicon";

        var client = new AmazonPollyClient();
        var putLexiconRequest = new PutLexiconRequest()
        {
            Name = lexiconName,
            Content = lexiconContent,
        };

        try
        {
            var response = await client.PutLexiconAsync(putLexiconRequest);
            if (response.HttpStatusCode == System.Net.HttpStatusCode.OK)
            {

```

```
        Console.WriteLine($"Successfully created Lexicon:
{lexiconName}.");
    }
    else
    {
        Console.WriteLine($"Could not create Lexicon: {lexiconName}.");
    }
}
catch (Exception ex)
{
    Console.WriteLine("Exception caught: " + ex.Message);
}
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [PutLexicon](#)。

SynthesizeSpeech

以下程式碼範例顯示如何使用 SynthesizeSpeech。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
using System;
using System.IO;
using System.Threading.Tasks;
using Amazon.Polly;
using Amazon.Polly.Model;

public class SynthesizeSpeech
{
    public static async Task Main()
    {
        string outputFileName = "speech.mp3";
```

```

        string text = "Twas brillig, and the slithy toves did gyre and gimbol in
the wabe";

        var client = new AmazonPollyClient();
        var response = await PollySynthesizeSpeech(client, text);

        WriteSpeechToStream(response.AudioStream, outputFileName);
    }

    /// <summary>
    /// Calls the Amazon Polly SynthesizeSpeechAsync method to convert text
    /// to speech.
    /// </summary>
    /// <param name="client">The Amazon Polly client object used to connect
    /// to the Amazon Polly service.</param>
    /// <param name="text">The text to convert to speech.</param>
    /// <returns>A SynthesizeSpeechResponse object that includes an AudioStream
    /// object with the converted text.</returns>
    private static async Task<SynthesizeSpeechResponse>
PollySynthesizeSpeech(IAmazonPolly client, string text)
    {
        var synthesizeSpeechRequest = new SynthesizeSpeechRequest()
        {
            OutputFormat = OutputFormat.Mp3,
            VoiceId = VoiceId.Joanna,
            Text = text,
        };

        var synthesizeSpeechResponse =
            await client.SynthesizeSpeechAsync(synthesizeSpeechRequest);

        return synthesizeSpeechResponse;
    }

    /// <summary>
    /// Writes the AudioStream returned from the call to
    /// SynthesizeSpeechAsync to a file in MP3 format.
    /// </summary>
    /// <param name="audioStream">The AudioStream returned from the
    /// call to the SynthesizeSpeechAsync method.</param>
    /// <param name="outputFileName">The full path to the file in which to
    /// save the audio stream.</param>
    private static void WriteSpeechToStream(Stream audioStream, string
outputFileName)

```

```
{
    var outputStream = new FileStream(
        outputFileName,
        FileMode.Create,
        FileAccess.Write);
    byte[] buffer = new byte[2 * 1024];
    int readBytes;

    while ((readBytes = audioStream.Read(buffer, 0, 2 * 1024)) > 0)
    {
        outputStream.Write(buffer, 0, readBytes);
    }

    // Flushes the buffer to avoid losing the last second or so of
    // the synthesized text.
    outputStream.Flush();
    Console.WriteLine($"Saved {outputFileName} to disk.");
}
}
```

使用 SDK 搭配 Amazon Polly 使用語音標記從文字合成語音 AWS。

```
using System;
using System.Collections.Generic;
using System.IO;
using System.Threading.Tasks;
using Amazon.Polly;
using Amazon.Polly.Model;

public class SynthesizeSpeechMarks
{
    public static async Task Main()
    {
        var client = new AmazonPollyClient();
        string outputFileName = "speechMarks.json";

        var synthesizeSpeechRequest = new SynthesizeSpeechRequest()
        {
            OutputFormat = OutputFormat.Json,
            SpeechMarkTypes = new List<string>
            {
```

```

        SpeechMarkType.Viseme,
        SpeechMarkType.Word,
    },
    VoiceId = VoiceId.Joanna,
    Text = "This is a sample text to be synthesized.",
};

try
{
    using (var outputStream = new FileStream(outputFileName,
        FileMode.Create, FileAccess.Write))
    {
        var synthesizeSpeechResponse = await
client.SynthesizeSpeechAsync(synthesizeSpeechRequest);
        var buffer = new byte[2 * 1024];
        int readBytes;

        var inputStream = synthesizeSpeechResponse.AudioStream;
        while ((readBytes = inputStream.Read(buffer, 0, 2 * 1024)) > 0)
        {
            outputStream.Write(buffer, 0, readBytes);
        }
    }
}
catch (Exception ex)
{
    Console.WriteLine($"Error: {ex.Message}");
}
}

```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [SynthesizeSpeech](#)。

案例

建立應用程式以分析客戶意見回饋

下列程式碼範例會示範如何建立可分析客戶評論卡、從其原始語言進行翻譯、判斷對方情緒，以及透過翻譯後的文字產生音訊檔案的應用程式。

適用於 .NET 的 SDK

此範例應用程式會分析和存儲客戶的意見回饋卡。具體來說，它滿足了紐約市一家虛構飯店的需求。飯店以實體評論卡的形式收到賓客以各種語言撰寫的意見回饋。這些意見回饋透過 Web 用戶端上傳至應用程式。評論卡的影像上傳後，系統會執行下列步驟：

- 文字內容是使用 Amazon Textract 從影像中擷取。
- Amazon Comprehend 會決定擷取文字及其用語的情感。
- 擷取的文字內容會使用 Amazon Translate 翻譯成英文。
- Amazon Polly 會使用擷取的文字內容合成音訊檔案。

完整的應用程式可透過 AWS CDK 部署。如需原始程式碼和部署的說明，請參閱 [GitHub](#) 中的專案。

此範例中使用的服務

- Amazon Comprehend
- Lambda
- Amazon Polly
- Amazon Textract
- Amazon Translate

使用的 Amazon RDS 範例 適用於 .NET 的 SDK

下列程式碼範例示範如何使用 適用於 .NET 的 AWS SDK 搭配 Amazon RDS 執行動作和實作常見案例。

基本概念是程式碼範例，這些範例說明如何在服務內執行基本操作。

Actions 是大型程式的程式碼摘錄，必須在內容中執行。雖然動作會告訴您如何呼叫個別服務函數，但您可以在其相關情境中查看內容中的動作。

案例是向您展示如何呼叫服務中的多個函數或與其他 AWS 服務組合來完成特定任務的程式碼範例。

每個範例均包含完整原始碼的連結，您可在連結中找到如何設定和執行內容中程式碼的相關指示。

主題

- [開始使用](#)
- [基本概念](#)

- [動作](#)
- [案例](#)
- [無伺服器範例](#)

開始使用

您好 Amazon RDS

下列程式碼範例示範如何開始使用 Amazon RDS。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
using System;
using System.Threading.Tasks;
using Amazon.RDS;
using Amazon.RDS.Model;

namespace RDSActions;

public static class HelloRds
{
    static async Task Main(string[] args)
    {
        var rdsClient = new AmazonRDSClient();

        Console.WriteLine($"Hello Amazon RDS! Following are some of your DB instances:");
        Console.WriteLine();

        // You can use await and any of the async methods to get a response.
        // Let's get the first twenty DB instances.
        var response = await rdsClient.DescribeDBInstancesAsync(
            new DescribeDBInstancesRequest()
            {
                MaxRecords = 20 // Must be between 20 and 100.
            }
        );
    }
}
```



```
});

foreach (var instance in response.DBInstances)
{
    Console.WriteLine($"\\tDB name: {instance.DBName}");
    Console.WriteLine($"\\tArn: {instance.DBInstanceArn}");
    Console.WriteLine($"\\tIdentifier: {instance.DBInstanceIdentifier}");
    Console.WriteLine();
}
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [DescribeDBInstances](#)。

基本概念

了解基本概念

以下程式碼範例顯示做法：

- 建立自訂資料庫參數群組並設定參數值。
- 建立資料庫執行個體，設定為使用參數群組。資料庫執行個體也包含資料庫。
- 擷取執行個體的快照。
- 刪除執行個體和參數群組。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

在命令提示中執行互動式案例。

```
/// <summary>
```

```

/// Scenario for RDS DB instance example.
/// </summary>
public class RDSInstanceScenario
{
    /*
        Before running this .NET code example, set up your development environment,
        including your credentials.

        This .NET example performs the following tasks:
        1. Returns a list of the available DB engine families using the
DescribeDBEngineVersionsAsync method.
        2. Selects an engine family and creates a custom DB parameter group using the
CreateDBParameterGroupAsync method.
        3. Gets the parameter groups using the DescribeDBParameterGroupsAsync method.
        4. Gets parameters in the group using the DescribeDBParameters method.
        5. Parses and displays parameters in the group.
        6. Modifies both the auto_increment_offset and auto_increment_increment
parameters
        using the ModifyDBParameterGroupAsync method.
        7. Gets and displays the updated parameters using the DescribeDBParameters
method with a source of "user".
        8. Gets a list of allowed engine versions using the
DescribeDBEngineVersionsAsync method.
        9. Displays and selects from a list of micro instance classes available for the
selected engine and version.
        10. Creates an RDS DB instance that contains a MySql database and uses the
parameter group
        using the CreateDBInstanceAsync method.
        11. Waits for DB instance to be ready using the DescribeDBInstancesAsync method.
        12. Prints out the connection endpoint string for the new DB instance.
        13. Creates a snapshot of the DB instance using the CreateDBSnapshotAsync
method.
        14. Waits for DB snapshot to be ready using the DescribeDBSnapshots method.
        15. Deletes the DB instance using the DeleteDBInstanceAsync method.
        16. Waits for DB instance to be deleted using the DescribeDbInstances method.
        17. Deletes the parameter group using the DeleteDBParameterGroupAsync.
    */

    private static readonly string sepBar = new('-', 80);
    private static RDSWrapper rdsWrapper = null!;
    private static ILogger logger = null!;
    private static readonly string engine = "mysql";
    static async Task Main(string[] args)
    {

```

```

// Set up dependency injection for the Amazon RDS service.
using var host = Host.CreateDefaultBuilder(args)
    .ConfigureLogging(logging =>
        logging.AddFilter("System", LogLevel.Debug)
        .AddFilter<DebugLoggerProvider>("Microsoft",
LogLevel.Information)
        .AddFilter<ConsoleLoggerProvider>("Microsoft", LogLevel.Trace))
    .ConfigureServices((_, services) =>
        services.AddAWSService<IAmazonRDS>()
        .AddTransient<RDSWrapper>()
    )
    .Build();

logger = LoggerFactory.Create(builder =>
{
    builder.AddConsole();
}).CreateLogger<RDSInstanceScenario>();

rdsWrapper = host.Services.GetRequiredService<RDSWrapper>();

Console.WriteLine(sepBar);
Console.WriteLine(
    "Welcome to the Amazon Relational Database Service (Amazon RDS) DB
instance scenario example.");
Console.WriteLine(sepBar);

try
{
    var parameterGroupFamily = await ChooseParameterGroupFamily();

    var parameterGroup = await CreateDbParameterGroup(parameterGroupFamily);

    var parameters = await
DescribeParametersInGroup(parameterGroup.DBParameterGroupName,
        new List<string> { "auto_increment_offset",
"auto_increment_increment" });

    await ModifyParameters(parameterGroup.DBParameterGroupName, parameters);

    await DescribeUserSourceParameters(parameterGroup.DBParameterGroupName);

    var engineVersionChoice = await
ChooseDbEngineVersion(parameterGroupFamily);

```

```

        var instanceChoice = await ChooseDbInstanceClass(engine,
engineVersionChoice.EngineVersion);

        var newInstanceIdentifier = "Example-Instance-" + DateTime.Now.Ticks;

        var newInstance = await CreateRdsNewInstance(parameterGroup, engine,
engineVersionChoice.EngineVersion,
            instanceChoice.DBInstanceClass, newInstanceIdentifier);
        if (newInstance != null)
        {
            DisplayConnectionString(newInstance);

            await CreateSnapshot(newInstance);

            await DeleteRdsInstance(newInstance);
        }

        await DeleteParameterGroup(parameterGroup);

        Console.WriteLine("Scenario complete.");
        Console.WriteLine(sepBar);
    }
    catch (Exception ex)
    {
        logger.LogError(ex, "There was a problem executing the scenario.");
    }
}

/// <summary>
/// Choose the RDS DB parameter group family from a list of available options.
/// </summary>
/// <returns>The selected parameter group family.</returns>
public static async Task<string> ChooseParameterGroupFamily()
{
    Console.WriteLine(sepBar);
    // 1. Get a list of available engines.
    var engines = await rdsWrapper.DescribeDBEngineVersions(engine);

    Console.WriteLine("1. The following is a list of available DB parameter
group families:");
    int i = 1;
    var parameterGroupFamilies = engines.GroupBy(e =>
e.DBParameterGroupFamily).ToList();
    foreach (var parameterGroupFamily in parameterGroupFamilies)

```

```

    {
        // List the available parameter group families.
        Console.WriteLine(
            $"{t{i}. Family: {parameterGroupFamily.Key}");
        i++;
    }

    var choiceNumber = 0;
    while (choiceNumber < 1 || choiceNumber > parameterGroupFamilies.Count)
    {
        Console.WriteLine("Select an available DB parameter group family by
entering a number from the list above:");
        var choice = Console.ReadLine();
        Int32.TryParse(choice, out choiceNumber);
    }
    var parameterGroupFamilyChoice = parameterGroupFamilies[choiceNumber - 1];
    Console.WriteLine(sepBar);
    return parameterGroupFamilyChoice.Key;
}

/// <summary>
/// Create and get information on a DB parameter group.
/// </summary>
/// <param name="dbParameterGroupFamily">The DBParameterGroupFamily for the new
DB parameter group.</param>
/// <returns>The new DBParameterGroup.</returns>
public static async Task<DBParameterGroup> CreateDbParameterGroup(string
dbParameterGroupFamily)
{
    Console.WriteLine(sepBar);
    Console.WriteLine($"2. Create new DB parameter group with family
{dbParameterGroupFamily}:");

    var parameterGroup = await rdsWrapper.CreateDBParameterGroup(
        "ExampleParameterGroup-" + DateTime.Now.Ticks,
        dbParameterGroupFamily, "New example parameter group");

    var groupInfo =
        await rdsWrapper.DescribeDBParameterGroups(parameterGroup
            .DBParameterGroupName);

    Console.WriteLine(
        $"3. New DB parameter group: \n\t{groupInfo[0].Description}, \n\tARN
{groupInfo[0].DBParameterGroupArn}");
}

```

```

        Console.WriteLine(sepBar);
        return parameterGroup;
    }

    /// <summary>
    /// Get and describe parameters from a DBParameterGroup.
    /// </summary>
    /// <param name="parameterGroupName">Name of the DBParameterGroup.</param>
    /// <param name="parameterNames">Optional specific names of parameters to
describe.</param>
    /// <returns>The list of requested parameters.</returns>
    public static async Task<List<Parameter>> DescribeParametersInGroup(string
parameterGroupName, List<string>? parameterNames = null)
    {
        Console.WriteLine(sepBar);
        Console.WriteLine("4. Get some parameters from the group.");
        Console.WriteLine(sepBar);

        var parameters =
            await rdsWrapper.DescribeDBParameters(parameterGroupName);

        var matchingParameters =
            parameters.Where(p => parameterNames == null ||
parameterNames.Contains(p.ParameterName)).ToList();

        Console.WriteLine("5. Parameter information:");
        matchingParameters.ForEach(p =>
            Console.WriteLine(
                $"{p.ParameterName}." +
                $"{p.Description}." +
                $"{p.AllowedValues}." +
                $"{p.ParameterValue}"));

        Console.WriteLine(sepBar);

        return matchingParameters;
    }

    /// <summary>
    /// Modify a parameter from a DBParameterGroup.
    /// </summary>
    /// <param name="parameterGroupName">Name of the DBParameterGroup.</param>
    /// <param name="parameters">The parameters to modify.</param>
    /// <returns>Async task.</returns>

```

```

    public static async Task ModifyParameters(string parameterGroupName,
List<Parameter> parameters)
    {
        Console.WriteLine(sepBar);
        Console.WriteLine("6. Modify some parameters in the group.");

        foreach (var p in parameters)
        {
            if (p.IsModifiable && p.DataType == "integer")
            {
                int newValue = 0;
                while (newValue == 0)
                {
                    Console.WriteLine(
                        $"Enter a new value for {p.ParameterName} from the allowed
values {p.AllowedValues} ");

                    var choice = Console.ReadLine();
                    Int32.TryParse(choice, out newValue);
                }

                p.ParameterValue = newValue.ToString();
            }
        }

        await rdsWrapper.ModifyDBParameterGroup(parameterGroupName, parameters);

        Console.WriteLine(sepBar);
    }

    /// <summary>
    /// Describe the user source parameters in the group.
    /// </summary>
    /// <param name="parameterGroupName">Name of the DBParameterGroup.</param>
    /// <returns>Async task.</returns>
    public static async Task DescribeUserSourceParameters(string parameterGroupName)
    {
        Console.WriteLine(sepBar);
        Console.WriteLine("7. Describe user source parameters in the group.");

        var parameters =
            await rdsWrapper.DescribeDBParameters(parameterGroupName, "user");
    }

```

```

        parameters.ForEach(p =>
            Console.WriteLine(
                $"{p.ParameterName}." +
                $"{p.Description}." +
                $"{p.AllowedValues}." +
                $"{p.ParameterValue}"));

        Console.WriteLine(sepBar);
    }

    /// <summary>
    /// Choose a DB engine version.
    /// </summary>
    /// <param name="dbParameterGroupFamily">DB parameter group family for engine
choice.</param>
    /// <returns>The selected engine version.</returns>
    public static async Task<DBEngineVersion> ChooseDbEngineVersion(string
dbParameterGroupFamily)
    {
        Console.WriteLine(sepBar);
        // Get a list of allowed engines.
        var allowedEngines =
            await rdsWrapper.DescribeDBEngineVersions(engine,
dbParameterGroupFamily);

        Console.WriteLine($"Available DB engine versions for parameter group family
{dbParameterGroupFamily}:");
        int i = 1;
        foreach (var version in allowedEngines)
        {
            Console.WriteLine(
                $"{i}. Engine: {version.Engine} Version
{version.EngineVersion}");
            i++;
        }

        var choiceNumber = 0;
        while (choiceNumber < 1 || choiceNumber > allowedEngines.Count)
        {
            Console.WriteLine("8. Select an available DB engine version by entering
a number from the list above:");
            var choice = Console.ReadLine();
            Int32.TryParse(choice, out choiceNumber);
        }
    }

```



```

    }

    var engineChoice = allowedEngines[choiceNumber - 1];
    Console.WriteLine(sepBar);
    return engineChoice;
}

/// <summary>
/// Choose a DB instance class for a particular engine and engine version.
/// </summary>
/// <param name="engine">DB engine for DB instance choice.</param>
/// <param name="engineVersion">DB engine version for DB instance choice.</
param>
/// <returns>The selected orderable DB instance option.</returns>
public static async Task<OrderableDBInstanceOption> ChooseDbInstanceClass(string
engine, string engineVersion)
{
    Console.WriteLine(sepBar);
    // Get a list of allowed DB instance classes.
    var allowedInstances =
        await rdsWrapper.DescribeOrderableDBInstanceOptions(engine,
engineVersion);

    Console.WriteLine($"8. Available micro DB instance classes for engine
{engine} and version {engineVersion}:");
    int i = 1;

    // Filter to micro instances for this example.
    allowedInstances = allowedInstances
        .Where(i => i.DBInstanceClass.Contains("micro")).ToList();

    foreach (var instance in allowedInstances)
    {
        Console.WriteLine(
            $"{i}. Instance class: {instance.DBInstanceClass} (storage type
{instance.StorageType})");
        i++;
    }

    var choiceNumber = 0;
    while (choiceNumber < 1 || choiceNumber > allowedInstances.Count)
    {
        Console.WriteLine("9. Select an available DB instance class by entering
a number from the list above:");
    }
}

```

```

        var choice = Console.ReadLine();
        Int32.TryParse(choice, out choiceNumber);
    }

    var instanceChoice = allowedInstances[choiceNumber - 1];
    Console.WriteLine(sepBar);
    return instanceChoice;
}

/// <summary>
/// Create a new RDS DB instance.
/// </summary>
/// <param name="parameterGroup">Parameter group to use for the DB instance.</
param>
/// <param name="engineName">Engine to use for the DB instance.</param>
/// <param name="engineVersion">Engine version to use for the DB instance.</
param>
/// <param name="instanceClass">Instance class to use for the DB instance.</
param>
/// <param name="instanceIdentifier">Instance identifier to use for the DB
instance.</param>
/// <returns>The new DB instance.</returns>
public static async Task<DBInstance?> CreateRdsNewInstance(DBParameterGroup
parameterGroup,
    string engineName, string engineVersion, string instanceClass, string
instanceIdentifier)
{
    Console.WriteLine(sepBar);
    Console.WriteLine($"10. Create a new DB instance with identifier
{instanceIdentifier}.");
    bool isInstanceReady = false;
    DBInstance newInstance;
    var instances = await rdsWrapper.DescribeDBInstances();
    isInstanceReady = instances.FirstOrDefault(i =>
        i.DBInstanceIdentifier == instanceIdentifier)?.DBInstanceStatus ==
"available";

    if (isInstanceReady)
    {
        Console.WriteLine("Instance already created.");
        newInstance = instances.First(i => i.DBInstanceIdentifier ==
instanceIdentifier);
    }
    else

```

```

    {
        Console.WriteLine("Please enter an admin user name:");
        var username = Console.ReadLine();

        Console.WriteLine("Please enter an admin password:");
        var password = Console.ReadLine();

        newInstance = await rdsWrapper.CreateDBInstance(
            "ExampleInstance",
            instanceIdentifier,
            parameterGroup.DBParameterGroupName,
            engineName,
            engineVersion,
            instanceClass,
            20,
            username,
            password
        );

        // 11. Wait for the DB instance to be ready.

        Console.WriteLine("11. Waiting for DB instance to be ready...");
        while (!newInstance.IsInstanceReady)
        {
            instances = await
rdsWrapper.DescribeDBInstances(instanceIdentifier);
            newInstance.IsInstanceReady = instances.FirstOrDefault()?.DBInstanceStatus ==
"available";
            newInstance = instances.First();
            Thread.Sleep(30000);
        }
    }

    Console.WriteLine(sepBar);
    return newInstance;
}

/// <summary>
/// Display a connection string for an RDS DB instance.
/// </summary>
/// <param name="instance">The DB instance to use to get a connection string.</
param>
public static void DisplayConnectionString(DBInstance instance)
{

```

```

        Console.WriteLine(sepBar);
        // Display the connection string.
        Console.WriteLine("12. New DB instance connection string: ");
        Console.WriteLine(
            $"\\n{engine} -h {instance.Endpoint.Address} -P {instance.Endpoint.Port}
"
            + $"-u {instance.MasterUsername} -p [YOUR PASSWORD]\\n");

        Console.WriteLine(sepBar);
    }

    /// <summary>
    /// Create a snapshot from an RDS DB instance.
    /// </summary>
    /// <param name="instance">DB instance to use when creating a snapshot.</param>
    /// <returns>The snapshot object.</returns>
    public static async Task<DBSnapshot> CreateSnapshot(DBInstance instance)
    {
        Console.WriteLine(sepBar);
        // Create a snapshot.
        Console.WriteLine($"13. Creating snapshot from DB instance
{instance.DBInstanceIdentifier}.");
        var snapshot = await
rdsWrapper.CreateDBSnapshot(instance.DBInstanceIdentifier, "ExampleSnapshot-" +
DateTime.Now.Ticks);

        // Wait for the snapshot to be available
        bool isSnapshotReady = false;

        Console.WriteLine($"14. Waiting for snapshot to be ready...");
        while (!isSnapshotReady)
        {
            var snapshots = await
rdsWrapper.DescribeDBSnapshots(instance.DBInstanceIdentifier);
            isSnapshotReady = snapshots.FirstOrDefault()?.Status == "available";
            snapshot = snapshots.First();
            Thread.Sleep(30000);
        }

        Console.WriteLine(
            $"Snapshot {snapshot.DBSnapshotIdentifier} status is
{snapshot.Status}.");
        Console.WriteLine(sepBar);
        return snapshot;
    }

```

```

    }

    /// <summary>
    /// Delete an RDS DB instance.
    /// </summary>
    /// <param name="instance">The DB instance to delete.</param>
    /// <returns>Async task.</returns>
    public static async Task DeleteRdsInstance(DBInstance newInstance)
    {
        Console.WriteLine(sepBar);
        // Delete the DB instance.
        Console.WriteLine($"15. Delete the DB instance
{newInstance.DBInstanceIdentifier}.");
        await rdsWrapper.DeleteDBInstance(newInstance.DBInstanceIdentifier);

        // Wait for the DB instance to delete.
        Console.WriteLine($"16. Waiting for the DB instance to delete...");
        bool isInstanceDeleted = false;

        while (!isInstanceDeleted)
        {
            var instance = await rdsWrapper.DescribeDBInstances();
            isInstanceDeleted = instance.All(i => i.DBInstanceIdentifier !=
newInstance.DBInstanceIdentifier);
            Thread.Sleep(30000);
        }

        Console.WriteLine("DB instance deleted.");
        Console.WriteLine(sepBar);
    }

    /// <summary>
    /// Delete a DB parameter group.
    /// </summary>
    /// <param name="parameterGroup">The parameter group to delete.</param>
    /// <returns>Async task.</returns>
    public static async Task DeleteParameterGroup(DBParameterGroup parameterGroup)
    {
        Console.WriteLine(sepBar);
        // Delete the parameter group.
        Console.WriteLine($"17. Delete the DB parameter group
{parameterGroup.DBParameterGroupName}.");
        await
rdsWrapper.DeleteDBParameterGroup(parameterGroup.DBParameterGroupName);
    }

```

```
        Console.WriteLine(sepBar);  
    }
```

資料庫執行個體動作案例所使用的包裝函式方式。

```
/// <summary>  
/// Wrapper methods to use Amazon Relational Database Service (Amazon RDS) with DB  
/// instance operations.  
/// </summary>  
public partial class RDSWrapper  
{  
    private readonly IAmazonRDS _amazonRDS;  
    public RDSWrapper(IAmazonRDS amazonRDS)  
    {  
        _amazonRDS = amazonRDS;  
    }  
  
    /// <summary>  
    /// Get a list of DB engine versions for a particular DB engine.  
    /// </summary>  
    /// <param name="engine">Name of the engine.</param>  
    /// <param name="dbParameterGroupFamily">Optional parameter group family name.</  
param>  
    /// <returns>List of DBEngineVersions.</returns>  
    public async Task<List<DBEngineVersion>> DescribeDBEngineVersions(string engine,  
        string dbParameterGroupFamily = null)  
    {  
        var response = await _amazonRDS.DescribeDBEngineVersionsAsync(  
            new DescribeDBEngineVersionsRequest()  
            {  
                Engine = engine,  
                DBParameterGroupFamily = dbParameterGroupFamily  
            });  
        return response.DBEngineVersions;  
    }  
  
    /// <summary>
```

```

    /// Get a list of orderable DB instance options for a specific
    /// engine and engine version.
    /// </summary>
    /// <param name="engine">Name of the engine.</param>
    /// <param name="engineVersion">Version of the engine.</param>
    /// <returns>List of OrderableDBInstanceOptions.</returns>
    public async Task<List<OrderableDBInstanceOption>>
DescribeOrderableDBInstanceOptions(string engine, string engineVersion)
    {
        // Use a paginator to get a list of DB instance options.
        var results = new List<OrderableDBInstanceOption>();
        var paginateInstanceOptions =
        _amazonRDS.Paginators.DescribeOrderableDBInstanceOptions(
            new DescribeOrderableDBInstanceOptionsRequest()
            {
                Engine = engine,
                EngineVersion = engineVersion,
            });
        // Get the entire list using the paginator.
        await foreach (var instanceOptions in
paginateInstanceOptions.OrderableDBInstanceOptions)
        {
            results.Add(instanceOptions);
        }
        return results;
    }

    /// <summary>
    /// Returns a list of DB instances.
    /// </summary>
    /// <param name="dbInstanceIdentifier">Optional name of a specific DB
instance.</param>
    /// <returns>List of DB instances.</returns>
    public async Task<List<DBInstance>> DescribeDBInstances(string
dbInstanceIdentifier = null)
    {
        var results = new List<DBInstance>();
        var instancesPaginator = _amazonRDS.Paginators.DescribeDBInstances(
            new DescribeDBInstancesRequest
            {
                DBInstanceIdentifier = dbInstanceIdentifier
            });
    }

```

```

        // Get the entire list using the paginator.
        await foreach (var instances in instancesPaginator.DBInstances)
        {
            results.Add(instances);
        }
        return results;
    }

    /// <summary>
    /// Create an RDS DB instance with a particular set of properties. Use the
    action DescribeDBInstancesAsync
    /// to determine when the DB instance is ready to use.
    /// </summary>
    /// <param name="dbName">Name for the DB instance.</param>
    /// <param name="dbInstanceId">DB instance identifier.</param>
    /// <param name="parameterGroupName">DB parameter group to associate with the
    instance.</param>
    /// <param name="dbEngine">The engine for the DB instance.</param>
    /// <param name="dbEngineVersion">Version for the DB instance.</param>
    /// <param name="instanceClass">Class for the DB instance.</param>
    /// <param name="allocatedStorage">The amount of storage in gibibytes (GiB) to
    allocate to the DB instance.</param>
    /// <param name="adminName">Admin user name.</param>
    /// <param name="adminPassword">Admin user password.</param>
    /// <returns>DB instance object.</returns>
    public async Task<DBInstance> CreateDBInstance(string dbName, string
    dbInstanceId,
        string parameterGroupName, string dbEngine, string dbEngineVersion,
        string instanceClass, int allocatedStorage, string adminName, string
    adminPassword)
    {
        var response = await _amazonRDS.CreateDBInstanceAsync(
            new CreateDBInstanceRequest()
            {
                DBName = dbName,
                DBInstanceId = dbInstanceId,
                DBParameterGroupName = parameterGroupName,
                Engine = dbEngine,
                EngineVersion = dbEngineVersion,
                DBInstanceClass = instanceClass,
                AllocatedStorage = allocatedStorage,
                MasterUsername = adminName,
            }
        );
    }

```



```

        MasterUserPassword = adminPassword
    });

    return response.DBInstance;
}

/// <summary>
/// Delete a particular DB instance.
/// </summary>
/// <param name="dbInstanceIdentifier">DB instance identifier.</param>
/// <returns>DB instance object.</returns>
public async Task<DBInstance> DeleteDBInstance(string dbInstanceIdentifier)
{
    var response = await _amazonRDS.DeleteDBInstanceAsync(
        new DeleteDBInstanceRequest()
        {
            DBInstanceIdentifier = dbInstanceIdentifier,
            SkipFinalSnapshot = true,
            DeleteAutomatedBackups = true
        });

    return response.DBInstance;
}

```

資料庫參數群組案例所使用的包裝函式方式。

```

/// <summary>
/// Wrapper methods to use Amazon Relational Database Service (Amazon RDS) with
/// parameter groups.
/// </summary>
public partial class RDSWrapper
{
    /// <summary>
    /// Get descriptions of DB parameter groups.
    /// </summary>
    /// <param name="name">Optional name of the DB parameter group to describe.</
    param>

```

```
/// <returns>The list of DB parameter group descriptions.</returns>
public async Task<List<DBParameterGroup>> DescribeDBParameterGroups(string name
= null)
{
    var response = await _amazonRDS.DescribeDBParameterGroupsAsync(
        new DescribeDBParameterGroupsRequest()
        {
            DBParameterGroupName = name
        });
    return response.DBParameterGroups;
}

/// <summary>
/// Create a new DB parameter group. Use the action
DescribeDBParameterGroupsAsync
/// to determine when the DB parameter group is ready to use.
/// </summary>
/// <param name="name">Name of the DB parameter group.</param>
/// <param name="family">Family of the DB parameter group.</param>
/// <param name="description">Description of the DB parameter group.</param>
/// <returns>The new DB parameter group.</returns>
public async Task<DBParameterGroup> CreateDBParameterGroup(
    string name, string family, string description)
{
    var response = await _amazonRDS.CreateDBParameterGroupAsync(
        new CreateDBParameterGroupRequest()
        {
            DBParameterGroupName = name,
            DBParameterGroupFamily = family,
            Description = description
        });
    return response.DBParameterGroup;
}

/// <summary>
/// Update a DB parameter group. Use the action DescribeDBParameterGroupsAsync
/// to determine when the DB parameter group is ready to use.
/// </summary>
/// <param name="name">Name of the DB parameter group.</param>
```

```

    /// <param name="parameters">List of parameters. Maximum of 20 per request.</param>
    /// <returns>The updated DB parameter group name.</returns>
    public async Task<string> ModifyDBParameterGroup(
        string name, List<Parameter> parameters)
    {
        var response = await _amazonRDS.ModifyDBParameterGroupAsync(
            new ModifyDBParameterGroupRequest()
            {
                DBParameterGroupName = name,
                Parameters = parameters,
            });
        return response.DBParameterGroupName;
    }

    /// <summary>
    /// Delete a DB parameter group. The group cannot be a default DB parameter
group
    /// or be associated with any DB instances.
    /// </summary>
    /// <param name="name">Name of the DB parameter group.</param>
    /// <returns>True if successful.</returns>
    public async Task<bool> DeleteDBParameterGroup(string name)
    {
        var response = await _amazonRDS.DeleteDBParameterGroupAsync(
            new DeleteDBParameterGroupRequest()
            {
                DBParameterGroupName = name,
            });
        return response.HttpStatusCode == HttpStatusCode.OK;
    }

    /// <summary>
    /// Get a list of DB parameters from a specific parameter group.
    /// </summary>
    /// <param name="dbParameterGroupName">Name of a specific DB parameter group.</param>
param>
    /// <param name="source">Optional source for selecting parameters.</param>
    /// <returns>List of parameter values.</returns>

```

```

public async Task<List<Parameter>> DescribeDBParameters(string
dbParameterGroupName, string source = null)
{
    var results = new List<Parameter>();
    var paginateParameters = _amazonRDS.Paginators.DescribeDBParameters(
        new DescribeDBParametersRequest()
        {
            DBParameterGroupName = dbParameterGroupName,
            Source = source
        });
    // Get the entire list using the paginator.
    await foreach (var parameters in paginateParameters.Parameters)
    {
        results.Add(parameters);
    }
    return results;
}

```

資料庫快照動作案例所使用的包裝函式方式。

```

/// <summary>
/// Wrapper methods to use Amazon Relational Database Service (Amazon RDS) with
/// snapshots.
/// </summary>
public partial class RDSWrapper
{
    /// <summary>
    /// Create a snapshot of a DB instance.
    /// </summary>
    /// <param name="dbInstanceIdentifier">DB instance identifier.</param>
    /// <param name="snapshotIdentifier">Identifier for the snapshot.</param>
    /// <returns>DB snapshot object.</returns>
    public async Task<DBSnapshot> CreateDBSnapshot(string dbInstanceIdentifier,
string snapshotIdentifier)
    {
        var response = await _amazonRDS.CreateDBSnapshotAsync(
            new CreateDBSnapshotRequest()
            {
                DBSnapshotIdentifier = snapshotIdentifier,

```

```
        DBInstanceIdentifier = dbInstanceIdentifier
    });

    return response.DBSnapshot;
}

/// <summary>
/// Return a list of DB snapshots for a particular DB instance.
/// </summary>
/// <param name="dbInstanceIdentifier">DB instance identifier.</param>
/// <returns>List of DB snapshots.</returns>
public async Task<List<DBSnapshot>> DescribeDBSnapshots(string
dbInstanceIdentifier)
{
    var results = new List<DBSnapshot>();
    var snapshotsPaginator = _amazonRDS.Paginators.DescribeDBSnapshots(
        new DescribeDBSnapshotsRequest()
        {
            DBInstanceIdentifier = dbInstanceIdentifier
        });

    // Get the entire list using the paginator.
    await foreach (var snapshots in snapshotsPaginator.DBSnapshots)
    {
        results.Add(snapshots);
    }
    return results;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的下列主題。

- [CreateDBInstance](#)
- [CreateDBParameterGroup](#)
- [CreateDBSnapshot](#)
- [DeleteDBInstance](#)
- [DeleteDBParameterGroup](#)
- [DescribeDBEngineVersions](#)

- [DescribeDBInstances](#)
- [DescribeDBParameterGroups](#)
- [DescribeDBParameters](#)
- [DescribeDBSnapshots](#)
- [DescribeOrderableDBInstanceOptions](#)
- [ModifyDBParameterGroup](#)

動作

CreateDBInstance

以下程式碼範例顯示如何使用 CreateDBInstance。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Create an RDS DB instance with a particular set of properties. Use the
action DescribeDBInstancesAsync
/// to determine when the DB instance is ready to use.
/// </summary>
/// <param name="dbName">Name for the DB instance.</param>
/// <param name="dbInstanceIdentifier">DB instance identifier.</param>
/// <param name="parameterGroupName">DB parameter group to associate with the
instance.</param>
/// <param name="dbEngine">The engine for the DB instance.</param>
/// <param name="dbEngineVersion">Version for the DB instance.</param>
/// <param name="instanceClass">Class for the DB instance.</param>
/// <param name="allocatedStorage">The amount of storage in gibibytes (GiB) to
allocate to the DB instance.</param>
/// <param name="adminName">Admin user name.</param>
/// <param name="adminPassword">Admin user password.</param>
/// <returns>DB instance object.</returns>
```

```
public async Task<DBInstance> CreateDBInstance(string dbName, string
dbInstanceIdIdentifier,
    string parameterGroupName, string dbEngine, string dbEngineVersion,
    string instanceClass, int allocatedStorage, string adminName, string
adminPassword)
{
    var response = await _amazonRDS.CreateDBInstanceAsync(
        new CreateDBInstanceRequest()
        {
            DBName = dbName,
            DBInstanceIdIdentifier = dbInstanceIdIdentifier,
            DBParameterGroupName = parameterGroupName,
            Engine = dbEngine,
            EngineVersion = dbEngineVersion,
            DBInstanceClass = instanceClass,
            AllocatedStorage = allocatedStorage,
            MasterUsername = adminName,
            MasterUserPassword = adminPassword
        });

    return response.DBInstance;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [CreateDBInstance](#)。

CreateDBParameterGroup

以下程式碼範例顯示如何使用 CreateDBParameterGroup。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
```

```

    /// Create a new DB parameter group. Use the action
    DescribeDBParameterGroupsAsync
    /// to determine when the DB parameter group is ready to use.
    /// </summary>
    /// <param name="name">Name of the DB parameter group.</param>
    /// <param name="family">Family of the DB parameter group.</param>
    /// <param name="description">Description of the DB parameter group.</param>
    /// <returns>The new DB parameter group.</returns>
    public async Task<DBParameterGroup> CreateDBParameterGroup(
        string name, string family, string description)
    {
        var response = await _amazonRDS.CreateDBParameterGroupAsync(
            new CreateDBParameterGroupRequest()
            {
                DBParameterGroupName = name,
                DBParameterGroupFamily = family,
                Description = description
            });
        return response.DBParameterGroup;
    }

```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [CreateDBParameterGroup](#)。

CreateDBSnapshot

以下程式碼範例顯示如何使用 CreateDBSnapshot。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```

    /// <summary>
    /// Create a snapshot of a DB instance.

```



```
/// </summary>
/// <param name="dbInstanceIdentifier">DB instance identifier.</param>
/// <param name="snapshotIdentifier">Identifier for the snapshot.</param>
/// <returns>DB snapshot object.</returns>
public async Task<DBSnapshot> CreateDBSnapshot(string dbInstanceIdentifier,
string snapshotIdentifier)
{
    var response = await _amazonRDS.CreateDBSnapshotAsync(
        new CreateDBSnapshotRequest()
        {
            DBSnapshotIdentifier = snapshotIdentifier,
            DBInstanceIdentifier = dbInstanceIdentifier
        });

    return response.DBSnapshot;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [CreateDBSnapshot](#)。

DeleteDBInstance

以下程式碼範例顯示如何使用 DeleteDBInstance。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Delete a particular DB instance.
/// </summary>
/// <param name="dbInstanceIdentifier">DB instance identifier.</param>
/// <returns>DB instance object.</returns>
public async Task<DBInstance> DeleteDBInstance(string dbInstanceIdentifier)
{

```

```

var response = await _amazonRDS.DeleteDBInstanceAsync(
    new DeleteDBInstanceRequest()
    {
        DBInstanceIdentifier = dbInstanceIdentifier,
        SkipFinalSnapshot = true,
        DeleteAutomatedBackups = true
    });

return response.DBInstance;
}

```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [DeleteDBInstance](#)。

DeleteDBParameterGroup

以下程式碼範例顯示如何使用 DeleteDBParameterGroup。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```

/// <summary>
/// Delete a DB parameter group. The group cannot be a default DB parameter
group
/// or be associated with any DB instances.
/// </summary>
/// <param name="name">Name of the DB parameter group.</param>
/// <returns>True if successful.</returns>
public async Task<bool> DeleteDBParameterGroup(string name)
{
    var response = await _amazonRDS.DeleteDBParameterGroupAsync(
        new DeleteDBParameterGroupRequest()
        {
            DBParameterGroupName = name,

```

```
});  
return response.HttpStatusCode == HttpStatusCode.OK;  
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [DeleteDBParameterGroup](#)。

DescribeDBEngineVersions

以下程式碼範例顯示如何使用 DescribeDBEngineVersions。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>  
/// Get a list of DB engine versions for a particular DB engine.  
/// </summary>  
/// <param name="engine">Name of the engine.</param>  
/// <param name="dbParameterGroupFamily">Optional parameter group family name.</param>  
public async Task<List<DBEngineVersion>> DescribeDBEngineVersions(string engine,  
    string dbParameterGroupFamily = null)  
{  
    var response = await _amazonRDS.DescribeDBEngineVersionsAsync(  
        new DescribeDBEngineVersionsRequest()  
        {  
            Engine = engine,  
            DBParameterGroupFamily = dbParameterGroupFamily  
        });  
    return response.DBEngineVersions;  
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [DescribeDBEngineVersions](#)。

DescribeDBInstances

以下程式碼範例顯示如何使用 DescribeDBInstances。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Returns a list of DB instances.
/// </summary>
/// <param name="dbInstanceIdentifier">Optional name of a specific DB
instance.</param>
/// <returns>List of DB instances.</returns>
public async Task<List<DBInstance>> DescribeDBInstances(string
dbInstanceIdentifier = null)
{
    var results = new List<DBInstance>();
    var instancesPaginator = _amazonRDS.Paginators.DescribeDBInstances(
        new DescribeDBInstancesRequest
        {
            DBInstanceIdentifier = dbInstanceIdentifier
        });
    // Get the entire list using the paginator.
    await foreach (var instances in instancesPaginator.DBInstances)
    {
        results.Add(instances);
    }
    return results;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [DescribeDBInstances](#)。

DescribeDBParameterGroups

以下程式碼範例顯示如何使用 DescribeDBParameterGroups。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Get descriptions of DB parameter groups.
/// </summary>
/// <param name="name">Optional name of the DB parameter group to describe.</
param>
/// <returns>The list of DB parameter group descriptions.</returns>
public async Task<List<DBParameterGroup>> DescribeDBParameterGroups(string name
= null)
{
    var response = await _amazonRDS.DescribeDBParameterGroupsAsync(
        new DescribeDBParameterGroupsRequest()
        {
            DBParameterGroupName = name
        });
    return response.DBParameterGroups;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [DescribeDBParameterGroups](#)。

DescribeDBParameters

以下程式碼範例顯示如何使用 DescribeDBParameters。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Get a list of DB parameters from a specific parameter group.
/// </summary>
/// <param name="dbParameterGroupName">Name of a specific DB parameter group.</
param>
/// <param name="source">Optional source for selecting parameters.</param>
/// <returns>List of parameter values.</returns>
public async Task<List<Parameter>> DescribeDBParameters(string
dbParameterGroupName, string source = null)
{
    var results = new List<Parameter>();
    var paginateParameters = _amazonRDS.Paginators.DescribeDBParameters(
        new DescribeDBParametersRequest()
        {
            DBParameterGroupName = dbParameterGroupName,
            Source = source
        });
    // Get the entire list using the paginator.
    await foreach (var parameters in paginateParameters.Parameters)
    {
        results.Add(parameters);
    }
    return results;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [DescribeDBParameters](#)。

DescribeDBSnapshots

以下程式碼範例顯示如何使用 DescribeDBSnapshots。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Return a list of DB snapshots for a particular DB instance.
/// </summary>
/// <param name="dbInstanceIdentifier">DB instance identifier.</param>
/// <returns>List of DB snapshots.</returns>
public async Task<List<DBSnapshot>> DescribeDBSnapshots(string
dbInstanceIdentifier)
{
    var results = new List<DBSnapshot>();
    var snapshotsPaginator = _amazonRDS.Paginators.DescribeDBSnapshots(
        new DescribeDBSnapshotsRequest()
        {
            DBInstanceIdentifier = dbInstanceIdentifier
        });

    // Get the entire list using the paginator.
    await foreach (var snapshots in snapshotsPaginator.DBSnapshots)
    {
        results.Add(snapshots);
    }
    return results;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [DescribeDBSnapshots](#)。

DescribeOrderableDBInstanceOptions

以下程式碼範例顯示如何使用 DescribeOrderableDBInstanceOptions。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Get a list of orderable DB instance options for a specific
/// engine and engine version.
/// </summary>
/// <param name="engine">Name of the engine.</param>
/// <param name="engineVersion">Version of the engine.</param>
/// <returns>List of OrderableDBInstanceOptions.</returns>
public async Task<List<OrderableDBInstanceOption>>
DescribeOrderableDBInstanceOptions(string engine, string engineVersion)
{
    // Use a paginator to get a list of DB instance options.
    var results = new List<OrderableDBInstanceOption>();
    var paginateInstanceOptions =
_amazonRDS.Paginators.DescribeOrderableDBInstanceOptions(
    new DescribeOrderableDBInstanceOptionsRequest()
    {
        Engine = engine,
        EngineVersion = engineVersion,
    });
    // Get the entire list using the paginator.
    await foreach (var instanceOptions in
paginateInstanceOptions.OrderableDBInstanceOptions)
    {
        results.Add(instanceOptions);
    }
    return results;
}
```


- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [DescribeOrderableDBInstanceOptions](#)。

ModifyDBParameterGroup

以下程式碼範例顯示如何使用 ModifyDBParameterGroup。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Update a DB parameter group. Use the action DescribeDBParameterGroupsAsync
/// to determine when the DB parameter group is ready to use.
/// </summary>
/// <param name="name">Name of the DB parameter group.</param>
/// <param name="parameters">List of parameters. Maximum of 20 per request.</
param>
/// <returns>The updated DB parameter group name.</returns>
public async Task<string> ModifyDBParameterGroup(
    string name, List<Parameter> parameters)
{
    var response = await _amazonRDS.ModifyDBParameterGroupAsync(
        new ModifyDBParameterGroupRequest()
        {
            DBParameterGroupName = name,
            Parameters = parameters,
        });
    return response.DBParameterGroupName;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [ModifyDBParameterGroup](#)。

案例

建立 Aurora 無伺服器工作項目追蹤器

下列程式碼示範如何建立一個 Web 應用程式，該應用程式會追蹤 Amazon Aurora Serverless 資料庫中的工作項目，並使用 Amazon Simple Email Service (Amazon SES) 傳送報告。

適用於 .NET 的 SDK

示範如何使用 適用於 .NET 的 AWS SDK 建立 Web 應用程式，以使用 Amazon Simple Email Service (Amazon SES) 追蹤 Amazon Aurora 資料庫中的工作項目和電子郵件報告。這個範例使用以 React.js 建置的前端與 RESTful .NET 後端互動。

- 將 React Web 應用程式與 AWS 服務整合。
- 列出、新增、更新和刪除 Aurora 資料表中的項目。
- 使用 Amazon SES 傳送篩選工作項目的電子郵件報告。
- 使用隨附的 AWS CloudFormation 指令碼部署和管理範例資源。

如需完整的原始碼和如何設定及執行的指示，請參閱 [GitHub](#) 上的完整範例。

此範例中使用的服務

- Aurora
- Amazon RDS
- Amazon RDS 資料服務
- Amazon SES

無伺服器範例

連線至 Lambda 函數中的 Amazon RDS 資料庫

以下程式碼範例示範如何實作連線至 RDS 資料庫的 Lambda 函式。該函數會提出簡單的資料庫請求並傳回結果。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在[無伺服器範例](#)儲存庫中設定和執行。

使用 .NET 連線至 Lambda 函式中的 Amazon RDS 資料庫。

```
using System.Data;
using System.Text.Json;
using Amazon.Lambda.APIGatewayEvents;
using Amazon.Lambda.Core;
using MySql.Data.MySqlClient;

// Assembly attribute to enable the Lambda function's JSON input to be converted
// into a .NET class.
[assembly:
    LambdaSerializer(typeof(Amazon.Lambda.Serialization.SystemTextJson.DefaultLambdaJsonSerializer))]

namespace aws_rds;

public class InputModel
{
    public string key1 { get; set; }
    public string key2 { get; set; }
}

public class Function
{
    /// <summary>
    /// Handles the Lambda function execution for connecting to RDS using IAM
    authentication.
    /// </summary>
    /// <param name="input">The input event data passed to the Lambda function</
    param>
    /// <param name="context">The Lambda execution context that provides runtime
    information</param>
    /// <returns>A response object containing the execution result</returns>

    public async Task<APIGatewayProxyResponse>
    FunctionHandler(APIGatewayProxyRequest request, ILambdaContext context)
    {
        // Sample Input: {"body": "{\"key1\":\"20\", \"key2\":\"25\"}"}
        var input = JsonSerializer.Deserialize<InputModel>(request.Body);

        /// Obtain authentication token
        var authToken = RDSAuthTokenGenerator.GenerateAuthToken(
            Environment.GetEnvironmentVariable("RDS_ENDPOINT"),
            Convert.ToInt32(Environment.GetEnvironmentVariable("RDS_PORT")),
            Environment.GetEnvironmentVariable("RDS_USERNAME")
        );
    }
}
```

```

    );

    /// Build the Connection String with the Token
    string connectionString =
    $"Server={Environment.GetEnvironmentVariable("RDS_ENDPOINT")};" +

    $"Port={Environment.GetEnvironmentVariable("RDS_PORT")};" +

    $"Uid={Environment.GetEnvironmentVariable("RDS_USERNAME")};" +
        $"Pwd={authToken}";

    try
    {
        await using var connection = new MySqlConnection(connectionString);
        await connection.OpenAsync();

        const string sql = "SELECT @param1 + @param2 AS Sum";

        await using var command = new MySqlCommand(sql, connection);
        command.Parameters.AddWithValue("@param1", int.Parse(input.key1 ??
"0"));
        command.Parameters.AddWithValue("@param2", int.Parse(input.key2 ??
"0"));

        await using var reader = await command.ExecuteReaderAsync();
        if (await reader.ReadAsync())
        {
            int result = reader.GetInt32("Sum");

            //Sample Response: {"statusCode":200,"body":{"\message\":"The sum
is: 45\"},"isBase64Encoded":false}
            return new APIGatewayProxyResponse
            {
                StatusCode = 200,
                Body = JsonSerializer.Serialize(new { message = $"The sum is:
{result}" })
            };
        }
    }
    catch (Exception ex)
    {
        Console.WriteLine($"Error: {ex.Message}");
    }

```

```
    }

    return new APIGatewayProxyResponse
    {
        StatusCode = 500,
        Body = JsonSerializer.Serialize(new { error = "Internal server error" });
    };
}
```

使用的 Amazon RDS Data Service 範例 適用於 .NET 的 SDK

下列程式碼範例示範如何使用 適用於 .NET 的 AWS SDK 搭配 Amazon RDS Data Service 執行動作和實作常見案例。

案例是向您展示如何呼叫服務中的多個函數或與其他 AWS 服務組合來完成特定任務的程式碼範例。

每個範例均包含完整原始碼的連結，您可在連結中找到如何設定和執行內容中程式碼的相關指示。

主題

- [案例](#)

案例

建立 Aurora 無伺服器工作項目追蹤器

下列程式碼示範如何建立一個 Web 應用程式，該應用程式會追蹤 Amazon Aurora Serverless 資料庫中的工作項目，並使用 Amazon Simple Email Service (Amazon SES) 傳送報告。

適用於 .NET 的 SDK

示範如何使用 適用於 .NET 的 AWS SDK 建立 Web 應用程式，以使用 Amazon Simple Email Service (Amazon SES) 追蹤 Amazon Aurora 資料庫中的工作項目和電子郵件報告。這個範例使用以 React.js 建置的前端與 RESTful .NET 後端互動。

- 將 React Web 應用程式與 AWS 服務整合。
- 列出、新增、更新和刪除 Aurora 資料表中的項目。
- 使用 Amazon SES 傳送篩選工作項目的電子郵件報告。
- 使用隨附的 AWS CloudFormation 指令碼部署和管理範例資源。

如需完整的原始碼和如何設定及執行的指示，請參閱 [GitHub](#) 上的完整範例。

此範例中使用的服務

- Aurora
- Amazon RDS
- Amazon RDS 資料服務
- Amazon SES

使用的 Amazon Rekognition 範例 適用於 .NET 的 SDK

下列程式碼範例示範如何使用 適用於 .NET 的 AWS SDK 搭配 Amazon Rekognition 執行動作和實作常見案例。

Actions 是大型程式的程式碼摘錄，必須在內容中執行。雖然動作會告訴您如何呼叫個別服務函數，但您可以在其相關情境中查看內容中的動作。

案例是向您展示如何呼叫服務中的多個函數或與其他 AWS 服務組合來完成特定任務的程式碼範例。

每個範例均包含完整原始碼的連結，您可在連結中找到如何設定和執行內容中程式碼的相關指示。

主題

- [動作](#)
- [案例](#)

動作

CompareFaces

以下程式碼範例顯示如何使用 CompareFaces。

如需詳細資訊，請參閱[比較映像中的人臉](#)。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
using System;
using System.IO;
using System.Threading.Tasks;
using Amazon.Rekognition;
using Amazon.Rekognition.Model;

/// <summary>
/// Uses the Amazon Rekognition Service to compare faces in two images.
/// </summary>
public class CompareFaces
{
    public static async Task Main()
    {
        float similarityThreshold = 70F;
        string sourceImage = "source.jpg";
        string targetImage = "target.jpg";

        var rekognitionClient = new AmazonRekognitionClient();

        Amazon.Rekognition.Model.Image imageSource = new
Amazon.Rekognition.Model.Image();

        try
        {
            using FileStream fs = new FileStream(sourceImage, FileMode.Open,
FileAccess.Read);
            byte[] data = new byte[fs.Length];
            fs.Read(data, 0, (int)fs.Length);
            imageSource.Bytes = new MemoryStream(data);
        }
        catch (Exception)
        {
            Console.WriteLine($"Failed to load source image: {sourceImage}");
            return;
        }

        Amazon.Rekognition.Model.Image imageTarget = new
Amazon.Rekognition.Model.Image();

        try
        {
            using FileStream fs = new FileStream(targetImage, FileMode.Open,
FileAccess.Read);
```

```
        byte[] data = new byte[fs.Length];
        data = new byte[fs.Length];
        fs.Read(data, 0, (int)fs.Length);
        imageTarget.Bytes = new MemoryStream(data);
    }
    catch (Exception ex)
    {
        Console.WriteLine($"Failed to load target image: {targetImage}");
        Console.WriteLine(ex.Message);
        return;
    }

    var compareFacesRequest = new CompareFacesRequest
    {
        SourceImage = imageSource,
        TargetImage = imageTarget,
        SimilarityThreshold = similarityThreshold,
    };

    // Call operation
    var compareFacesResponse = await
    rekognitionClient.CompareFacesAsync(compareFacesRequest);

    // Display results
    compareFacesResponse.FaceMatches.ForEach(match =>
    {
        ComparedFace face = match.Face;
        BoundingBox position = face.BoundingBox;
        Console.WriteLine($"Face at {position.Left} {position.Top} matches
        with {match.Similarity}% confidence.");
    });

    Console.WriteLine($"Found {compareFacesResponse.UnmatchedFaces.Count}
    face(s) that did not match.");
    }
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [CompareFaces](#)。

CreateCollection

以下程式碼範例顯示如何使用 CreateCollection。

如需更多資訊，請參閱[建立集合](#)。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
using System;
using System.Threading.Tasks;
using Amazon.Rekognition;
using Amazon.Rekognition.Model;

/// <summary>
/// Uses Amazon Rekognition to create a collection to which you can add
/// faces using the IndexFaces operation.
/// </summary>
public class CreateCollection
{
    public static async Task Main()
    {
        var rekognitionClient = new AmazonRekognitionClient();

        string collectionId = "MyCollection";
        Console.WriteLine("Creating collection: " + collectionId);

        var createCollectionRequest = new CreateCollectionRequest
        {
            CollectionId = collectionId,
        };

        CreateCollectionResponse createCollectionResponse = await
        rekognitionClient.CreateCollectionAsync(createCollectionRequest);
        Console.WriteLine($"CollectionArn :
{createCollectionResponse.CollectionArn}");
        Console.WriteLine($"Status code :
{createCollectionResponse.StatusCode}");
    }
}
```

```
}  
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [CreateCollection](#)。

DeleteCollection

以下程式碼範例顯示如何使用 DeleteCollection。

如需更多資訊，請參閱[刪除集合](#)。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
using System;  
using System.Threading.Tasks;  
using Amazon.Rekognition;  
using Amazon.Rekognition.Model;  
  
/// <summary>  
/// Uses the Amazon Rekognition Service to delete an existing collection.  
/// </summary>  
public class DeleteCollection  
{  
    public static async Task Main()  
    {  
        var rekognitionClient = new AmazonRekognitionClient();  
  
        string collectionId = "MyCollection";  
        Console.WriteLine("Deleting collection: " + collectionId);  
  
        var deleteCollectionRequest = new DeleteCollectionRequest()  
        {  
            CollectionId = collectionId,  

```

```
};

var deleteCollectionResponse = await
rekognitionClient.DeleteCollectionAsync(deleteCollectionRequest);
Console.WriteLine($"{collectionId}:
{deleteCollectionResponse.StatusCode}");
}
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [DeleteCollection](#)。

DeleteFaces

以下程式碼範例顯示如何使用 DeleteFaces。

如需詳細資訊，請參閱[從集合中刪除人臉](#)。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
using System;
using System.Collections.Generic;
using System.Threading.Tasks;
using Amazon.Rekognition;
using Amazon.Rekognition.Model;

/// <summary>
/// Uses the Amazon Rekognition Service to delete one or more faces from
/// a Rekognition collection.
/// </summary>
public class DeleteFaces
{
    public static async Task Main()
    {
```

```

        string collectionId = "MyCollection";
        var faces = new List<string> { "xxxxxxxx-xxxx-xxxx-xxxx-xxxxxxxxxxxxxx" };

        var rekognitionClient = new AmazonRekognitionClient();

        var deleteFacesRequest = new DeleteFacesRequest()
        {
            CollectionId = collectionId,
            FaceIds = faces,
        };

        DeleteFacesResponse deleteFacesResponse = await
        rekognitionClient.DeleteFacesAsync(deleteFacesRequest);
        deleteFacesResponse.DeletedFaces.ForEach(face =>
        {
            Console.WriteLine($"FaceID: {face}");
        });
    }
}

```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [DeleteFaces](#)。

DescribeCollection

以下程式碼範例顯示如何使用 DescribeCollection。

如需詳細資訊，請參閱[描述集合](#)。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```

using System;
using System.Threading.Tasks;
using Amazon.Rekognition;

```

```
using Amazon.Rekognition.Model;

/// <summary>
/// Uses the Amazon Rekognition Service to describe the contents of a
/// collection.
/// </summary>
public class DescribeCollection
{
    public static async Task Main()
    {
        var rekognitionClient = new AmazonRekognitionClient();

        string collectionId = "MyCollection";
        Console.WriteLine($"Describing collection: {collectionId}");

        var describeCollectionRequest = new DescribeCollectionRequest()
        {
            CollectionId = collectionId,
        };

        var describeCollectionResponse = await
rekognitionClient.DescribeCollectionAsync(describeCollectionRequest);
        Console.WriteLine($"Collection ARN:
{describeCollectionResponse.CollectionARN}");
        Console.WriteLine($"Face count:
{describeCollectionResponse.FaceCount}");
        Console.WriteLine($"Face model version:
{describeCollectionResponse.FaceModelVersion}");
        Console.WriteLine($"Created:
{describeCollectionResponse.CreationTimestamp}");
    }
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [DescribeCollection](#)。

DetectFaces

以下程式碼範例顯示如何使用 DetectFaces。

如需詳細資訊，請參閱[偵測影像中的人臉](#)。

適用於 .NET 的 SDK

 Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
using System;
using System.Collections.Generic;
using System.Threading.Tasks;
using Amazon.Rekognition;
using Amazon.Rekognition.Model;

/// <summary>
/// Uses the Amazon Rekognition Service to detect faces within an image
/// stored in an Amazon Simple Storage Service (Amazon S3) bucket.
/// </summary>
public class DetectFaces
{
    public static async Task Main()
    {
        string photo = "input.jpg";
        string bucket = "amzn-s3-demo-bucket";

        var rekognitionClient = new AmazonRekognitionClient();

        var detectFacesRequest = new DetectFacesRequest()
        {
            Image = new Image()
            {
                S3Object = new S3Object()
                {
                    Name = photo,
                    Bucket = bucket,
                },
            },

            // Attributes can be "ALL" or "DEFAULT".
            // "DEFAULT": BoundingBox, Confidence, Landmarks, Pose, and Quality.
            // "ALL": See https://docs.aws.amazon.com/sdkfornet/v3/apidocs/
            items/Rekognition/TFaceDetail.html
        }
```

```

        Attributes = new List<string>() { "ALL" },
    };

    try
    {
        DetectFacesResponse detectFacesResponse = await
rekognitionClient.DetectFacesAsync(detectFacesRequest);
        bool hasAll = detectFacesRequest.Attributes.Contains("ALL");
        foreach (FaceDetail face in detectFacesResponse.FaceDetails)
        {
            Console.WriteLine($"BoundingBox: top={face.BoundingBox.Left}
left={face.BoundingBox.Top} width={face.BoundingBox.Width}
height={face.BoundingBox.Height}");
            Console.WriteLine($"Confidence: {face.Confidence}");
            Console.WriteLine($"Landmarks: {face.Landmarks.Count}");
            Console.WriteLine($"Pose: pitch={face.Pose.Pitch}
roll={face.Pose.Roll} yaw={face.Pose.Yaw}");
            Console.WriteLine($"Brightness:
{face.Quality.Brightness}\tSharpness: {face.Quality.Sharpness}");

            if (hasAll)
            {
                Console.WriteLine($"Estimated age is between
{face.AgeRange.Low} and {face.AgeRange.High} years old.");
            }
        }
    }
    catch (Exception ex)
    {
        Console.WriteLine(ex.Message);
    }
}

```

顯示映像中所有人臉的邊界框資訊。

```

using System;
using System.Collections.Generic;
using System.Drawing;
using System.IO;
using System.Threading.Tasks;

```

```
using Amazon.Rekognition;
using Amazon.Rekognition.Model;

/// <summary>
/// Uses the Amazon Rekognition Service to display the details of the
/// bounding boxes around the faces detected in an image.
/// </summary>
public class ImageOrientationBoundingBox
{
    public static async Task Main()
    {
        string photo = @"D:\Development\AWS-Examples\Rekognition\target.jpg"; //
"photo.jpg";

        var rekognitionClient = new AmazonRekognitionClient();

        var image = new Amazon.Rekognition.Model.Image();
        try
        {
            using var fs = new FileStream(photo, FileMode.Open,
FileAccess.Read);
            byte[] data = null;
            data = new byte[fs.Length];
            fs.Read(data, 0, (int)fs.Length);
            image.Bytes = new MemoryStream(data);
        }
        catch (Exception)
        {
            Console.WriteLine("Failed to load file " + photo);
            return;
        }

        int height;
        int width;

        // Used to extract original photo width/height
        using (var imageBitmap = new Bitmap(photo))
        {
            height = imageBitmap.Height;
            width = imageBitmap.Width;
        }

        Console.WriteLine("Image Information:");
        Console.WriteLine(photo);
    }
}
```



```

        Console.WriteLine("Image Height: " + height);
        Console.WriteLine("Image Width: " + width);

        try
        {
            var detectFacesRequest = new DetectFacesRequest()
            {
                Image = image,
                Attributes = new List<string>() { "ALL" },
            };

            DetectFacesResponse detectFacesResponse = await
rekognitionClient.DetectFacesAsync(detectFacesRequest);
            detectFacesResponse.FaceDetails.ForEach(face =>
            {
                Console.WriteLine("Face:");
                ShowBoundingBoxPositions(
                    height,
                    width,
                    face.BoundingBox,
                    detectFacesResponse.OrientationCorrection);

                Console.WriteLine($"BoundingBox: top={face.BoundingBox.Left}
left={face.BoundingBox.Top} width={face.BoundingBox.Width}
height={face.BoundingBox.Height}");
                Console.WriteLine($"The detected face is estimated to be between
{face.AgeRange.Low} and {face.AgeRange.High} years old.\n");
            });
        }
        catch (Exception ex)
        {
            Console.WriteLine(ex.Message);
        }
    }

    /// <summary>
    /// Display the bounding box information for an image.
    /// </summary>
    /// <param name="imageHeight">The height of the image.</param>
    /// <param name="imageWidth">The width of the image.</param>
    /// <param name="box">The bounding box for a face found within the image.</
param>
    /// <param name="rotation">The rotation of the face's bounding box.</param>

```

```
public static void ShowBoundingBoxPositions(int imageHeight, int imageWidth,
BoundingBox box, string rotation)
{
    float left;
    float top;

    if (rotation == null)
    {
        Console.WriteLine("No estimated orientation. Check Exif data.");
        return;
    }

    // Calculate face position based on image orientation.
    switch (rotation)
    {
        case "ROTATE_0":
            left = imageWidth * box.Left;
            top = imageHeight * box.Top;
            break;
        case "ROTATE_90":
            left = imageHeight * (1 - (box.Top + box.Height));
            top = imageWidth * box.Left;
            break;
        case "ROTATE_180":
            left = imageWidth - (imageWidth * (box.Left + box.Width));
            top = imageHeight * (1 - (box.Top + box.Height));
            break;
        case "ROTATE_270":
            left = imageHeight * box.Top;
            top = imageWidth * (1 - box.Left - box.Width);
            break;
        default:
            Console.WriteLine("No estimated orientation information. Check
Exif data.");
            return;
    }

    // Display face location information.
    Console.WriteLine($"Left: {left}");
    Console.WriteLine($"Top: {top}");
    Console.WriteLine($"Face Width: {imageWidth * box.Width}");
    Console.WriteLine($"Face Height: {imageHeight * box.Height}");
}
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [DetectFaces](#)。

DetectLabels

以下程式碼範例顯示如何使用 DetectLabels。

如需詳細資訊，請參閱[偵測映像中的標籤](#)。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
using System;
using System.Threading.Tasks;
using Amazon.Rekognition;
using Amazon.Rekognition.Model;

/// <summary>
/// Uses the Amazon Rekognition Service to detect labels within an image
/// stored in an Amazon Simple Storage Service (Amazon S3) bucket.
/// </summary>
public class DetectLabels
{
    public static async Task Main()
    {
        string photo = "del_river_02092020_01.jpg"; // "input.jpg";
        string bucket = "amzn-s3-demo-bucket"; // "bucket";

        var rekognitionClient = new AmazonRekognitionClient();

        var detectlabelsRequest = new DetectLabelsRequest
        {
            Image = new Image()
            {
                S3object = new S3object()
```

```

        {
            Name = photo,
            Bucket = bucket,
        },
    },
    MaxLabels = 10,
    MinConfidence = 75F,
};

try
{
    DetectLabelsResponse detectLabelsResponse = await
rekognitionClient.DetectLabelsAsync(detectLabelsRequest);
    Console.WriteLine("Detected labels for " + photo);
    foreach (Label label in detectLabelsResponse.Labels)
    {
        Console.WriteLine($"Name: {label.Name} Confidence:
{label.Confidence}");
    }
}
catch (Exception ex)
{
    Console.WriteLine(ex.Message);
}
}
}

```

偵測儲存於您計算機的映像檔案中的標籤。

```

using System;
using System.IO;
using System.Threading.Tasks;
using Amazon.Rekognition;
using Amazon.Rekognition.Model;

/// <summary>
/// Uses the Amazon Rekognition Service to detect labels within an image
/// stored locally.
/// </summary>
public class DetectLabelsLocalFile
{

```

```
public static async Task Main()
{
    string photo = "input.jpg";

    var image = new Amazon.Rekognition.Model.Image();
    try
    {
        using var fs = new FileStream(photo, FileMode.Open,
FileAccess.Read);
        byte[] data = null;
        data = new byte[fs.Length];
        fs.Read(data, 0, (int)fs.Length);
        image.Bytes = new MemoryStream(data);
    }
    catch (Exception)
    {
        Console.WriteLine("Failed to load file " + photo);
        return;
    }

    var rekognitionClient = new AmazonRekognitionClient();

    var detectLabelsRequest = new DetectLabelsRequest
    {
        Image = image,
        MaxLabels = 10,
        MinConfidence = 77F,
    };

    try
    {
        DetectLabelsResponse detectLabelsResponse = await
rekognitionClient.DetectLabelsAsync(detectLabelsRequest);
        Console.WriteLine($"Detected labels for {photo}");
        foreach (Label label in detectLabelsResponse.Labels)
        {
            Console.WriteLine($"{label.Name}: {label.Confidence}");
        }
    }
    catch (Exception ex)
    {
        Console.WriteLine(ex.Message);
    }
}
```

```
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [DetectLabels](#)。

DetectModerationLabels

以下程式碼範例顯示如何使用 DetectModerationLabels。

如需詳細資訊，請參閱[偵測不適合的映像](#)。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
using System;
using System.Threading.Tasks;
using Amazon.Rekognition;
using Amazon.Rekognition.Model;

/// <summary>
/// Uses the Amazon Rekognition Service to detect unsafe content in a
/// JPEG or PNG format image.
/// </summary>
public class DetectModerationLabels
{
    public static async Task Main(string[] args)
    {
        string photo = "input.jpg";
        string bucket = "amzn-s3-demo-bucket";

        var rekognitionClient = new AmazonRekognitionClient();

        var detectModerationLabelsRequest = new DetectModerationLabelsRequest()
        {
            Image = new Image()
```

```
        {
            S3Object = new S3Object()
            {
                Name = photo,
                Bucket = bucket,
            },
        },
        MinConfidence = 60F,
    };

    try
    {
        var detectModerationLabelsResponse = await
            rekognitionClient.DetectModerationLabelsAsync(detectModerationLabelsRequest);
        Console.WriteLine("Detected labels for " + photo);
        foreach (ModerationLabel label in
            detectModerationLabelsResponse.ModerationLabels)
        {
            Console.WriteLine($"Label: {label.Name}");
            Console.WriteLine($"Confidence: {label.Confidence}");
            Console.WriteLine($"Parent: {label.ParentName}");
        }
    }
    catch (Exception ex)
    {
        Console.WriteLine(ex.Message);
    }
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [DetectModerationLabels](#)。

DetectText

以下程式碼範例顯示如何使用 DetectText。

如需更多資訊，請參閱[偵測映像中的文字](#)。

適用於 .NET 的 SDK

 Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
using System;
using System.Threading.Tasks;
using Amazon.Rekognition;
using Amazon.Rekognition.Model;

/// <summary>
/// Uses the Amazon Rekognition Service to detect text in an image. The
/// example was created using the AWS SDK for .NET version 3.7 and .NET
/// Core 5.0.
/// </summary>
public class DetectText
{
    public static async Task Main()
    {
        string photo = "Dad_photographer.jpg"; // "input.jpg";
        string bucket = "amzn-s3-demo-bucket"; // "bucket";

        var rekognitionClient = new AmazonRekognitionClient();

        var detectTextRequest = new DetectTextRequest()
        {
            Image = new Image()
            {
                S3Object = new S3Object()
                {
                    Name = photo,
                    Bucket = bucket,
                },
            },
        };

        try
        {
```



```

        DetectTextResponse detectTextResponse = await
rekognitionClient.DetectTextAsync(detectTextRequest);
        Console.WriteLine($"Detected lines and words for {photo}");
        detectTextResponse.TextDetections.ForEach(text =>
        {
            Console.WriteLine($"Detected: {text.DetectedText}");
            Console.WriteLine($"Confidence: {text.Confidence}");
            Console.WriteLine($"Id : {text.Id}");
            Console.WriteLine($"Parent Id: {text.ParentId}");
            Console.WriteLine($"Type: {text.Type}");
        });
    }
    catch (Exception e)
    {
        Console.WriteLine(e.Message);
    }
}
}

```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [DetectText](#)。

GetCelebrityInfo

以下程式碼範例顯示如何使用 GetCelebrityInfo。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```

using System;
using System.Threading.Tasks;
using Amazon.Rekognition;
using Amazon.Rekognition.Model;

/// <summary>

```

```
/// Shows how to use Amazon Rekognition to retrieve information about the
/// celebrity identified by the supplied celebrity Id.
/// </summary>
public class CelebrityInfo
{
    public static async Task Main()
    {
        string celebId = "nnnnnnnn";

        var rekognitionClient = new AmazonRekognitionClient();

        var celebrityInfoRequest = new GetCelebrityInfoRequest
        {
            Id = celebId,
        };

        Console.WriteLine($"Getting information for celebrity: {celebId}");

        var celebrityInfoResponse = await
rekognitionClient.GetCelebrityInfoAsync(celebrityInfoRequest);

        // Display celebrity information.
        Console.WriteLine($"celebrity name: {celebrityInfoResponse.Name}");
        Console.WriteLine("Further information (if available):");
        celebrityInfoResponse.Urls.ForEach(url =>
        {
            Console.WriteLine(url);
        });
    }
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [GetCelebrityInfo](#)。

IndexFaces

以下程式碼範例顯示如何使用 IndexFaces。

如需詳細資訊，請參閱[將人臉新增至集合](#)。

適用於 .NET 的 SDK

 Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
using System;
using System.Collections.Generic;
using System.Threading.Tasks;
using Amazon.Rekognition;
using Amazon.Rekognition.Model;

/// <summary>
/// Uses the Amazon Rekognition Service to detect faces in an image
/// that has been uploaded to an Amazon Simple Storage Service (Amazon S3)
/// bucket and then adds the information to a collection.
/// </summary>
public class AddFaces
{
    public static async Task Main()
    {
        string collectionId = "MyCollection2";
        string bucket = "amzn-s3-demo-bucket";
        string photo = "input.jpg";

        var rekognitionClient = new AmazonRekognitionClient();

        var image = new Image
        {
            S3Object = new S3Object
            {
                Bucket = bucket,
                Name = photo,
            },
        };

        var indexFacesRequest = new IndexFacesRequest
        {
            Image = image,
            CollectionId = collectionId,
```

```

        ExternalImageId = photo,
        DetectionAttributes = new List<string>() { "ALL" },
    };

    IndexFacesResponse indexFacesResponse = await
    rekognitionClient.IndexFacesAsync(indexFacesRequest);

    Console.WriteLine($"{photo} added");
    foreach (FaceRecord faceRecord in indexFacesResponse.FaceRecords)
    {
        Console.WriteLine($"Face detected: Faceid is
        {faceRecord.Face.FaceId}");
    }
}

```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [IndexFaces](#)。

ListCollections

以下程式碼範例顯示如何使用 ListCollections。

如需詳細資訊，請參閱[列出的集合](#)。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```

using System;
using System.Threading.Tasks;
using Amazon.Rekognition;
using Amazon.Rekognition.Model;

/// <summary>
/// Uses Amazon Rekognition to list the collection IDs in the

```

```
/// current account.
/// </summary>
public class ListCollections
{
    public static async Task Main()
    {
        var rekognitionClient = new AmazonRekognitionClient();

        Console.WriteLine("Listing collections");
        int limit = 10;

        var listCollectionsRequest = new ListCollectionsRequest
        {
            MaxResults = limit,
        };

        var listCollectionsResponse = new ListCollectionsResponse();

        do
        {
            if (listCollectionsResponse is not null)
            {
                listCollectionsRequest.NextToken =
listCollectionsResponse.NextToken;
            }

            listCollectionsResponse = await
rekognitionClient.ListCollectionsAsync(listCollectionsRequest);

            listCollectionsResponse.CollectionIds.ForEach(id =>
            {
                Console.WriteLine(id);
            });
        } while (listCollectionsResponse.NextToken is not null);
    }
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [ListCollections](#)。

ListFaces

以下程式碼範例顯示如何使用 ListFaces。

如需更多資訊，請參閱[集合中列出的人臉](#)。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
using System;
using System.Threading.Tasks;
using Amazon.Rekognition;
using Amazon.Rekognition.Model;

/// <summary>
/// Uses the Amazon Rekognition Service to retrieve the list of faces
/// stored in a collection.
/// </summary>
public class ListFaces
{
    public static async Task Main()
    {
        string collectionId = "MyCollection2";

        var rekognitionClient = new AmazonRekognitionClient();

        var listFacesResponse = new ListFacesResponse();
        Console.WriteLine($"Faces in collection {collectionId}");

        var listFacesRequest = new ListFacesRequest
        {
            CollectionId = collectionId,
            MaxResults = 1,
        };

        do
        {
```

```
        listFacesResponse = await
    rekognitionClient.ListFacesAsync(listFacesRequest);
        listFacesResponse.Faces.ForEach(face =>
        {
            Console.WriteLine(face.FaceId);
        });

        listFacesRequest.NextToken = listFacesResponse.NextToken;
    }
    while (!string.IsNullOrEmpty(listFacesResponse.NextToken));
}
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [ListFaces](#)。

RecognizeCelebrities

以下程式碼範例顯示如何使用 RecognizeCelebrities。

如需詳細資訊，請參閱[在映像中辨識名人](#)。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
using System;
using System.IO;
using System.Threading.Tasks;
using Amazon.Rekognition;
using Amazon.Rekognition.Model;

/// <summary>
/// Shows how to use Amazon Rekognition to identify celebrities in a photo.
/// </summary>
public class CelebritiesInImage
{

```

```
public static async Task Main(string[] args)
{
    string photo = "moviestars.jpg";

    var rekognitionClient = new AmazonRekognitionClient();

    var recognizeCelebritiesRequest = new RecognizeCelebritiesRequest();

    var img = new Amazon.Rekognition.Model.Image();
    byte[] data = null;
    try
    {
        using var fs = new FileStream(photo, FileMode.Open,
FileAccess.Read);
        data = new byte[fs.Length];
        fs.Read(data, 0, (int)fs.Length);
    }
    catch (Exception)
    {
        Console.WriteLine($"Failed to load file {photo}");
        return;
    }

    img.Bytes = new MemoryStream(data);
    recognizeCelebritiesRequest.Image = img;

    Console.WriteLine($"Looking for celebrities in image {photo}\n");

    var recognizeCelebritiesResponse = await
rekognitionClient.RecognizeCelebritiesAsync(recognizeCelebritiesRequest);

    Console.WriteLine($"{recognizeCelebritiesResponse.CelebrityFaces.Count}
celebrity(s) were recognized.\n");
    recognizeCelebritiesResponse.CelebrityFaces.ForEach(celeb =>
    {
        Console.WriteLine($"Celebrity recognized: {celeb.Name}");
        Console.WriteLine($"Celebrity ID: {celeb.Id}");
        BoundingBox boundingBox = celeb.Face.BoundingBox;
        Console.WriteLine($"position: {boundingBox.Left}
{boundingBox.Top}");
        Console.WriteLine("Further information (if available):");
        celeb.UrlsWithMetadata.ForEach(url =>
        {
            Console.WriteLine(url);
        });
    });
}
```



```
        });  
    });  
  
    Console.WriteLine($"{recognizeCelebritiesResponse.UnrecognizedFaces.Count} face(s)  
were unrecognized.");  
    }  
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [RecognizeCelebrities](#)。

SearchFaces

以下程式碼範例顯示如何使用 SearchFaces。

如需詳細資訊，請參閱[搜尋人臉 \(臉部 ID\)](#)。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
using System;  
using System.Threading.Tasks;  
using Amazon.Rekognition;  
using Amazon.Rekognition.Model;  
  
/// <summary>  
/// Uses the Amazon Rekognition Service to find faces in an image that  
/// match the face Id provided in the method request.  
/// </summary>  
public class SearchFacesMatchingId  
{  
    public static async Task Main()  
    {
```

```
string collectionId = "MyCollection";
string faceId = "xxxxxxxx-xxxx-xxxx-xxxx-xxxxxxxxxxxxxx";

var rekognitionClient = new AmazonRekognitionClient();

// Search collection for faces matching the face id.
var searchFacesRequest = new SearchFacesRequest
{
    CollectionId = collectionId,
    FaceId = faceId,
    FaceMatchThreshold = 70F,
    MaxFaces = 2,
};

SearchFacesResponse searchFacesResponse = await
rekognitionClient.SearchFacesAsync(searchFacesRequest);

Console.WriteLine("Face matching faceId " + faceId);

Console.WriteLine("Matche(s): ");
searchFacesResponse.FaceMatches.ForEach(face =>
{
    Console.WriteLine($"FaceId: {face.Face.FaceId} Similarity:
{face.Similarity}");
});
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [SearchFaces](#)。

SearchFacesByImage

以下程式碼範例顯示如何使用 SearchFacesByImage。

如需詳細資訊，請參閱[搜尋人臉 \(映像\)](#)。

適用於 .NET 的 SDK

 Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
using System;
using System.Threading.Tasks;
using Amazon.Rekognition;
using Amazon.Rekognition.Model;

/// <summary>
/// Uses the Amazon Rekognition Service to search for images matching those
/// in a collection.
/// </summary>
public class SearchFacesMatchingImage
{
    public static async Task Main()
    {
        string collectionId = "MyCollection";
        string bucket = "amzn-s3-demo-bucket";
        string photo = "input.jpg";

        var rekognitionClient = new AmazonRekognitionClient();

        // Get an image object from S3 bucket.
        var image = new Image()
        {
            S3Object = new S3Object()
            {
                Bucket = bucket,
                Name = photo,
            },
        };

        var searchFacesByImageRequest = new SearchFacesByImageRequest()
        {
            CollectionId = collectionId,
            Image = image,
            FaceMatchThreshold = 70F,
        };
    }
}
```

```
        MaxFaces = 2,
    };

    SearchFacesByImageResponse searchFacesByImageResponse = await
    rekognitionClient.SearchFacesByImageAsync(searchFacesByImageRequest);

    Console.WriteLine("Faces matching largest face in image from " + photo);
    searchFacesByImageResponse.FaceMatches.ForEach(face =>
    {
        Console.WriteLine($"FaceId: {face.Face.FaceId}, Similarity:
    {face.Similarity}");
    });
    }
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [SearchFacesByImage](#)。

案例

建立無伺服器應用程式來管理相片

下列程式碼範例示範如何建立無伺服器應用程式，讓使用者以標籤管理相片。

適用於 .NET 的 SDK

顯示如何開發照片資產管理應用程式，以便使用 Amazon Rekognition 偵測圖片中的標籤，並將其儲存以供日後擷取。

如需完整的原始碼和如何設定及執行的指示，請參閱 [GitHub](#) 上的完整範例。

如要深入探索此範例的來源，請參閱 [AWS 社群](#) 上的文章。

此範例中使用的服務

- API Gateway
- DynamoDB
- Lambda
- Amazon Rekognition

- Amazon S3
- Amazon SNS

偵測映像中的物件

下列程式碼範例示範如何建置應用程式，該應用程式可使用 Amazon Rekognition 依影像中的類別偵測物件。

適用於 .NET 的 SDK

說明如何使用 Amazon Rekognition .NET API 建立應用程式，該應用程式可使用 Amazon Rekognition 對 Amazon Simple Storage Service (Amazon S3) 儲存貯體中的映像按類別識別物件。此應用程式可使用 Amazon Simple Email Service (Amazon SES) 向管理員傳送包含結果的電子郵件通知。

如需完整的原始碼和如何設定及執行的指示，請參閱 [GitHub](#) 上的完整範例。

此範例中使用的服務

- Amazon Rekognition
- Amazon S3
- Amazon SES

使用的 Route 53 網域註冊範例 適用於 .NET 的 SDK

下列程式碼範例示範如何使用 適用於 .NET 的 AWS SDK 具有 Route 53 網域註冊的 來執行動作和實作常見案例。

基本概念是程式碼範例，這些範例說明如何在服務內執行基本操作。

Actions 是大型程式的程式碼摘錄，必須在內容中執行。雖然動作會告訴您如何呼叫個別服務函數，但您可以在其相關情境中查看內容中的動作。

每個範例均包含完整原始碼的連結，您可在連結中找到如何設定和執行內容中程式碼的相關指示。

主題

- [開始使用](#)
- [基本概念](#)

- [動作](#)

開始使用

Hello Route 53 網域註冊

下列程式碼範例說明如何開始使用 Route 53 網域註冊。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
public static class HelloRoute53Domains
{
    static async Task Main(string[] args)
    {
        // Use the AWS .NET Core Setup package to set up dependency injection for
        the Amazon Route 53 domain registration service.
        // Use your AWS profile name, or leave it blank to use the default profile.
        using var host = Host.CreateDefaultBuilder(args)
            .ConfigureServices((_, services) =>
                services.AddAWSService<IAmazonRoute53Domains>()
            ).Build();

        // Now the client is available for injection.
        var route53Client =
            host.Services.GetRequiredService<IAmazonRoute53Domains>();

        // You can use await and any of the async methods to get a response.
        var response = await route53Client.ListPricesAsync(new ListPricesRequest
        { Tld = "com" });
        Console.WriteLine($"Hello Amazon Route 53 Domains! Following are prices
        for .com domain operations:");
        var comPrices = response.Prices.FirstOrDefault();
        if (comPrices != null)
        {
```

```
        Console.WriteLine($"\\tRegistration: {comPrices.RegistrationPrice?.Price}
{comPrices.RegistrationPrice?.Currency}");
        Console.WriteLine($"\\tRenewal: {comPrices.RenewalPrice?.Price}
{comPrices.RenewalPrice?.Currency}");
    }
}
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [ListPrices](#)。

基本概念

了解基本概念

以下程式碼範例顯示做法：

- 列出目前網域和過去一年的操作。
- 檢視過去一年的帳單和網域類型對應的價格。
- 取得網域建議。
- 檢查網域的可用性和可轉移性。
- 或者，要求網域註冊。
- 取得操作詳細資訊。
- 或者，取得網域詳細資訊。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

在命令提示中執行互動式案例。

```
public static class Route53DomainScenario
{
```

```

/*
    Before running this .NET code example, set up your development environment,
    including your credentials.

    This .NET example performs the following tasks:
    1. List current domains.
    2. List operations in the past year.
    3. View billing for the account in the past year.
    4. View prices for domain types.
    5. Get domain suggestions.
    6. Check domain availability.
    7. Check domain transferability.
    8. Optionally, request a domain registration.
    9. Get an operation detail.
    10. Optionally, get a domain detail.
*/

private static Route53Wrapper _route53Wrapper = null!;
private static IConfiguration _configuration = null!;

static async Task Main(string[] args)
{
    // Set up dependency injection for the Amazon service.
    using var host = Host.CreateDefaultBuilder(args)
        .ConfigureLogging(logging =>
            logging.AddFilter("System", LogLevel.Debug)
                .AddFilter<DebugLoggerProvider>("Microsoft",
LogLevel.Information)
                .AddFilter<ConsoleLoggerProvider>("Microsoft", LogLevel.Trace))
        .ConfigureServices((_, services) =>
            services.AddAWSService<IAmazonRoute53Domains>()
                .AddTransient<Route53Wrapper>()
        )
        .Build();

    _configuration = new ConfigurationBuilder()
        .SetBasePath(Directory.GetCurrentDirectory())
        .AddJsonFile("settings.json") // Load settings from .json file.
        .AddJsonFile("settings.local.json",
            true) // Optionally, load local settings.
        .Build();

    var logger = LoggerFactory.Create(builder =>
    {

```



```

        builder.AddConsole();
    }).CreateLogger(typeof(Route53DomainScenario));

    _route53Wrapper = host.Services.GetRequiredService<Route53Wrapper>();

    Console.WriteLine(new string('-', 80));
    Console.WriteLine("Welcome to the Amazon Route 53 domains example
scenario.");
    Console.WriteLine(new string('-', 80));

    try
    {
        await ListDomains();
        await ListOperations();
        await ListBillingRecords();
        await ListPrices();
        await ListDomainSuggestions();
        await CheckDomainAvailability();
        await CheckDomainTransferability();
        var operationId = await RequestDomainRegistration();
        await GetOperationalDetail(operationId);
        await GetDomainDetails();
    }
    catch (Exception ex)
    {
        logger.LogError(ex, "There was a problem executing the scenario.");
    }

    Console.WriteLine(new string('-', 80));
    Console.WriteLine("The Amazon Route 53 domains example scenario is
complete.");
    Console.WriteLine(new string('-', 80));
}

/// <summary>
/// List account registered domains.
/// </summary>
/// <returns>Async task.</returns>
private static async Task ListDomains()
{
    Console.WriteLine(new string('-', 80));
    Console.WriteLine($"1. List account domains.");
    var domains = await _route53Wrapper.ListDomains();
    for (int i = 0; i < domains.Count; i++)

```

```
{
    Console.WriteLine($"\\t{i + 1}. {domains[i].DomainName}");
}

if (!domains.Any())
{
    Console.WriteLine("\\tNo domains found in this account.");
}

Console.WriteLine(new string('-', 80));
}

/// <summary>
/// List domain operations in the past year.
/// </summary>
/// <returns>Async task.</returns>
private static async Task ListOperations()
{
    Console.WriteLine(new string('-', 80));
    Console.WriteLine($"2. List account domain operations in the past year.");
    var operations = await _route53Wrapper.ListOperations(
        DateTime.Today.AddYears(-1));
    for (int i = 0; i < operations.Count; i++)
    {
        Console.WriteLine($"\\tOperation Id: {operations[i].OperationId}");
        Console.WriteLine($"\\tStatus: {operations[i].Status}");
        Console.WriteLine($"\\tDate: {operations[i].SubmittedDate}");
    }
    Console.WriteLine(new string('-', 80));
}

/// <summary>
/// List billing in the past year.
/// </summary>
/// <returns>Async task.</returns>
private static async Task ListBillingRecords()
{
    Console.WriteLine(new string('-', 80));
    Console.WriteLine($"3. View billing for the account in the past year.");
    var billingRecords = await _route53Wrapper.ViewBilling(
        DateTime.Today.AddYears(-1),
        DateTime.Today);
    for (int i = 0; i < billingRecords.Count; i++)
    {
```

```

        Console.WriteLine($"\\tBill Date:
{billingRecords[i].BillDate.ToShortDateString()}");
        Console.WriteLine($"\\tOperation: {billingRecords[i].Operation}");
        Console.WriteLine($"\\tPrice: {billingRecords[i].Price}");
    }
    if (!billingRecords.Any())
    {
        Console.WriteLine("\\tNo billing records found in this account for the
past year.");
    }
    Console.WriteLine(new string('-', 80));
}

/// <summary>
/// List prices for a few domain types.
/// </summary>
/// <returns>Async task.</returns>
private static async Task ListPrices()
{
    Console.WriteLine(new string('-', 80));
    Console.WriteLine($"4. View prices for domain types.");
    var domainTypes = new List<string> { "net", "com", "org", "co" };

    var prices = await _route53Wrapper.ListPrices(domainTypes);
    foreach (var pr in prices)
    {
        Console.WriteLine($"\\tName: {pr.Name}");
        Console.WriteLine($"\\tRegistration: {pr.RegistrationPrice?.Price}
{pr.RegistrationPrice?.Currency}");
        Console.WriteLine($"\\tRenewal: {pr.RenewalPrice?.Price}
{pr.RenewalPrice?.Currency}");
        Console.WriteLine($"\\tTransfer: {pr.TransferPrice?.Price}
{pr.TransferPrice?.Currency}");
        Console.WriteLine($"\\tChange Ownership: {pr.ChangeOwnershipPrice?.Price}
{pr.ChangeOwnershipPrice?.Currency}");
        Console.WriteLine($"\\tRestoration: {pr.RestorationPrice?.Price}
{pr.RestorationPrice?.Currency}");
        Console.WriteLine();
    }
    Console.WriteLine(new string('-', 80));
}

/// <summary>
/// List domain suggestions for a domain name.

```

```

    /// </summary>
    /// <returns>Async task.</returns>
    private static async Task ListDomainSuggestions()
    {
        Console.WriteLine(new string('-', 80));
        Console.WriteLine($"5. Get domain suggestions.");
        string? domainName = null;
        while (domainName == null || string.IsNullOrEmpty(domainName))
        {
            Console.WriteLine($"Enter a domain name to get available domain
suggestions.");
            domainName = Console.ReadLine();
        }

        var suggestions = await _route53Wrapper.GetDomainSuggestions(domainName,
true, 5);
        foreach (var suggestion in suggestions)
        {
            Console.WriteLine($"    \tSuggestion Name: {suggestion.DomainName}");
            Console.WriteLine($"    \tAvailability: {suggestion.Availability}");
        }
        Console.WriteLine(new string('-', 80));
    }

    /// <summary>
    /// Check availability for a domain name.
    /// </summary>
    /// <returns>Async task.</returns>
    private static async Task CheckDomainAvailability()
    {
        Console.WriteLine(new string('-', 80));
        Console.WriteLine($"6. Check domain availability.");
        string? domainName = null;
        while (domainName == null || string.IsNullOrEmpty(domainName))
        {
            Console.WriteLine($"Enter a domain name to check domain availability.");
            domainName = Console.ReadLine();
        }

        var availability = await
_route53Wrapper.CheckDomainAvailability(domainName);
        Console.WriteLine($"    \tAvailability: {availability}");
        Console.WriteLine(new string('-', 80));
    }

```

```

    /// <summary>
    /// Check transferability for a domain name.
    /// </summary>
    /// <returns>Async task.</returns>
    private static async Task CheckDomainTransferability()
    {
        Console.WriteLine(new string('-', 80));
        Console.WriteLine($"7. Check domain transferability.");
        string? domainName = null;
        while (domainName == null || string.IsNullOrEmpty(domainName))
        {
            Console.WriteLine($"Enter a domain name to check domain
transferability.");
            domainName = Console.ReadLine();
        }

        var transferability = await
_route53Wrapper.CheckDomainTransferability(domainName);
        Console.WriteLine($"\\tTransferability: {transferability}");

        Console.WriteLine(new string('-', 80));
    }

    /// <summary>
    /// Check transferability for a domain name.
    /// </summary>
    /// <returns>Async task.</returns>
    private static async Task<string?> RequestDomainRegistration()
    {
        Console.WriteLine(new string('-', 80));
        Console.WriteLine($"8. Optionally, request a domain registration.");

        Console.WriteLine($"\\tNote: This example uses domain request settings in
settings.json.");
        Console.WriteLine($"\\tTo change the domain registration settings, set the
values in that file.");
        Console.WriteLine($"\\tRemember, registering an actual domain will incur an
account billing cost.");
        Console.WriteLine($"\\tWould you like to begin a domain registration? (y/
n)");
        var ynResponse = Console.ReadLine();
        if (ynResponse != null && ynResponse.Equals("y",
StringComparison.InvariantCultureIgnoreCase))

```

```

    {
        string domainName = _configuration["DomainName"];
        ContactDetail contact = new ContactDetail();
        contact.CountryCode =
CountryCode.FindValue(_configuration["Contact:CountryCode"]);
        contact.ContactType =
ContactType.FindValue(_configuration["Contact:ContactType"]);

        _configuration.GetSection("Contact").Bind(contact);

        var operationId = await _route53Wrapper.RegisterDomain(
            domainName,
            Convert.ToBoolean(_configuration["AutoRenew"]),
            Convert.ToInt32(_configuration["DurationInYears"]),
            contact);
        if (operationId != null)
        {
            Console.WriteLine(
                $"{Environment.NewLine}Registration requested. Operation Id: {operationId}");
        }

        return operationId;
    }

    Console.WriteLine(new string('-', 80));
    return null;
}

/// <summary>
/// Get details for an operation.
/// </summary>
/// <returns>Async task.</returns>
private static async Task GetOperationalDetail(string? operationId)
{
    Console.WriteLine(new string('-', 80));
    Console.WriteLine($"9. Get an operation detail.");

    var operationDetails =
        await _route53Wrapper.GetOperationDetail(operationId);

    Console.WriteLine(operationDetails);

    Console.WriteLine(new string('-', 80));
}

```

```

    /// <summary>
    /// Optionally, get details for a registered domain.
    /// </summary>
    /// <returns>Async task.</returns>
    private static async Task<string?> GetDomainDetails()
    {
        Console.WriteLine(new string('-', 80));
        Console.WriteLine($"10. Get details on a domain.");

        Console.WriteLine($"\\tNote: you must have a registered domain to get
details.");
        Console.WriteLine($"\\tWould you like to get domain details? (y/n)");
        var ynResponse = Console.ReadLine();
        if (ynResponse != null && ynResponse.Equals("y",
StringComparison.InvariantCultureIgnoreCase))
        {
            string? domainName = null;
            while (domainName == null)
            {
                Console.WriteLine($"\\tEnter a domain name to get details.");
                domainName = Console.ReadLine();
            }

            var domainDetails = await _route53Wrapper.GetDomainDetail(domainName);
            Console.WriteLine(domainDetails);
        }

        Console.WriteLine(new string('-', 80));
        return null;
    }
}

```

Route 53 網域註冊動作案例使用的包裝函式方式。

```

public class Route53Wrapper
{
    private readonly IAmazonRoute53Domains _amazonRoute53Domains;
    private readonly ILogger<Route53Wrapper> _logger;
    public Route53Wrapper(IAmazonRoute53Domains amazonRoute53Domains,
        ILogger<Route53Wrapper> logger)

```

```
{
    _amazonRoute53Domains = amazonRoute53Domains;
    _logger = logger;
}

/// <summary>
/// List prices for domain type operations.
/// </summary>
/// <param name="domainTypes">Domain types to include in the results.</param>
/// <returns>The list of domain prices.</returns>
public async Task<List<DomainPrice>> ListPrices(List<string> domainTypes)
{
    var results = new List<DomainPrice>();
    var paginatePrices = _amazonRoute53Domains.Paginators.ListPrices(new
ListPricesRequest());
    // Get the entire list using the paginator.
    await foreach (var prices in paginatePrices.Prices)
    {
        results.Add(prices);
    }
    return results.Where(p => domainTypes.Contains(p.Name)).ToList();
}

/// <summary>
/// Check the availability of a domain name.
/// </summary>
/// <param name="domain">The domain to check for availability.</param>
/// <returns>An availability result string.</returns>
public async Task<string> CheckDomainAvailability(string domain)
{
    var result = await _amazonRoute53Domains.CheckDomainAvailabilityAsync(
        new CheckDomainAvailabilityRequest
        {
            DomainName = domain
        }
    );
    return result.Availability.Value;
}

/// <summary>
/// Check the transferability of a domain name.
```



```

    /// </summary>
    /// <param name="domain">The domain to check for transferability.</param>
    /// <returns>A transferability result string.</returns>
    public async Task<string> CheckDomainTransferability(string domain)
    {
        var result = await _amazonRoute53Domains.CheckDomainTransferabilityAsync(
            new CheckDomainTransferabilityRequest
            {
                DomainName = domain
            }
        );
        return result.Transferability.Transferable.Value;
    }

    /// <summary>
    /// Get a list of suggestions for a given domain.
    /// </summary>
    /// <param name="domain">The domain to check for suggestions.</param>
    /// <param name="onlyAvailable">If true, only returns available domains.</param>
    /// <param name="suggestionCount">The number of suggestions to return. Defaults
    to the max of 50.</param>
    /// <returns>A collection of domain suggestions.</returns>
    public async Task<List<DomainSuggestion>> GetDomainSuggestions(string domain,
        bool onlyAvailable, int suggestionCount = 50)
    {
        var result = await _amazonRoute53Domains.GetDomainSuggestionsAsync(
            new GetDomainSuggestionsRequest
            {
                DomainName = domain,
                OnlyAvailable = onlyAvailable,
                SuggestionCount = suggestionCount
            }
        );
        return result.SuggestionsList;
    }

    /// <summary>
    /// Get details for a domain action operation.
    /// </summary>
    /// <param name="operationId">The operational Id.</param>
    /// <returns>A string describing the operational details.</returns>
    public async Task<string> GetOperationDetail(string? operationId)

```

```

    {
        if (operationId == null)
            return "Unable to get operational details because ID is null.";
        try
        {
            var operationDetails =
                await _amazonRoute53Domains.GetOperationDetailAsync(
                    new GetOperationDetailRequest
                    {
                        OperationId = operationId
                    }
                );

            var details = $"\\tOperation {operationId}:\\n" +
                $"\\tFor domain {operationDetails.DomainName} on"
{operationDetails.SubmittedDate.ToShortDateString()}.\\n" +
                $"\\tMessage is {operationDetails.Message}.\\n" +
                $"\\tStatus is {operationDetails.Status}.\\n";

            return details;
        }
        catch (AmazonRoute53DomainsException ex)
        {
            return $"Unable to get operation details. Here's why: {ex.Message}.";
        }
    }

    /// <summary>
    /// Initiate a domain registration request.
    /// </summary>
    /// <param name="contact">Contact details.</param>
    /// <param name="domainName">The domain name to register.</param>
    /// <param name="autoRenew">True if the domain should automatically renew.</
param>
    /// <param name="duration">The duration in years for the domain registration.</
param>
    /// <returns>The operation Id.</returns>
    public async Task<string?> RegisterDomain(string domainName, bool autoRenew, int
duration, ContactDetail contact)
    {
        // This example uses the same contact information for admin, registrant, and
tech contacts.
        try

```

```

    {
        var result = await _amazonRoute53Domains.RegisterDomainAsync(
            new RegisterDomainRequest()
            {
                AdminContact = contact,
                RegistrantContact = contact,
                TechContact = contact,
                DomainName = domainName,
                AutoRenew = autoRenew,
                DurationInYears = duration,
                PrivacyProtectAdminContact = false,
                PrivacyProtectRegistrantContact = false,
                PrivacyProtectTechContact = false
            }
        );
        return result.OperationId;
    }
    catch (InvalidInputException)
    {
        _logger.LogInformation($"Unable to request registration for domain
{domainName}");
        return null;
    }
}

/// <summary>
/// View billing records for the account between a start and end date.
/// </summary>
/// <param name="startDate">The start date for billing results.</param>
/// <param name="endDate">The end date for billing results.</param>
/// <returns>A collection of billing records.</returns>
public async Task<List<BillingRecord>> ViewBilling(DateTime startDate, DateTime
endDate)
{
    var results = new List<BillingRecord>();
    var paginateBilling = _amazonRoute53Domains.Paginators.ViewBilling(
        new ViewBillingRequest()
        {
            Start = startDate,
            End = endDate
        });

    // Get the entire list using the paginator.

```

```
        await foreach (var billingRecords in paginateBilling.BillingRecords)
        {
            results.Add(billingRecords);
        }
        return results;
    }

    /// <summary>
    /// List the domains for the account.
    /// </summary>
    /// <returns>A collection of domain summary records.</returns>
    public async Task<List<DomainSummary>> ListDomains()
    {
        var results = new List<DomainSummary>();
        var paginateDomains = _amazonRoute53Domains.Paginators.ListDomains(
            new ListDomainsRequest());

        // Get the entire list using the paginator.
        await foreach (var domain in paginateDomains.Domains)
        {
            results.Add(domain);
        }
        return results;
    }

    /// <summary>
    /// List operations for the account that are submitted after a specified date.
    /// </summary>
    /// <returns>A collection of operation summary records.</returns>
    public async Task<List<OperationSummary>> ListOperations(DateTime
submittedSince)
    {
        var results = new List<OperationSummary>();
        var paginateOperations = _amazonRoute53Domains.Paginators.ListOperations(
            new ListOperationsRequest()
            {
                SubmittedSince = submittedSince
            });

        // Get the entire list using the paginator.
        await foreach (var operations in paginateOperations.Operations)
        {
```

```

        results.Add(operations);
    }
    return results;
}

/// <summary>
/// Get details for a domain.
/// </summary>
/// <returns>A string with detail information about the domain.</returns>
public async Task<string> GetDomainDetail(string domainName)
{
    try
    {
        var result = await _amazonRoute53Domains.GetDomainDetailAsync(
            new GetDomainDetailRequest()
            {
                DomainName = domainName
            });
        var details = $"\\tDomain {domainName}:\\n" +
            $"\\tCreated on {result.CreationDate.ToShortDateString()}.\\n" +
            $"\\tAdmin contact is {result.AdminContact.Email}.\\n" +
            $"\\tAuto-renew is {result.AutoRenew}.\\n";

        return details;
    }
    catch (InvalidInputException)
    {
        return $"Domain {domainName} was not found in your account.";
    }
}
}

```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的下列主題。

- [CheckDomainAvailability](#)
- [CheckDomainTransferability](#)
- [GetDomainDetail](#)
- [GetDomainSuggestions](#)
- [GetOperationDetail](#)

- [ListDomains](#)
- [ListOperations](#)
- [ListPrices](#)
- [RegisterDomain](#)
- [ViewBilling](#)

動作

CheckDomainAvailability

以下程式碼範例顯示如何使用 CheckDomainAvailability。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Check the availability of a domain name.
/// </summary>
/// <param name="domain">The domain to check for availability.</param>
/// <returns>An availability result string.</returns>
public async Task<string> CheckDomainAvailability(string domain)
{
    var result = await _amazonRoute53Domains.CheckDomainAvailabilityAsync(
        new CheckDomainAvailabilityRequest
        {
            DomainName = domain
        }
    );
    return result.Availability.Value;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [CheckDomainAvailability](#)。

CheckDomainTransferability

以下程式碼範例顯示如何使用 CheckDomainTransferability。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Check the transferability of a domain name.
/// </summary>
/// <param name="domain">The domain to check for transferability.</param>
/// <returns>A transferability result string.</returns>
public async Task<string> CheckDomainTransferability(string domain)
{
    var result = await _amazonRoute53Domains.CheckDomainTransferabilityAsync(
        new CheckDomainTransferabilityRequest
        {
            DomainName = domain
        }
    );
    return result.Transferability.Transferable.Value;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [CheckDomainTransferability](#)。

GetDomainDetail

以下程式碼範例顯示如何使用 GetDomainDetail。

適用於 .NET 的 SDK

 Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Get details for a domain.
/// </summary>
/// <returns>A string with detail information about the domain.</returns>
public async Task<string> GetDomainDetail(string domainName)
{
    try
    {
        var result = await _amazonRoute53Domains.GetDomainDetailAsync(
            new GetDomainDetailRequest()
            {
                DomainName = domainName
            });
        var details = $"\\tDomain {domainName}:\\n" +
            $"\\tCreated on {result.CreationDate.ToShortDateString()}.\\n" +
            $"\\tAdmin contact is {result.AdminContact.Email}.\\n" +
            $"\\tAuto-renew is {result.AutoRenew}.\\n";

        return details;
    }
    catch (InvalidInputException)
    {
        return $"Domain {domainName} was not found in your account.";
    }
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [GetDomainDetail](#)。

GetDomainSuggestions

以下程式碼範例顯示如何使用 GetDomainSuggestions。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Get a list of suggestions for a given domain.
/// </summary>
/// <param name="domain">The domain to check for suggestions.</param>
/// <param name="onlyAvailable">If true, only returns available domains.</param>
/// <param name="suggestionCount">The number of suggestions to return. Defaults
to the max of 50.</param>
/// <returns>A collection of domain suggestions.</returns>
public async Task<List<DomainSuggestion>> GetDomainSuggestions(string domain,
bool onlyAvailable, int suggestionCount = 50)
{
    var result = await _amazonRoute53Domains.GetDomainSuggestionsAsync(
        new GetDomainSuggestionsRequest
        {
            DomainName = domain,
            OnlyAvailable = onlyAvailable,
            SuggestionCount = suggestionCount
        }
    );
    return result.SuggestionsList;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [GetDomainSuggestions](#)。

GetOperationDetail

以下程式碼範例顯示如何使用 GetOperationDetail。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Get details for a domain action operation.
/// </summary>
/// <param name="operationId">The operational Id.</param>
/// <returns>A string describing the operational details.</returns>
public async Task<string> GetOperationDetail(string? operationId)
{
    if (operationId == null)
        return "Unable to get operational details because ID is null.";
    try
    {
        var operationDetails =
            await _amazonRoute53Domains.GetOperationDetailAsync(
                new GetOperationDetailRequest
                {
                    OperationId = operationId
                }
            );

        var details = $"\\tOperation {operationId}:\\n" +
            $"\\tFor domain {operationDetails.DomainName} on
{operationDetails.SubmittedDate.ToShortDateString()}\\n" +
            $"\\tMessage is {operationDetails.Message}\\n" +
            $"\\tStatus is {operationDetails.Status}\\n";

        return details;
    }
    catch (AmazonRoute53DomainsException ex)
    {
        return $"Unable to get operation details. Here's why: {ex.Message}.";
    }
}
```

```
}  
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [GetOperationDetail](#)。

ListDomains

以下程式碼範例顯示如何使用 ListDomains。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>  
/// List the domains for the account.  
/// </summary>  
/// <returns>A collection of domain summary records.</returns>  
public async Task<List<DomainSummary>> ListDomains()  
{  
    var results = new List<DomainSummary>();  
    var paginateDomains = _amazonRoute53Domains.Paginators.ListDomains(  
        new ListDomainsRequest());  
  
    // Get the entire list using the paginator.  
    await foreach (var domain in paginateDomains.Domains)  
    {  
        results.Add(domain);  
    }  
    return results;  
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [ListDomains](#)。

ListOperations

以下程式碼範例顯示如何使用 ListOperations。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// List operations for the account that are submitted after a specified date.
/// </summary>
/// <returns>A collection of operation summary records.</returns>
public async Task<List<OperationSummary>> ListOperations(DateTime
submittedSince)
{
    var results = new List<OperationSummary>();
    var paginateOperations = _amazonRoute53Domains.Paginators.ListOperations(
        new ListOperationsRequest()
        {
            SubmittedSince = submittedSince
        });

    // Get the entire list using the paginator.
    await foreach (var operations in paginateOperations.Operations)
    {
        results.Add(operations);
    }
    return results;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》<https://docs.aws.amazon.com/goto/DotNetSDKV3/route53domains-2014-05-15/ListOperations> 中的 ListOperations。

ListPrices

以下程式碼範例顯示如何使用 ListPrices。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// List prices for domain type operations.
/// </summary>
/// <param name="domainTypes">Domain types to include in the results.</param>
/// <returns>The list of domain prices.</returns>
public async Task<List<DomainPrice>> ListPrices(List<string> domainTypes)
{
    var results = new List<DomainPrice>();
    var paginatePrices = _amazonRoute53Domains.Paginators.ListPrices(new
ListPricesRequest());
    // Get the entire list using the paginator.
    await foreach (var prices in paginatePrices.Prices)
    {
        results.Add(prices);
    }
    return results.Where(p => domainTypes.Contains(p.Name)).ToList();
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [ListPrices](#)。

RegisterDomain

以下程式碼範例顯示如何使用 RegisterDomain。

適用於 .NET 的 SDK

 Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Initiate a domain registration request.
/// </summary>
/// <param name="contact">Contact details.</param>
/// <param name="domainName">The domain name to register.</param>
/// <param name="autoRenew">True if the domain should automatically renew.</
param>
/// <param name="duration">The duration in years for the domain registration.</
param>
/// <returns>The operation Id.</returns>
public async Task<string?> RegisterDomain(string domainName, bool autoRenew, int
duration, ContactDetail contact)
{
    // This example uses the same contact information for admin, registrant, and
    tech contacts.
    try
    {
        var result = await _amazonRoute53Domains.RegisterDomainAsync(
            new RegisterDomainRequest()
            {
                AdminContact = contact,
                RegistrantContact = contact,
                TechContact = contact,
                DomainName = domainName,
                AutoRenew = autoRenew,
                DurationInYears = duration,
                PrivacyProtectAdminContact = false,
                PrivacyProtectRegistrantContact = false,
                PrivacyProtectTechContact = false
            }
        );
        return result.OperationId;
    }
}
```

```
        catch (InvalidInputException)
        {
            _logger.LogInformation($"Unable to request registration for domain {domainName}");
            return null;
        }
    }
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [RegisterDomain](#)。

ViewBilling

以下程式碼範例顯示如何使用 ViewBilling。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// View billing records for the account between a start and end date.
/// </summary>
/// <param name="startDate">The start date for billing results.</param>
/// <param name="endDate">The end date for billing results.</param>
/// <returns>A collection of billing records.</returns>
public async Task<List<BillingRecord>> ViewBilling(DateTime startDate, DateTime
endDate)
{
    var results = new List<BillingRecord>();
    var paginateBilling = _amazonRoute53Domains.Paginators.ViewBilling(
        new ViewBillingRequest()
        {
            Start = startDate,
            End = endDate
        });

    // Get the entire list using the paginator.
```

```
await foreach (var billingRecords in paginateBilling.BillingRecords)
{
    results.Add(billingRecords);
}
return results;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [ViewBilling](#)。

使用的 Amazon S3 範例 適用於 .NET 的 SDK

下列程式碼範例示範如何使用 適用於 .NET 的 AWS SDK 搭配 Amazon S3 執行動作和實作常見案例。

Actions 是大型程式的程式碼摘錄，必須在內容中執行。雖然動作會告訴您如何呼叫個別服務函數，但您可以在其相關情境中查看內容中的動作。

案例是向您展示如何呼叫服務中的多個函數或與其他 AWS 服務組合來完成特定任務的程式碼範例。

每個範例均包含完整原始碼的連結，您可在連結中找到如何設定和執行內容中程式碼的相關指示。

主題

- [動作](#)
- [案例](#)
- [無伺服器範例](#)

動作

CopyObject

以下程式碼範例顯示如何使用 CopyObject。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

使用條件式請求複製物件。

```

    /// <summary>
    /// Copies an object from one Amazon S3 bucket to another with a conditional
    request.
    /// </summary>
    /// <param name="sourceKey">The key of the source object to copy.</param>
    /// <param name="destKey">The key of the destination object.</param>
    /// <param name="sourceBucket">The source bucket of the object.</param>
    /// <param name="destBucket">The destination bucket of the object.</param>
    /// <param name="conditionType">The type of condition to apply, e.g.
    'CopySourceIfMatch', 'CopySourceIfNoneMatch', 'CopySourceIfModifiedSince',
    'CopySourceIfUnmodifiedSince'.</param>
    /// <param name="conditionDateValue">The value to use for the condition for
    dates.</param>
    /// <param name="etagConditionalValue">The value to use for the condition for
    etags.</param>
    /// <returns>True if the conditional copy is successful, False otherwise.</
    returns>
    public async Task<bool> CopyObjectConditional(string sourceKey, string destKey,
        string sourceBucket, string destBucket,
        S3ConditionType conditionType, DateTime? conditionDateValue = null, string?
        etagConditionalValue = null)
    {
        try
        {
            var copyObjectRequest = new CopyObjectRequest
            {
                DestinationBucket = destBucket,
                DestinationKey = destKey,
                SourceBucket = sourceBucket,
                SourceKey = sourceKey
            };

            switch (conditionType)
            {
                case S3ConditionType.IfMatch:
                    copyObjectRequest.ETagToMatch = etagConditionalValue;
                    break;
                case S3ConditionType.IfNoneMatch:
                    copyObjectRequest.ETagToNotMatch = etagConditionalValue;
                    break;
                case S3ConditionType.IfModifiedSince:

```

```

        copyObjectRequest.ModifiedSinceDateUtc =
conditionDateValue.GetValueOrDefault();
        break;
        case S3ConditionType.IfUnmodifiedSince:
            copyObjectRequest.UnmodifiedSinceDateUtc =
conditionDateValue.GetValueOrDefault();
            break;
        default:
            throw new ArgumentOutOfRangeException(nameof(conditionType),
conditionType, null);
    }

    await _amazonS3.CopyObjectAsync(copyObjectRequest);
    _logger.LogInformation($"Conditional copy successful for key {destKey}
in bucket {destBucket}.");
    return true;
}
catch (AmazonS3Exception e)
{
    if (e.ErrorCode == "PreconditionFailed")
    {
        _logger.LogError("Conditional copy failed: Precondition failed");
    }
    else if (e.ErrorCode == "304")
    {
        _logger.LogError("Conditional copy failed: Object not modified");
    }
    else
    {
        _logger.LogError($"Unexpected error: {e.ErrorCode}");
        throw;
    }
    return false;
}
}

```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [CopyObject](#)。

CreateBucket

以下程式碼範例顯示如何使用 CreateBucket。

適用於 .NET 的 SDK

 Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

建立已啟用物件鎖定的儲存貯體。

```
/// <summary>
/// Create a new Amazon S3 bucket with object lock actions.
/// </summary>
/// <param name="bucketName">The name of the bucket to create.</param>
/// <param name="enableObjectLock">True to enable object lock on the bucket.</
param>
/// <returns>True if successful.</returns>
public async Task<bool> CreateBucketWithObjectLock(string bucketName, bool
enableObjectLock)
{
    Console.WriteLine($"\\tCreating bucket {bucketName} with object lock
{enableObjectLock}.");
    try
    {
        var request = new PutBucketRequest
        {
            BucketName = bucketName,
            UseClientRegion = true,
            ObjectLockEnabledForBucket = enableObjectLock,
        };

        var response = await _amazonS3.PutBucketAsync(request);

        return response.HttpStatusCode == System.Net.HttpStatusCode.OK;
    }
    catch (AmazonS3Exception ex)
    {
        Console.WriteLine($"Error creating bucket: '{ex.Message}'");
        return false;
    }
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [CreateBucket](#)。

DeleteBucketCors

以下程式碼範例顯示如何使用 DeleteBucketCors。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Deletes a CORS configuration from an Amazon S3 bucket.
/// </summary>
/// <param name="client">The initialized Amazon S3 client object used
/// to delete the CORS configuration from the bucket.</param>
private static async Task DeleteCORSConfigurationAsync(AmazonS3Client
client)
{
    DeleteCORSConfigurationRequest request = new
DeleteCORSConfigurationRequest()
    {
        BucketName = BucketName,
    };
    await client.DeleteCORSConfigurationAsync(request);
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [DeleteBucketCors](#)。

DeleteBucketLifecycle

以下程式碼範例顯示如何使用 DeleteBucketLifecycle。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// This method removes the Lifecycle configuration from the named
/// S3 bucket.
/// </summary>
/// <param name="client">The S3 client object used to call
/// the RemoveLifecycleConfigAsync method.</param>
/// <param name="bucketName">A string representing the name of the
/// S3 bucket from which the configuration will be removed.</param>
public static async Task RemoveLifecycleConfigAsync(IAmazonS3 client, string
bucketName)
{
    var request = new DeleteLifecycleConfigurationRequest()
    {
        BucketName = bucketName,
    };
    await client.DeleteLifecycleConfigurationAsync(request);
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [DeleteBucketLifecycle](#)。

DeleteObject

以下程式碼範例顯示如何使用 DeleteObject。

適用於 .NET 的 SDK

 Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

刪除未進行版本控制之 S3 儲存貯體中的物件。

```
using System;
using System.Threading.Tasks;
using Amazon.S3;
using Amazon.S3.Model;

/// <summary>
/// This example shows how to delete an object from a non-versioned Amazon
/// Simple Storage Service (Amazon S3) bucket.
/// </summary>
public class DeleteObject
{
    /// <summary>
    /// The Main method initializes the necessary variables and then calls
    /// the DeleteObjectNonVersionedBucketAsync method to delete the object
    /// named by the keyName parameter.
    /// </summary>
    public static async Task Main()
    {
        const string bucketName = "amzn-s3-demo-bucket";
        const string keyName = "testfile.txt";

        // If the Amazon S3 bucket is located in an AWS Region other than the
        // Region of the default account, define the AWS Region for the
        // Amazon S3 bucket in your call to the AmazonS3Client constructor.
        // For example RegionEndpoint.USWest2.
        IAmazonS3 client = new AmazonS3Client();
        await DeleteObjectNonVersionedBucketAsync(client, bucketName, keyName);
    }

    /// <summary>
    /// The DeleteObjectNonVersionedBucketAsync takes care of deleting the
    /// desired object from the named bucket.
    /// </summary>
}
```

```

    /// <param name="client">An initialized Amazon S3 client used to delete
    /// an object from an Amazon S3 bucket.</param>
    /// <param name="bucketName">The name of the bucket from which the
    /// object will be deleted.</param>
    /// <param name="keyName">The name of the object to delete.</param>
    public static async Task DeleteObjectNonVersionedBucketAsync(IAmazonS3
client, string bucketName, string keyName)
    {
        try
        {
            var deleteObjectRequest = new DeleteObjectRequest
            {
                BucketName = bucketName,
                Key = keyName,
            };

            Console.WriteLine($"Deleting object: {keyName}");
            await client.DeleteObjectAsync(deleteObjectRequest);
            Console.WriteLine($"Object: {keyName} deleted from {bucketName}.");
        }
        catch (AmazonS3Exception ex)
        {
            Console.WriteLine($"Error encountered on server.
Message: '{ex.Message}' when deleting an object.");
        }
    }
}

```

刪除已進行版本控制之 S3 儲存貯體中的物件。

```

using System;
using System.Threading.Tasks;
using Amazon.S3;
using Amazon.S3.Model;

/// <summary>
/// This example creates an object in an Amazon Simple Storage Service
/// (Amazon S3) bucket and then deletes the object version that was
/// created.
/// </summary>
public class DeleteObjectVersion

```

```

{
    public static async Task Main()
    {
        string bucketName = "amzn-s3-demo-bucket";
        string keyName = "verstioned-object.txt";

        // If the AWS Region of the default user is different from the AWS
        // Region of the Amazon S3 bucket, pass the AWS Region of the
        // bucket region to the Amazon S3 client object's constructor.
        // Define it like this:
        //      RegionEndpoint bucketRegion = RegionEndpoint.USSouth1;
        IAmazonS3 client = new AmazonS3Client();

        await CreateAndDeleteObjectVersionAsync(client, bucketName, keyName);
    }

    /// <summary>
    /// This method creates and then deletes a versioned object.
    /// </summary>
    /// <param name="client">The initialized Amazon S3 client object used to
    /// create and delete the object.</param>
    /// <param name="bucketName">The name of the Amazon S3 bucket where the
    /// object will be created and deleted.</param>
    /// <param name="keyName">The key name of the object to create.</param>
    public static async Task CreateAndDeleteObjectVersionAsync(IAmazonS3 client,
string bucketName, string keyName)
    {
        try
        {
            // Add a sample object.
            string versionID = await PutAnObject(client, bucketName, keyName);

            // Delete the object by specifying an object key and a version ID.
            DeleteObjectRequest request = new DeleteObjectRequest()
            {
                BucketName = bucketName,
                Key = keyName,
                VersionId = versionID,
            };

            Console.WriteLine("Deleting an object");
            await client.DeleteObjectAsync(request);
        }
        catch (AmazonS3Exception ex)
    }

```



```

        {
            Console.WriteLine($"Error: {ex.Message}");
        }
    }

    /// <summary>
    /// This method is used to create the temporary Amazon S3 object.
    /// </summary>
    /// <param name="client">The initialized Amazon S3 object which will be used
    /// to create the temporary Amazon S3 object.</param>
    /// <param name="bucketName">The name of the Amazon S3 bucket where the
object
    /// will be created.</param>
    /// <param name="objectKey">The name of the Amazon S3 object co create.</
param>
    /// <returns>The Version ID of the created object.</returns>
    public static async Task<string> PutAnObject(IAmazonS3 client, string
bucketName, string objectKey)
    {
        PutObjectRequest request = new PutObjectRequest()
        {
            BucketName = bucketName,
            Key = objectKey,
            ContentBody = "This is the content body!",
        };

        PutObjectResponse response = await client.PutObjectAsync(request);
        return response.VersionId;
    }
}

```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [DeleteObject](#)。

DeleteObjects

以下程式碼範例顯示如何使用 DeleteObjects。

適用於 .NET 的 SDK

 Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

刪除未進行版本控制之 S3 儲存貯體中的多個物件。

```
using System;
using System.Collections.Generic;
using System.Threading.Tasks;
using Amazon.S3;
using Amazon.S3.Model;

/// <summary>
/// This example shows how to delete multiple objects from an Amazon Simple
/// Storage Service (Amazon S3) bucket.
/// </summary>
public class DeleteMultipleObjects
{
    /// <summary>
    /// The Main method initializes the Amazon S3 client and the name of
    /// the bucket and then passes those values to MultiObjectDeleteAsync.
    /// </summary>
    public static async Task Main()
    {
        const string bucketName = "amzn-s3-demo-bucket";

        // If the Amazon S3 bucket from which you wish to delete objects is not
        // located in the same AWS Region as the default user, define the
        // AWS Region for the Amazon S3 bucket as a parameter to the client
        // constructor.
        IAmazonS3 s3Client = new AmazonS3Client();

        await MultiObjectDeleteAsync(s3Client, bucketName);
    }

    /// <summary>
    /// This method uses the passed Amazon S3 client to first create and then
    /// delete three files from the named bucket.
    /// </summary>
}
```

```

call
    /// <param name="client">The initialized Amazon S3 client object used to
    /// Amazon S3 methods.</param>
    /// <param name="bucketName">The name of the Amazon S3 bucket where objects
    /// will be created and then deleted.</param>
    public static async Task MultiObjectDeleteAsync(IAmazonS3 client, string
bucketName)
    {
        // Create three sample objects which we will then delete.
        var keysAndVersions = await PutObjectsAsync(client, 3, bucketName);

        // Now perform the multi-object delete, passing the key names and
        // version IDs. Since we are working with a non-versioned bucket,
        // the object keys collection includes null version IDs.
        DeleteObjectsRequest multiObjectDeleteRequest = new DeleteObjectsRequest
        {
            BucketName = bucketName,
            Objects = keysAndVersions,
        };

        // You can add a specific object key to the delete request using the
        // AddKey method of the multiObjectDeleteRequest.
        try
        {
            DeleteObjectsResponse response = await
client.DeleteObjectsAsync(multiObjectDeleteRequest);
            Console.WriteLine("Successfully deleted all the {0} items",
response.DeletedObjects.Count);
        }
        catch (DeleteObjectsException e)
        {
            PrintDeletionErrorStatus(e);
        }
    }

    /// <summary>
    /// Prints the list of errors raised by the call to DeleteObjectsAsync.
    /// </summary>
    /// <param name="ex">A collection of exceptions returned by the call to
    /// DeleteObjectsAsync.</param>
    public static void PrintDeletionErrorStatus(DeleteObjectsException ex)
    {
        DeleteObjectsResponse errorResponse = ex.Response;
        Console.WriteLine("x {0}", errorResponse.DeletedObjects.Count);
    }

```

```

        Console.WriteLine($"Successfully deleted
{errorResponse.DeletedObjects.Count}.");
        Console.WriteLine($"No. of objects failed to delete =
{errorResponse.DeleteErrors.Count}");

        Console.WriteLine("Printing error data...");
        foreach (DeleteError deleteError in errorResponse.DeleteErrors)
        {
            Console.WriteLine($"Object Key:
{deleteError.Key}\t{deleteError.Code}\t{deleteError.Message}");
        }
    }

    /// <summary>
    /// This method creates simple text file objects that can be used in
    /// the delete method.
    /// </summary>
    /// <param name="client">The Amazon S3 client used to call PutObjectAsync.</
param>
    /// <param name="number">The number of objects to create.</param>
    /// <param name="bucketName">The name of the bucket where the objects
    /// will be created.</param>
    /// <returns>A list of keys (object keys) and versions that the calling
    /// method will use to delete the newly created files.</returns>
    public static async Task<List<KeyVersion>> PutObjectsAsync(IAmazonS3 client,
int number, string bucketName)
    {
        List<KeyVersion> keys = new List<KeyVersion>();
        for (int i = 0; i < number; i++)
        {
            string key = "ExampleObject-" + new System.Random().Next();
            PutObjectRequest request = new PutObjectRequest
            {
                BucketName = bucketName,
                Key = key,
                ContentBody = "This is the content body!",
            };

            PutObjectResponse response = await client.PutObjectAsync(request);

            // For non-versioned bucket operations, we only need the
            // object key.
            KeyVersion keyVersion = new KeyVersion

```

```

        {
            Key = key,
        };
        keys.Add(keyVersion);
    }

    return keys;
}
}

```

刪除已進行版本控制之 S3 儲存貯體中的多個物件。

```

using System;
using System.Collections.Generic;
using System.Threading.Tasks;
using Amazon.S3;
using Amazon.S3.Model;

/// <summary>
/// This example shows how to delete objects in a version-enabled Amazon
/// Simple StorageService (Amazon S3) bucket.
/// </summary>
public class DeleteMultipleObjects
{
    public static async Task Main()
    {
        string bucketName = "amzn-s3-demo-bucket";

        // If the AWS Region for your Amazon S3 bucket is different from
        // the AWS Region of the default user, define the AWS Region for
        // the Amazon S3 bucket and pass it to the client constructor
        // like this:
        // RegionEndpoint bucketRegion = RegionEndpoint.USWest2;
        IAmazonS3 s3Client;

        s3Client = new AmazonS3Client();
        await DeleteMultipleObjectsFromVersionedBucketAsync(s3Client,
bucketName);
    }

    /// <summary>

```

```

    /// This method removes multiple versions and objects from a
    /// version-enabled Amazon S3 bucket.
    /// </summary>
    /// <param name="client">The initialized Amazon S3 client object used to
call
    /// DeleteObjectVersionsAsync, DeleteObjectsAsync, and
    /// RemoveDeleteMarkersAsync.</param>
    /// <param name="bucketName">The name of the bucket from which to delete
    /// objects.</param>
    public static async Task
DeleteMultipleObjectsFromVersionedBucketAsync(IAmazonS3 client, string bucketName)
    {
        // Delete objects (specifying object version in the request).
        await DeleteObjectVersionsAsync(client, bucketName);

        // Delete objects (without specifying object version in the request).
        var deletedObjects = await DeleteObjectsAsync(client, bucketName);

        // Additional exercise - remove the delete markers Amazon S3 returned
from
        // the preceding response. This results in the objects reappearing
        // in the bucket (you can verify the appearance/disappearance of
        // objects in the console).
        await RemoveDeleteMarkersAsync(client, bucketName, deletedObjects);
    }

    /// <summary>
    /// Creates and then deletes non-versioned Amazon S3 objects and then
deletes
    /// them again. The method returns a list of the Amazon S3 objects deleted.
    /// </summary>
    /// <param name="client">The initialized Amazon S3 client object used to
call
    /// PubObjectsAsync and NonVersionedDeleteAsync.</param>
    /// <param name="bucketName">The name of the bucket where the objects
    /// will be created and then deleted.</param>
    /// <returns>A list of DeletedObjects.</returns>
    public static async Task<List<DeletedObject>> DeleteObjectsAsync(IAmazonS3
client, string bucketName)
    {
        // Upload the sample objects.
        var keysAndVersions2 = await PutObjectsAsync(client, bucketName, 3);

        // Delete objects using only keys. Amazon S3 creates a delete marker and

```

```

        // returns its version ID in the response.
        List<DeletedObject> deletedObjects = await
NonVersionedDeleteAsync(client, bucketName, keysAndVersions2);
        return deletedObjects;
    }

    /// <summary>
    /// This method creates several temporary objects and then deletes them.
    /// </summary>
    /// <param name="client">The S3 client.</param>
    /// <param name="bucketName">Name of the bucket.</param>
    /// <returns>Async task.</returns>
    public static async Task DeleteObjectVersionsAsync(IAmazonS3 client, string
bucketName)
    {
        // Upload the sample objects.
        var keysAndVersions1 = await PutObjectsAsync(client, bucketName, 3);

        // Delete the specific object versions.
        await VersionedDeleteAsync(client, bucketName, keysAndVersions1);
    }

    /// <summary>
    /// Displays the list of information about deleted files to the console.
    /// </summary>
    /// <param name="e">Error information from the delete process.</param>
    private static void DisplayDeletionErrors(DeleteObjectsException e)
    {
        var errorResponse = e.Response;
        Console.WriteLine($"No. of objects successfully deleted =
{errorResponse.DeletedObjects.Count}");
        Console.WriteLine($"No. of objects failed to delete =
{errorResponse.DeleteErrors.Count}");
        Console.WriteLine("Printing error data...");
        foreach (var deleteError in errorResponse.DeleteErrors)
        {
            Console.WriteLine($"Object Key:
{deleteError.Key}\t{deleteError.Code}\t{deleteError.Message}");
        }
    }

    /// <summary>
    /// Delete multiple objects from a version-enabled bucket.
    /// </summary>

```

```

    /// <param name="client">The initialized Amazon S3 client object used to
call
    /// DeleteObjectVersionsAsync, DeleteObjectsAsync, and
    /// RemoveDeleteMarkersAsync.</param>
    /// <param name="bucketName">The name of the bucket from which to delete
    /// objects.</param>
    /// <param name="keys">A list of key names for the objects to delete.</
param>
    private static async Task VersionedDeleteAsync(IAmazonS3 client, string
bucketName, List<KeyVersion> keys)
    {
        var multiObjectDeleteRequest = new DeleteObjectsRequest
        {
            BucketName = bucketName,
            Objects = keys, // This includes the object keys and specific
version IDs.
        };

        try
        {
            Console.WriteLine("Executing VersionedDelete...");
            DeleteObjectsResponse response = await
client.DeleteObjectsAsync(multiObjectDeleteRequest);
            Console.WriteLine($"Successfully deleted all the
{response.DeletedObjects.Count} items");
        }
        catch (DeleteObjectsException ex)
        {
            DisplayDeletionErrors(ex);
        }
    }

    /// <summary>
    /// Deletes multiple objects from a non-versioned Amazon S3 bucket.
    /// </summary>
    /// <param name="client">The initialized Amazon S3 client object used to
call
    /// DeleteObjectVersionsAsync, DeleteObjectsAsync, and
    /// RemoveDeleteMarkersAsync.</param>
    /// <param name="bucketName">The name of the bucket from which to delete
    /// objects.</param>
    /// <param name="keys">A list of key names for the objects to delete.</
param>
    /// <returns>A list of the deleted objects.</returns>

```



```

        private static async Task<List<DeletedObject>>
NonVersionedDeleteAsync(IAmazonS3 client, string bucketName, List<KeyVersion> keys)
        {
            // Create a request that includes only the object key names.
            DeleteObjectsRequest multiObjectDeleteRequest = new
DeleteObjectsRequest();
            multiObjectDeleteRequest.BucketName = bucketName;

            foreach (var key in keys)
            {
                multiObjectDeleteRequest.AddKey(key.Key);
            }

            // Execute DeleteObjectsAsync.
            // The DeleteObjectsAsync method adds a delete marker for each
            // object deleted. You can verify that the objects were removed
            // using the Amazon S3 console.
            DeleteObjectsResponse response;
            try
            {
                Console.WriteLine("Executing NonVersionedDelete...");
                response = await
client.DeleteObjectsAsync(multiObjectDeleteRequest);
                Console.WriteLine("Successfully deleted all the {0} items",
response.DeletedObjects.Count);
            }
            catch (DeleteObjectsException ex)
            {
                DisplayDeletionErrors(ex);
                throw; // Some deletions failed. Investigate before continuing.
            }

            // This response contains the DeletedObjects list which we use to delete
            the delete markers.
            return response.DeletedObjects;
        }

        /// <summary>
        /// Deletes the markers left after deleting the temporary objects.
        /// </summary>
        /// <param name="client">The initialized Amazon S3 client object used to
call
        /// DeleteObjectVersionsAsync, DeleteObjectsAsync, and
        /// RemoveDeleteMarkersAsync.</param>

```

```

    /// <param name="bucketName">The name of the bucket from which to delete
    /// objects.</param>
    /// <param name="deletedObjects">A list of the objects that were deleted.</
param>
    private static async Task RemoveDeleteMarkersAsync(IAmazonS3 client, string
bucketName, List<DeletedObject> deletedObjects)
    {
        var keyVersionList = new List<KeyVersion>();

        foreach (var deletedObject in deletedObjects)
        {
            KeyVersion keyVersion = new KeyVersion
            {
                Key = deletedObject.Key,
                VersionId = deletedObject.DeleteMarkerVersionId,
            };
            keyVersionList.Add(keyVersion);
        }

        // Create another request to delete the delete markers.
        var multiObjectDeleteRequest = new DeleteObjectsRequest
        {
            BucketName = bucketName,
            Objects = keyVersionList,
        };

        // Now, delete the delete marker to bring your objects back to the
bucket.
        try
        {
            Console.WriteLine("Removing the delete markers .....");
            var deleteObjectResponse = await
client.DeleteObjectsAsync(multiObjectDeleteRequest);
            Console.WriteLine($"Successfully deleted the
{deleteObjectResponse.DeletedObjects.Count} delete markers");
        }
        catch (DeleteObjectsException ex)
        {
            DisplayDeletionErrors(ex);
        }
    }

    /// <summary>

```

```

    /// Create temporary Amazon S3 objects to show how object deletion works in
an
    /// Amazon S3 bucket with versioning enabled.
    /// </summary>
    /// <param name="client">The initialized Amazon S3 client object used to
call
    /// PutObjectAsync to create temporary objects for the example.</param>
    /// <param name="bucketName">A string representing the name of the S3
    /// bucket where we will create the temporary objects.</param>
    /// <param name="number">The number of temporary objects to create.</param>
    /// <returns>A list of the KeyVersion objects.</returns>
    private static async Task<List<KeyVersion>> PutObjectsAsync(IAmazonS3
client, string bucketName, int number)
    {
        var keys = new List<KeyVersion>();

        for (var i = 0; i < number; i++)
        {
            string key = "ObjectToDelete-" + new System.Random().Next();
            PutObjectRequest request = new PutObjectRequest
            {
                BucketName = bucketName,
                Key = key,
                ContentBody = "This is the content body!",
            };

            var response = await client.PutObjectAsync(request);
            KeyVersion keyVersion = new KeyVersion
            {
                Key = key,
                VersionId = response.VersionId,
            };

            keys.Add(keyVersion);
        }

        return keys;
    }
}

```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [DeleteObjects](#)。

GetBucketAcl

以下程式碼範例顯示如何使用 GetBucketAcl。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Get the access control list (ACL) for the new bucket.
/// </summary>
/// <param name="client">The initialized client object used to get the
/// access control list (ACL) of the bucket.</param>
/// <param name="newBucketName">The name of the newly created bucket.</
param>
/// <returns>An S3AccessControlList.</returns>
public static async Task<S3AccessControlList> GetACLForBucketAsync(IAmazonS3
client, string newBucketName)
{
    // Retrieve bucket ACL to show that the ACL was properly applied to
    // the new bucket.
    GetACLResponse getACLResponse = await client.GetACLAsync(new
GetACLRequest
    {
        BucketName = newBucketName,
    });

    return getACLResponse.AccessControlList;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [GetBucketAcl](#)。

GetBucketCors

以下程式碼範例顯示如何使用 GetBucketCors。

適用於 .NET 的 SDK

 Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Retrieve the CORS configuration applied to the Amazon S3 bucket.
/// </summary>
/// <param name="client">The initialized Amazon S3 client object used
/// to retrieve the CORS configuration.</param>
/// <returns>The created CORS configuration object.</returns>
private static async Task<CORSConfiguration>
RetrieveCORSConfigurationAsync(AmazonS3Client client)
{
    GetCORSConfigurationRequest request = new GetCORSConfigurationRequest()
    {
        BucketName = BucketName,
    };
    var response = await client.GetCORSConfigurationAsync(request);
    var configuration = response.Configuration;
    PrintCORSRules(configuration);
    return configuration;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [GetBucketCors](#)。

GetBucketEncryption

以下程式碼範例顯示如何使用 GetBucketEncryption。

適用於 .NET 的 SDK

 Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Get and print the encryption settings of a bucket.
/// </summary>
/// <param name="bucketName">Name of the bucket.</param>
/// <returns>Async task.</returns>
public static async Task GetEncryptionSettings(string bucketName)
{
    // Check and print the bucket encryption settings.
    Console.WriteLine($"Getting encryption settings for bucket {bucketName}.");

    try
    {
        var settings =
            await _s3Client.GetBucketEncryptionAsync(
                new GetBucketEncryptionRequest() { BucketName = bucketName });

        foreach (var encryptionSettings in
            settings?.ServerSideEncryptionConfiguration?.ServerSideEncryptionRules!)
        {
            Console.WriteLine(
                $"{Environment.NewLine}\tAlgorithm:
{encryptionSettings.ServerSideEncryptionByDefault.ServerSideEncryptionAlgorithm}");
            Console.WriteLine(
                $"{Environment.NewLine}\tKey:
{encryptionSettings.ServerSideEncryptionByDefault.ServerSideEncryptionKeyManagementServiceKey
            }
        }
    }
    catch (AmazonS3Exception ex)
    {
        Console.WriteLine(ex.ErrorCode == "InvalidBucketName"
            ? $"Bucket {bucketName} was not found."
            : $"Unable to get bucket encryption for bucket {bucketName},
{ex.Message}");
    }
}
```

```
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [GetBucketEncryption](#)。

GetBucketLifecycleConfiguration

以下程式碼範例顯示如何使用 `GetBucketLifecycleConfiguration`。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Returns a configuration object for the supplied bucket name.
/// </summary>
/// <param name="client">The S3 client object used to call
/// the GetLifecycleConfigurationAsync method.</param>
/// <param name="bucketName">The name of the S3 bucket for which a
/// configuration will be created.</param>
/// <returns>Returns a new LifecycleConfiguration object.</returns>
public static async Task<LifecycleConfiguration>
RetrieveLifecycleConfigAsync(IAmazonS3 client, string bucketName)
{
    var request = new GetLifecycleConfigurationRequest()
    {
        BucketName = bucketName,
    };
    var response = await client.GetLifecycleConfigurationAsync(request);
    var configuration = response.Configuration;
    return configuration;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [GetBucketLifecycleConfiguration](#)。

GetBucketWebsite

以下程式碼範例顯示如何使用 GetBucketWebsite。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
// Get the website configuration.
GetBucketWebsiteRequest getRequest = new GetBucketWebsiteRequest()
{
    BucketName = bucketName,
};
GetBucketWebsiteResponse getResponse = await
client.GetBucketWebsiteAsync(getRequest);
Console.WriteLine($"Index document:
{getResponse.WebsiteConfiguration.IndexDocumentSuffix}");
Console.WriteLine($"Error document:
{getResponse.WebsiteConfiguration.ErrorDocument}");
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [GetBucketWebsite](#)。

GetObject

以下程式碼範例顯示如何使用 GetObject。

適用於 .NET 的 SDK

 Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

使用條件式請求取得物件。

```
/// <summary>
/// Retrieves an object from Amazon S3 with a conditional request.
/// </summary>
/// <param name="objectKey">The key of the object to retrieve.</param>
/// <param name="sourceBucket">The source bucket of the object.</param>
/// <param name="conditionType">The type of condition: 'IfMatch', 'IfNoneMatch',
'IfModifiedSince', 'IfUnmodifiedSince'.</param>
/// <param name="conditionDateValue">The value to use for the condition for
dates.</param>
/// <param name="etagConditionalValue">The value to use for the condition for
etags.</param>
/// <returns>True if the conditional read is successful, False otherwise.</
returns>
public async Task<bool> GetObjectConditional(string objectKey, string
sourceBucket,
    S3ConditionType conditionType, DateTime? conditionDateValue = null, string?
etagConditionalValue = null)
{
    try
    {
        var getObjectRequest = new GetObjectRequest
        {
            BucketName = sourceBucket,
            Key = objectKey
        };

        switch (conditionType)
        {
            case S3ConditionType.IfMatch:
                getObjectRequest.EtagToMatch = etagConditionalValue;
                break;
            case S3ConditionType.IfNoneMatch:
                getObjectRequest.EtagToNotMatch = etagConditionalValue;
```

```

        break;
        case S3ConditionType.IfModifiedSince:
            getObjectRequest.ModifiedSinceDateUtc =
conditionDateValue.GetValueOrDefault();
            break;
        case S3ConditionType.IfUnmodifiedSince:
            getObjectRequest.UnmodifiedSinceDateUtc =
conditionDateValue.GetValueOrDefault();
            break;
        default:
            throw new ArgumentOutOfRangeException(nameof(conditionType),
conditionType, null);
    }

    var response = await _amazonS3.GetObjectAsync(getObjectRequest);
    var sampleBytes = new byte[20];
    await response.ResponseStream.ReadAsync(sampleBytes, 0, 20);
    _logger.LogInformation($"Conditional read successful. Here are the first
20 bytes of the object:\n{System.Text.Encoding.UTF8.GetString(sampleBytes)}");
    return true;
}
catch (AmazonS3Exception e)
{
    if (e.ErrorCode == "PreconditionFailed")
    {
        _logger.LogError("Conditional read failed: Precondition failed");
    }
    else if (e.ErrorCode == "NotModified")
    {
        _logger.LogError("Conditional read failed: Object not modified");
    }
    else
    {
        _logger.LogError($"Unexpected error: {e.ErrorCode}");
        throw;
    }
    return false;
}
}

```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [GetObject](#)。

GetObjectLegalHold

以下程式碼範例顯示如何使用 GetObjectLegalHold。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Get the legal hold details for an S3 object.
/// </summary>
/// <param name="bucketName">The bucket of the object.</param>
/// <param name="objectKey">The object key.</param>
/// <returns>The object legal hold details.</returns>
public async Task<ObjectLockLegalHold> GetObjectLegalHold(string bucketName,
    string objectKey)
{
    try
    {
        var request = new GetObjectLegalHoldRequest()
        {
            BucketName = bucketName,
            Key = objectKey
        };

        var response = await _amazonS3.GetObjectLegalHoldAsync(request);
        Console.WriteLine($"Object legal hold for {objectKey} in {bucketName}:
" +
            $"Status: {response.LegalHold.Status}");
        return response.LegalHold;
    }
    catch (AmazonS3Exception ex)
    {
        Console.WriteLine($"Unable to fetch legal hold: '{ex.Message}'");
        return new ObjectLockLegalHold();
    }
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [GetObjectLegalHold](#)。

GetObjectLockConfiguration

以下程式碼範例顯示如何使用 GetObjectLockConfiguration。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Get the object lock configuration details for an S3 bucket.
/// </summary>
/// <param name="bucketName">The bucket to get details.</param>
/// <returns>The bucket's object lock configuration details.</returns>
public async Task<ObjectLockConfiguration>
GetBucketObjectLockConfiguration(string bucketName)
{
    try
    {
        var request = new GetObjectLockConfigurationRequest()
        {
            BucketName = bucketName
        };

        var response = await _amazonS3.GetObjectLockConfigurationAsync(request);
        Console.WriteLine($"{bucketName} object lock config for {bucketName} in
{bucketName}: " +
                        $"{response.ObjectLockConfiguration.ObjectLockEnabled}" +
                        $"{response.ObjectLockConfiguration.Rule?.DefaultRetention}");

        return response.ObjectLockConfiguration;
    }
    catch (AmazonS3Exception ex)
    {

```

```
        Console.WriteLine($"\\tUnable to fetch object lock config:
'{ex.Message}');
        return new ObjectLockConfiguration();
    }
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [GetObjectLockConfiguration](#)。

GetObjectRetention

以下程式碼範例顯示如何使用 `GetObjectRetention`。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Get the retention period for an S3 object.
/// </summary>
/// <param name="bucketName">The bucket of the object.</param>
/// <param name="objectKey">The object key.</param>
/// <returns>The object retention details.</returns>
public async Task<ObjectLockRetention> GetObjectRetention(string bucketName,
    string objectKey)
{
    try
    {
        var request = new GetObjectRetentionRequest()
        {
            BucketName = bucketName,
            Key = objectKey
        };

        var response = await _amazonS3.GetObjectRetentionAsync(request);
```

```

        Console.WriteLine($"{\tObject retention for {objectKey} in {bucketName}:
" +
                           $"\n\t{response.Retention.Mode} until
{response.Retention.RetainUntilDate:d}.");
        return response.Retention;
    }
    catch (AmazonS3Exception ex)
    {
        Console.WriteLine($"{\tUnable to fetch object lock retention:
'{ex.Message}'");
        return new ObjectLockRetention();
    }
}

```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [GetObjectRetention](#)。

ListBuckets

以下程式碼範例顯示如何使用 ListBuckets。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```

namespace ListBucketsExample
{
    using System;
    using System.Collections.Generic;
    using System.Threading.Tasks;
    using Amazon.S3;
    using Amazon.S3.Model;

    /// <summary>
    /// This example uses the AWS SDK for .NET to list the Amazon Simple Storage
    /// Service (Amazon S3) buckets belonging to the default account.
    /// </summary>

```

```

public class ListBuckets
{
    private static IAmazonS3 _s3Client;

    /// <summary>
    /// Get a list of the buckets owned by the default user.
    /// </summary>
    /// <param name="client">An initialized Amazon S3 client object.</param>
    /// <returns>The response from the ListingBuckets call that contains a
    /// list of the buckets owned by the default user.</returns>
    public static async Task<ListBucketsResponse> GetBuckets(IAmazonS3 client)
    {
        return await client.ListBucketsAsync();
    }

    /// <summary>
    /// This method lists the name and creation date for the buckets in
    /// the passed List of S3 buckets.
    /// </summary>
    /// <param name="bucketList">A List of S3 bucket objects.</param>
    public static void DisplayBucketList(List<S3Bucket> bucketList)
    {
        bucketList
            .ForEach(b => Console.WriteLine($"Bucket name: {b.BucketName},
created on: {b.CreationDate}"));
    }

    public static async Task Main()
    {
        // The client uses the AWS Region of the default user.
        // If the Region where the buckets were created is different,
        // pass the Region to the client constructor. For example:
        // _s3Client = new AmazonS3Client(RegionEndpoint.USEast1);
        _s3Client = new AmazonS3Client();
        var response = await GetBuckets(_s3Client);
        DisplayBucketList(response.Buckets);
    }
}

```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [ListBuckets](#)。

ListObjectVersions

以下程式碼範例顯示如何使用 ListObjectVersions。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
using System;
using System.Threading.Tasks;
using Amazon.S3;
using Amazon.S3.Model;

/// <summary>
/// This example lists the versions of the objects in a version enabled
/// Amazon Simple Storage Service (Amazon S3) bucket.
/// </summary>
public class ListObjectVersions
{
    public static async Task Main()
    {
        string bucketName = "amzn-s3-demo-bucket";

        // If the AWS Region where your bucket is defined is different from
        // the AWS Region where the Amazon S3 bucket is defined, pass the
constant
        // for the AWS Region to the client constructor like this:
        //     var client = new AmazonS3Client(RegionEndpoint.USSouth1);
        IAmazonS3 client = new AmazonS3Client();
        await GetObjectListWithAllVersionsAsync(client, bucketName);
    }

    /// <summary>
    /// This method lists all versions of the objects within an Amazon S3
    /// version enabled bucket.
    /// </summary>
    /// <param name="client">The initialized client object used to call
    /// ListVersionsAsync.</param>
```



```
    /// <param name="bucketName">The name of the version enabled Amazon S3
bucket
    /// for which you want to list the versions of the contained objects.</
param>
    public static async Task GetObjectListWithAllVersionsAsync(IAmazonS3 client,
string bucketName)
    {
        try
        {
            // When you instantiate the ListVersionRequest, you can
            // optionally specify a key name prefix in the request
            // if you want a list of object versions of a specific object.

            // For this example we set a small limit in MaxKeys to return
            // a small list of versions.
            ListVersionsRequest request = new ListVersionsRequest()
            {
                BucketName = bucketName,
                MaxKeys = 2,
            };

            do
            {
                ListVersionsResponse response = await
client.ListVersionsAsync(request);

                // Process response.
                foreach (S3ObjectVersion entry in response.Versions)
                {
                    Console.WriteLine($"key: {entry.Key} size: {entry.Size}");
                }

                // If response is truncated, set the marker to get the next
                // set of keys.
                if (response.IsTruncated)
                {
                    request.KeyMarker = response.NextKeyMarker;
                    request.VersionIdMarker = response.NextVersionIdMarker;
                }
                else
                {
                    request = null;
                }
            }
        }
    }
```

```
        while (request != null);
    }
    catch (AmazonS3Exception ex)
    {
        Console.WriteLine($"Error: '{ex.Message}'");
    }
}
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [ListObjectVersions](#)。

ListObjectsV2

以下程式碼範例顯示如何使用 ListObjectsV2。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

使用分頁程式列出物件。

```
using System;
using System.Threading.Tasks;
using Amazon.S3;
using Amazon.S3.Model;

/// <summary>
/// The following example lists objects in an Amazon Simple Storage
/// Service (Amazon S3) bucket.
/// </summary>
public class ListObjectsPaginator
{
    private const string BucketName = "amzn-s3-demo-bucket";

    public static async Task Main()
```

```

    {
        IAmazonS3 s3Client = new AmazonS3Client();

        Console.WriteLine($"Listing the objects contained in {BucketName}:\n");
        await ListingObjectsAsync(s3Client, BucketName);
    }

    /// <summary>
    /// This method uses a paginator to retrieve the list of objects in an
    /// an Amazon S3 bucket.
    /// </summary>
    /// <param name="client">An Amazon S3 client object.</param>
    /// <param name="bucketName">The name of the S3 bucket whose objects
    /// you want to list.</param>
    public static async Task ListingObjectsAsync(IAmazonS3 client, string
bucketName)
    {
        var listObjectsV2Paginator = client.Paginators.ListObjectsV2(new
ListObjectsV2Request
        {
            BucketName = bucketName,
        });

        await foreach (var response in listObjectsV2Paginator.Responses)
        {
            Console.WriteLine($"HttpStatusCode: {response.HttpStatusCode}");
            Console.WriteLine($"Number of Keys: {response.KeyCount}");
            foreach (var entry in response.S3Objects)
            {
                Console.WriteLine($"Key = {entry.Key} Size = {entry.Size}");
            }
        }
    }
}

```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [ListObjectsV2](#)。

PutBucketAccelerateConfiguration

以下程式碼範例顯示如何使用 PutBucketAccelerateConfiguration。

適用於 .NET 的 SDK

 Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
using System;
using System.Threading.Tasks;
using Amazon.S3;
using Amazon.S3.Model;

/// <summary>
/// Amazon Simple Storage Service (Amazon S3) Transfer Acceleration is a
/// bucket-level feature that enables you to perform faster data transfers
/// to Amazon S3. This example shows how to configure Transfer
/// Acceleration.
/// </summary>
public class TransferAcceleration
{
    /// <summary>
    /// The main method initializes the client object and sets the
    /// Amazon Simple Storage Service (Amazon S3) bucket name before
    /// calling EnableAccelerationAsync.
    /// </summary>
    public static async Task Main()
    {
        var s3Client = new AmazonS3Client();
        const string bucketName = "amzn-s3-demo-bucket";

        await EnableAccelerationAsync(s3Client, bucketName);
    }

    /// <summary>
    /// This method sets the configuration to enable transfer acceleration
    /// for the bucket referred to in the bucketName parameter.
    /// </summary>
    /// <param name="client">An Amazon S3 client used to enable the
    /// acceleration on an Amazon S3 bucket.</param>
    /// <param name="bucketName">The name of the Amazon S3 bucket for which the
    /// method will be enabling acceleration.</param>
```

```
private static async Task EnableAccelerationAsync(AmazonS3Client client,
string bucketName)
{
    try
    {
        var putRequest = new PutBucketAccelerateConfigurationRequest
        {
            BucketName = bucketName,
            AccelerateConfiguration = new AccelerateConfiguration
            {
                Status = BucketAccelerateStatus.Enabled,
            },
        };
        await client.PutBucketAccelerateConfigurationAsync(putRequest);

        var getRequest = new GetBucketAccelerateConfigurationRequest
        {
            BucketName = bucketName,
        };
        var response = await
client.GetBucketAccelerateConfigurationAsync(getRequest);

        Console.WriteLine($"Acceleration state = '{response.Status}' ");
    }
    catch (AmazonS3Exception ex)
    {
        Console.WriteLine($"Error occurred. Message: '{ex.Message}' when
setting transfer acceleration");
    }
}
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [PutBucketAccelerateConfiguration](#)。

PutBucketAcl

以下程式碼範例顯示如何使用 PutBucketAcl。

適用於 .NET 的 SDK

 Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```

    /// <summary>
    /// Creates an Amazon S3 bucket with an ACL to control access to the
    /// bucket and the objects stored in it.
    /// </summary>
    /// <param name="client">The initialized client object used to create
    /// an Amazon S3 bucket, with an ACL applied to the bucket.
    /// </param>
    /// <param name="region">The AWS Region where the bucket will be created.</
param>
    /// <param name="newBucketName">The name of the bucket to create.</param>
    /// <returns>A boolean value indicating success or failure.</returns>
    public static async Task<bool> CreateBucketUseCannedACLAsync(IAmazonS3
client, S3Region region, string newBucketName)
    {
        try
        {
            // Create a new Amazon S3 bucket with Canned ACL.
            var putBucketRequest = new PutBucketRequest()
            {
                BucketName = newBucketName,
                BucketRegion = region,
                CannedACL = S3CannedACL.LogDeliveryWrite,
            };

            PutBucketResponse putBucketResponse = await
client.PutBucketAsync(putBucketRequest);

            return putBucketResponse.HttpStatusCode ==
System.Net.HttpStatusCode.OK;
        }
        catch (AmazonS3Exception ex)
        {
            Console.WriteLine($"Amazon S3 error: {ex.Message}");
        }
    }

```

```
    }

    return false;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [PutBucketAcl](#)。

PutBucketCors

以下程式碼範例顯示如何使用 PutBucketCors。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Add CORS configuration to the Amazon S3 bucket.
/// </summary>
/// <param name="client">The initialized Amazon S3 client object used
/// to apply the CORS configuration to an Amazon S3 bucket.</param>
/// <param name="configuration">The CORS configuration to apply.</param>
private static async Task PutCORSConfigurationAsync(AmazonS3Client client,
CORSConfiguration configuration)
{
    PutCORSConfigurationRequest request = new PutCORSConfigurationRequest()
    {
        BucketName = BucketName,
        Configuration = configuration,
    };

    _ = await client.PutCORSConfigurationAsync(request);
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [PutBucketCors](#)。

PutBucketEncryption

以下程式碼範例顯示如何使用 PutBucketEncryption。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Set the bucket server side encryption to use AWSKMS with a customer-managed
key id.
/// </summary>
/// <param name="bucketName">Name of the bucket.</param>
/// <param name="kmsKeyId">The Id of the KMS Key.</param>
/// <returns>True if successful.</returns>
public static async Task<bool> SetBucketServerSideEncryption(string bucketName,
string kmsKeyId)
{
    var serverSideEncryptionByDefault = new ServerSideEncryptionConfiguration
    {
        ServerSideEncryptionRules = new List<ServerSideEncryptionRule>
        {
            new ServerSideEncryptionRule
            {
                ServerSideEncryptionByDefault = new
ServerSideEncryptionByDefault
                {
                    ServerSideEncryptionAlgorithm =
ServerSideEncryptionMethod.AWSKMS,
                    ServerSideEncryptionKeyManagementServiceKeyId = kmsKeyId
                }
            }
        }
    };
    try
    {
```



```
var encryptionResponse = await _s3Client.PutBucketEncryptionAsync(new
PutBucketEncryptionRequest
{
    BucketName = bucketName,
    ServerSideEncryptionConfiguration = serverSideEncryptionByDefault,
});

return encryptionResponse.HttpStatusCode == HttpStatusCode.OK;
}
catch (AmazonS3Exception ex)
{
    Console.WriteLine(ex.ErrorCode == "AccessDenied"
        ? $"This account does not have permission to set encryption on
{bucketName}, please try again."
        : $"Unable to set bucket encryption for bucket {bucketName},
{ex.Message}");
}
return false;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [PutBucketEncryption](#)。

PutBucketLifecycleConfiguration

以下程式碼範例顯示如何使用 PutBucketLifecycleConfiguration。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Adds lifecycle configuration information to the S3 bucket named in
/// the bucketName parameter.
/// </summary>
```

```
/// <param name="client">The S3 client used to call the
/// PutLifecycleConfigurationAsync method.</param>
/// <param name="bucketName">A string representing the S3 bucket to
/// which configuration information will be added.</param>
/// <param name="configuration">A LifecycleConfiguration object that
/// will be applied to the S3 bucket.</param>
public static async Task AddExampleLifecycleConfigAsync(IAmazonS3 client,
string bucketName, LifecycleConfiguration configuration)
{
    var request = new PutLifecycleConfigurationRequest()
    {
        BucketName = bucketName,
        Configuration = configuration,
    };
    var response = await client.PutLifecycleConfigurationAsync(request);
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [PutBucketLifecycleConfiguration](#)。

PutBucketLogging

以下程式碼範例顯示如何使用 PutBucketLogging。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
using System;
using System.IO;
using System.Threading.Tasks;
using Amazon.S3;
using Amazon.S3.Model;
using Microsoft.Extensions.Configuration;
```

```

    /// <summary>
    /// This example shows how to enable logging on an Amazon Simple Storage
    /// Service (Amazon S3) bucket. You need to have two Amazon S3 buckets for
    /// this example. The first is the bucket for which you wish to enable
    /// logging, and the second is the location where you want to store the
    /// logs.
    /// </summary>
    public class ServerAccessLogging
    {
        private static IConfiguration _configuration = null!;

        public static async Task Main()
        {
            LoadConfig();

            string bucketName = _configuration["BucketName"];
            string logBucketName = _configuration["LogBucketName"];
            string logObjectKeyPrefix = _configuration["LogObjectKeyPrefix"];
            string accountId = _configuration["AccountId"];

            // If the AWS Region defined for your default user is different
            // from the Region where your Amazon S3 bucket is located,
            // pass the Region name to the Amazon S3 client object's constructor.
            // For example: RegionEndpoint.USWest2 or RegionEndpoint.USEast2.
            IAmazonS3 client = new AmazonS3Client();

            try
            {
                // Update bucket policy for target bucket to allow delivery of logs
                to it.
                await SetBucketPolicyToAllowLogDelivery(
                    client,
                    bucketName,
                    logBucketName,
                    logObjectKeyPrefix,
                    accountId);

                // Enable logging on the source bucket.
                await EnableLoggingAsync(
                    client,
                    bucketName,
                    logBucketName,
                    logObjectKeyPrefix);
            }
        }
    }

```

```

        catch (AmazonS3Exception e)
        {
            Console.WriteLine($"Error: {e.Message}");
        }
    }

    /// <summary>
    /// This method grants appropriate permissions for logging to the
    /// Amazon S3 bucket where the logs will be stored.
    /// </summary>
    /// <param name="client">The initialized Amazon S3 client which will be used
    /// to apply the bucket policy.</param>
    /// <param name="sourceBucketName">The name of the source bucket.</param>
    /// <param name="logBucketName">The name of the bucket where logging
    /// information will be stored.</param>
    /// <param name="logPrefix">The logging prefix where the logs should be
    delivered.</param>
    /// <param name="accountId">The account id of the account where the source
    bucket exists.</param>
    /// <returns>Async task.</returns>
    public static async Task SetBucketPolicyToAllowLogDelivery(
        IAmazonS3 client,
        string sourceBucketName,
        string logBucketName,
        string logPrefix,
        string accountId)
    {
        var resourceArn = @""""arn:aws:s3:::" + logBucketName + "/" + logPrefix +
@""""";

        var newPolicy = @"{
            ""Statement"": [{
                ""Sid"": ""S3ServerAccessLogsPolicy"",
                ""Effect"": ""Allow"",
                ""Principal"": { ""Service"":
""logging.s3.amazonaws.com"" },
                ""Action"": [""s3:PutObject""],
                ""Resource"": ["" + resourceArn + @""],
                ""Condition"": {
                    ""ArnLike"": { ""aws:SourceArn"": ""arn:aws:s3:::" +
sourceBucketName + @"""" },
                    ""StringEquals"": { ""aws:SourceAccount"": """" +
accountId + @"""" }
                }
            }
        }
    }

```

```

        ]]
    }";

    Console.WriteLine($"The policy to apply to bucket {logBucketName} to
enable logging:");
    Console.WriteLine(newPolicy);

    PutBucketPolicyRequest putRequest = new PutBucketPolicyRequest
    {
        BucketName = logBucketName,
        Policy = newPolicy,
    };
    await client.PutBucketPolicyAsync(putRequest);
    Console.WriteLine("Policy applied.");
}

/// <summary>
/// This method enables logging for an Amazon S3 bucket. Logs will be stored
/// in the bucket you selected for logging. Selected prefix
/// will be prepended to each log object.
/// </summary>
/// <param name="client">The initialized Amazon S3 client which will be used
/// to configure and apply logging to the selected Amazon S3 bucket.</param>
/// <param name="bucketName">The name of the Amazon S3 bucket for which you
/// wish to enable logging.</param>
/// <param name="logBucketName">The name of the Amazon S3 bucket where
logging
/// information will be stored.</param>
/// <param name="logObjectKeyPrefix">The prefix to prepend to each
/// object key.</param>
/// <returns>Async task.</returns>
public static async Task EnableLoggingAsync(
    IAmazonS3 client,
    string bucketName,
    string logBucketName,
    string logObjectKeyPrefix)
{
    Console.WriteLine($"Enabling logging for bucket {bucketName}.");
    var loggingConfig = new S3BucketLoggingConfig
    {
        TargetBucketName = logBucketName,
        TargetPrefix = logObjectKeyPrefix,
    };

    var putBucketLoggingRequest = new PutBucketLoggingRequest

```

```

        {
            BucketName = bucketName,
            LoggingConfig = loggingConfig,
        };
        await client.PutBucketLoggingAsync(putBucketLoggingRequest);
        Console.WriteLine($"Logging enabled.");
    }

    /// <summary>
    /// Loads configuration from settings files.
    /// </summary>
    public static void LoadConfig()
    {
        _configuration = new ConfigurationBuilder()
            .SetBasePath(Directory.GetCurrentDirectory())
            .AddJsonFile("settings.json") // Load settings from .json file.
            .AddJsonFile("settings.local.json", true) // Optionally, load local
settings.
            .Build();
    }
}

```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [PutBucketLogging](#)。

PutBucketNotificationConfiguration

以下程式碼範例顯示如何使用 PutBucketNotificationConfiguration。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```

using System;
using System.Collections.Generic;
using System.Threading.Tasks;
using Amazon.S3;

```

```

using Amazon.S3.Model;

/// <summary>
/// This example shows how to enable notifications for an Amazon Simple
/// Storage Service (Amazon S3) bucket.
/// </summary>
public class EnableNotifications
{
    public static async Task Main()
    {
        const string bucketName = "amzn-s3-demo-bucket1";
        const string snsTopic = "arn:aws:sns:us-east-2:0123456789ab:bucket-
notify";
        const string sqsQueue = "arn:aws:sqs:us-
east-2:0123456789ab:Example_Queue";

        IAmazonS3 client = new AmazonS3Client(Amazon.RegionEndpoint.USEast2);
        await EnableNotificationAsync(client, bucketName, snsTopic, sqsQueue);
    }

    /// <summary>
    /// This method makes the call to the PutBucketNotificationAsync method.
    /// </summary>
    /// <param name="client">An initialized Amazon S3 client used to call
    /// the PutBucketNotificationAsync method.</param>
    /// <param name="bucketName">The name of the bucket for which
    /// notifications will be turned on.</param>
    /// <param name="snsTopic">The ARN for the Amazon Simple Notification
    /// Service (Amazon SNS) topic associated with the S3 bucket.</param>
    /// <param name="sqsQueue">The ARN of the Amazon Simple Queue Service
    /// (Amazon SQS) queue to which notifications will be pushed.</param>
    public static async Task EnableNotificationAsync(
        IAmazonS3 client,
        string bucketName,
        string snsTopic,
        string sqsQueue)
    {
        try
        {
            // The bucket for which we are setting up notifications.
            var request = new PutBucketNotificationRequest()
            {
                BucketName = bucketName,
            };

```

```
// Defines the topic to use when sending a notification.
var topicConfig = new TopicConfiguration()
{
    Events = new List<EventType> { EventType.ObjectCreatedCopy },
    Topic = snsTopic,
};
request.TopicConfigurations = new List<TopicConfiguration>
{
    topicConfig,
};
request.QueueConfigurations = new List<QueueConfiguration>
{
    new QueueConfiguration()
    {
        Events = new List<EventType> { EventType.ObjectCreatedPut },
        Queue = sqsQueue,
    },
};

// Now apply the notification settings to the bucket.
PutBucketNotificationResponse response = await
client.PutBucketNotificationAsync(request);
}
catch (AmazonS3Exception ex)
{
    Console.WriteLine($"Error: {ex.Message}");
}
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [PutBucketNotificationConfiguration](#)。

PutBucketWebsite

以下程式碼範例顯示如何使用 PutBucketWebsite。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
// Put the website configuration.
PutBucketWebsiteRequest putRequest = new PutBucketWebsiteRequest()
{
    BucketName = bucketName,
    WebsiteConfiguration = new WebsiteConfiguration()
    {
        IndexDocumentSuffix = indexDocumentSuffix,
        ErrorDocument = errorDocument,
    },
};
PutBucketWebsiteResponse response = await
client.PutBucketWebsiteAsync(putRequest);
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [PutBucketWebsite](#)。

PutObject

以下程式碼範例顯示如何使用 PutObject。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

使用伺服器端加密上傳物件。

```
using System;
using System.Threading.Tasks;
```

```
using Amazon.S3;
using Amazon.S3.Model;

/// <summary>
/// This example shows how to upload an object to an Amazon Simple Storage
/// Service (Amazon S3) bucket with server-side encryption enabled.
/// </summary>
public class ServerSideEncryption
{
    public static async Task Main()
    {
        string bucketName = "amzn-s3-demo-bucket";
        string keyName = "samplefile.txt";

        // If the AWS Region defined for your default user is different
        // from the Region where your Amazon S3 bucket is located,
        // pass the Region name to the Amazon S3 client object's constructor.
        // For example: RegionEndpoint.USWest2.
        IAmazonS3 client = new AmazonS3Client();

        await WritingAnObjectAsync(client, bucketName, keyName);
    }

    /// <summary>
    /// Upload a sample object include a setting for encryption.
    /// </summary>
    /// <param name="client">The initialized Amazon S3 client object used to
    /// to upload a file and apply server-side encryption.</param>
    /// <param name="bucketName">The name of the Amazon S3 bucket where the
    /// encrypted object will reside.</param>
    /// <param name="keyName">The name for the object that you want to
    /// create in the supplied bucket.</param>
    public static async Task WritingAnObjectAsync(IAmazonS3 client, string
bucketName, string keyName)
    {
        try
        {
            var putRequest = new PutObjectRequest
            {
                BucketName = bucketName,
                Key = keyName,
                ContentBody = "sample text",
                ServerSideEncryptionMethod = ServerSideEncryptionMethod.AES256,
            };
        }
    }
}
```

```

        var putResponse = await client.PutObjectAsync(putRequest);

        // Determine the encryption state of an object.
        GetObjectMetadataRequest metadataRequest = new
GetObjectMetadataRequest
        {
            BucketName = bucketName,
            Key = keyName,
        };
        GetObjectMetadataResponse response = await
client.GetObjectMetadataAsync(metadataRequest);
        ServerSideEncryptionMethod objectEncryption =
response.ServerSideEncryptionMethod;

        Console.WriteLine($"Encryption method used: {0}",
objectEncryption.ToString());
    }
    catch (AmazonS3Exception ex)
    {
        Console.WriteLine($"Error: '{ex.Message}' when writing an object");
    }
}
}

```

使用條件式請求放置物件。

```

/// <summary>
/// Uploads an object to Amazon S3 with a conditional request. Prevents
overwrite using an IfNoneMatch condition for the object key.
/// </summary>
/// <param name="objectKey">The key of the object to upload.</param>
/// <param name="bucket">The source bucket of the object.</param>
/// <param name="content">The content to upload as a string.</param>
/// <returns>The ETag if the conditional write is successful, empty otherwise.</
returns>
public async Task<string> PutObjectConditional(string objectKey, string bucket,
string content)
{
    try
    {

```

```
var putObjectRequest = new PutObjectRequest
{
    BucketName = bucket,
    Key = objectKey,
    ContentBody = content,
    IfNoneMatch = "*"
};

var putResult = await _amazonS3.PutObjectAsync(putObjectRequest);
_logger.LogInformation($"Conditional write successful for key
{objectKey} in bucket {bucket}.");
return putResult.ETag;
}
catch (AmazonS3Exception e)
{
    if (e.ErrorCode == "PreconditionFailed")
    {
        _logger.LogError("Conditional write failed: Precondition failed");
    }
    else
    {
        _logger.LogError($"Unexpected error: {e.ErrorCode}");
        throw;
    }
    return string.Empty;
}
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [PutObject](#)。

PutObjectLegalHold

以下程式碼範例顯示如何使用 PutObjectLegalHold。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```

    /// <summary>
    /// Set or modify a legal hold on an object in an S3 bucket.
    /// </summary>
    /// <param name="bucketName">The bucket of the object.</param>
    /// <param name="objectKey">The key of the object.</param>
    /// <param name="holdStatus">The On or Off status for the legal hold.</param>
    /// <returns>True if successful.</returns>
    public async Task<bool> ModifyObjectLegalHold(string bucketName,
        string objectKey, ObjectLockLegalHoldStatus holdStatus)
    {
        try
        {
            var request = new PutObjectLegalHoldRequest()
            {
                BucketName = bucketName,
                Key = objectKey,
                LegalHold = new ObjectLockLegalHold()
                {
                    Status = holdStatus
                }
            };

            var response = await _amazonS3.PutObjectLegalHoldAsync(request);
            Console.WriteLine($"\\tModified legal hold for {objectKey} in
{bucketName}.");
            return response.HttpStatusCode == System.Net.HttpStatusCode.OK;
        }
        catch (AmazonS3Exception ex)
        {
            Console.WriteLine($"\\tError modifying legal hold: '{ex.Message}'");
            return false;
        }
    }
}

```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [PutObjectLegalHold](#)。

PutObjectLockConfiguration

以下程式碼範例顯示如何使用 PutObjectLockConfiguration。

適用於 .NET 的 SDK

 Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

設定儲存貯體的物件鎖定組態。

```
/// <summary>
/// Enable object lock on an existing bucket.
/// </summary>
/// <param name="bucketName">The name of the bucket to modify.</param>
/// <returns>True if successful.</returns>
public async Task<bool> EnableObjectLockOnBucket(string bucketName)
{
    try
    {
        // First, enable Versioning on the bucket.
        await _amazonS3.PutBucketVersioningAsync(new
PutBucketVersioningRequest()
        {
            BucketName = bucketName,
            VersioningConfig = new S3BucketVersioningConfig()
            {
                EnableMfaDelete = false,
                Status = VersionStatus.Enabled
            }
        });

        var request = new PutObjectLockConfigurationRequest()
        {
            BucketName = bucketName,
            ObjectLockConfiguration = new ObjectLockConfiguration()
            {
                ObjectLockEnabled = new ObjectLockEnabled("Enabled"),
            },
        };

        var response = await _amazonS3.PutObjectLockConfigurationAsync(request);
        Console.WriteLine($"{bucketName}\tAdded an object lock policy to bucket
{bucketName}.");
    }
}
```

```

        return response.HttpStatusCode == System.Net.HttpStatusCode.OK;
    }
    catch (AmazonS3Exception ex)
    {
        Console.WriteLine($"Error modifying object lock: '{ex.Message}'");
        return false;
    }
}

```

設定儲存貯體的預設保留期間。

```

/// <summary>
/// Set or modify a retention period on an S3 bucket.
/// </summary>
/// <param name="bucketName">The bucket to modify.</param>
/// <param name="retention">The retention mode.</param>
/// <param name="retainUntilDate">The date for retention until.</param>
/// <returns>True if successful.</returns>
public async Task<bool> ModifyBucketDefaultRetention(string bucketName, bool
enableObjectLock, ObjectLockRetentionMode retention, DateTime retainUntilDate)
{
    var enabledString = enableObjectLock ? "Enabled" : "Disabled";
    var timeDifference = retainUntilDate.Subtract(DateTime.Now);
    try
    {
        // First, enable Versioning on the bucket.
        await _amazonS3.PutBucketVersioningAsync(new
PutBucketVersioningRequest()
        {
            BucketName = bucketName,
            VersioningConfig = new S3BucketVersioningConfig()
            {
                EnableMfaDelete = false,
                Status = VersionStatus.Enabled
            }
        });

        var request = new PutObjectLockConfigurationRequest()
        {
            BucketName = bucketName,
            ObjectLockConfiguration = new ObjectLockConfiguration()
            {

```

```

        ObjectLockEnabled = new ObjectLockEnabled(enabledString),
        Rule = new ObjectLockRule()
        {
            DefaultRetention = new DefaultRetention()
            {
                Mode = retention,
                Days = timeDifference.Days // Can be specified in days
or years but not both.
            }
        }
    };

    var response = await _amazonS3.PutObjectLockConfigurationAsync(request);
    Console.WriteLine($"\\tAdded a default retention to bucket
{bucketName}.");
    return response.HttpStatusCode == System.Net.HttpStatusCode.OK;
}
catch (AmazonS3Exception ex)
{
    Console.WriteLine($"\\tError modifying object lock: '{ex.Message}'");
    return false;
}
}

```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [PutObjectLockConfiguration](#)。

PutObjectRetention

以下程式碼範例顯示如何使用 PutObjectRetention。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。


```

    /// <summary>
    /// Set or modify a retention period on an object in an S3 bucket.
    /// </summary>
    /// <param name="bucketName">The bucket of the object.</param>
    /// <param name="objectKey">The key of the object.</param>
    /// <param name="retention">The retention mode.</param>
    /// <param name="retainUntilDate">The date retention expires.</param>
    /// <returns>True if successful.</returns>
    public async Task<bool> ModifyObjectRetentionPeriod(string bucketName,
        string objectKey, ObjectLockRetentionMode retention, DateTime
retainUntilDate)
    {
        try
        {
            var request = new PutObjectRetentionRequest()
            {
                BucketName = bucketName,
                Key = objectKey,
                Retention = new ObjectLockRetention()
                {
                    Mode = retention,
                    RetainUntilDate = retainUntilDate
                }
            };

            var response = await _amazonS3.PutObjectRetentionAsync(request);
            Console.WriteLine($"\\tSet retention for {objectKey} in {bucketName}
until {retainUntilDate:d}.");
            return response.HttpStatusCode == System.Net.HttpStatusCode.OK;
        }
        catch (AmazonS3Exception ex)
        {
            Console.WriteLine($"\\tError modifying retention period:
'{ex.Message}'");
            return false;
        }
    }
}

```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [PutObjectRetention](#)。

RestoreObject

以下程式碼範例顯示如何使用 RestoreObject。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
using System;
using System.Threading.Tasks;
using Amazon;
using Amazon.S3;
using Amazon.S3.Model;

/// <summary>
/// This example shows how to restore an archived object in an Amazon
/// Simple Storage Service (Amazon S3) bucket.
/// </summary>
public class RestoreArchivedObject
{
    public static void Main()
    {
        string bucketName = "amzn-s3-demo-bucket";
        string objectKey = "archived-object.txt";

        // Specify your bucket region (an example region is shown).
        RegionEndpoint bucketRegion = RegionEndpoint.USSouth1;

        IAmazonS3 client = new AmazonS3Client(bucketRegion);
        RestoreObjectAsync(client, bucketName, objectKey).Wait();
    }

    /// <summary>
    /// This method restores an archived object from an Amazon S3 bucket.
    /// </summary>
    /// <param name="client">The initialized Amazon S3 client object used to
call
    /// RestoreObjectAsync.</param>
    /// <param name="bucketName">A string representing the name of the
```

```

    /// bucket where the object was located before it was archived.</param>
    /// <param name="objectKey">A string representing the name of the
    /// archived object to restore.</param>
    public static async Task RestoreObjectAsync(IAmazonS3 client, string
bucketName, string objectKey)
    {
        try
        {
            var restoreRequest = new RestoreObjectRequest
            {
                BucketName = bucketName,
                Key = objectKey,
                Days = 2,
            };
            RestoreObjectResponse response = await
client.RestoreObjectAsync(restoreRequest);

            // Check the status of the restoration.
            await CheckRestorationStatusAsync(client, bucketName, objectKey);
        }
        catch (AmazonS3Exception amazonS3Exception)
        {
            Console.WriteLine($"Error: {amazonS3Exception.Message}");
        }
    }

    /// <summary>
    /// This method retrieves the status of the object's restoration.
    /// </summary>
    /// <param name="client">The initialized Amazon S3 client object used to
call
    /// GetObjectMetadataAsync.</param>
    /// <param name="bucketName">A string representing the name of the Amazon
    /// S3 bucket which contains the archived object.</param>
    /// <param name="objectKey">A string representing the name of the
    /// archived object you want to restore.</param>
    public static async Task CheckRestorationStatusAsync(IAmazonS3 client,
string bucketName, string objectKey)
    {
        GetObjectMetadataRequest metadataRequest = new
GetObjectMetadataRequest()
        {
            BucketName = bucketName,
            Key = objectKey,

```

```
};

GetObjectMetadataResponse response = await
client.GetObjectMetadataAsync(metadataRequest);

var restStatus = response.RestoreInProgress ? "in-progress" : "finished
or failed";
Console.WriteLine($"Restoration status: {restStatus}");
}
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [RestoreObject](#)。

案例

建立預先簽章 URL

下列程式碼範例示範如何建立適用於 Amazon S3 預先簽署的 URL，並上傳物件。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

產生可以於限定時間內執行 Amazon S3 動作的預先簽署的 URL。

```
using System;
using Amazon;
using Amazon.S3;
using Amazon.S3.Model;

public class GenPresignedUrl
{
    public static void Main()
    {
        const string bucketName = "amzn-s3-demo-bucket";
        const string objectKey = "sample.txt";
```

```

        // Specify how long the presigned URL lasts, in hours
        const double timeoutDuration = 12;

        // Specify the AWS Region of your Amazon S3 bucket. If it is
        // different from the Region defined for the default user,
        // pass the Region to the constructor for the client. For
        // example: new AmazonS3Client(RegionEndpoint.USEast1);

        // If using the Region us-east-1, and server-side encryption with AWS
        KMS, you must specify Signature Version 4.
        // Region us-east-1 defaults to Signature Version 2 unless explicitly
        set to Version 4 as shown below.
        // For more details, see https://docs.aws.amazon.com/AmazonS3/latest/userguide/UsingAWSSDK.html#specify-signature-version
        // and https://docs.aws.amazon.com/sdkfornet/v3/apidocs/items/Amazon/TAWSConfigsS3.html
        AWSConfigsS3.UseSignatureVersion4 = true;
        IAmazonS3 s3Client = new AmazonS3Client(RegionEndpoint.USEast1);

        string urlString = GeneratePresignedURL(s3Client, bucketName, objectKey,
        timeoutDuration);
        Console.WriteLine($"The generated URL is: {urlString}.");
    }

    /// <summary>
    /// Generate a presigned URL that can be used to access the file named
    /// in the objectKey parameter for the amount of time specified in the
    /// duration parameter.
    /// </summary>
    /// <param name="client">An initialized S3 client object used to call
    /// the GetPresignedUrl method.</param>
    /// <param name="bucketName">The name of the S3 bucket containing the
    /// object for which to create the presigned URL.</param>
    /// <param name="objectKey">The name of the object to access with the
    /// presigned URL.</param>
    /// <param name="duration">The length of time for which the presigned
    /// URL will be valid.</param>
    /// <returns>A string representing the generated presigned URL.</returns>
    public static string GeneratePresignedURL(IAmazonS3 client, string
    bucketName, string objectKey, double duration)
    {
        string urlString = string.Empty;
        try

```

```
    {
        var request = new GetPreSignedUrlRequest()
        {
            BucketName = bucketName,
            Key = objectKey,
            Expires = DateTime.UtcNow.AddHours(duration),
        };
        urlString = client.GetPreSignedURL(request);
    }
    catch (AmazonS3Exception ex)
    {
        Console.WriteLine($"Error: '{ex.Message}'");
    }

    return urlString;
}
}
```

產生預先簽章的 URL 並使用該 URL 執行上傳。

```
using System;
using System.IO;
using System.Net.Http;
using System.Threading.Tasks;
using Amazon;
using Amazon.S3;
using Amazon.S3.Model;

/// <summary>
/// This example shows how to upload an object to an Amazon Simple Storage
/// Service (Amazon S3) bucket using a presigned URL. The code first
/// creates a presigned URL and then uses it to upload an object to an
/// Amazon S3 bucket using that URL.
/// </summary>
public class UploadUsingPresignedURL
{
    private static HttpClient httpClient = new HttpClient();

    public static async Task Main()
    {
        string bucketName = "amzn-s3-demo-bucket";
```

```

        string keyName = "samplefile.txt";
        string filePath = $"source\\{keyName}";

        // Specify how long the signed URL will be valid in hours.
        double timeoutDuration = 12;

        // Specify the AWS Region of your Amazon S3 bucket. If it is
        // different from the Region defined for the default user,
        // pass the Region to the constructor for the client. For
        // example: new AmazonS3Client(RegionEndpoint.USEast1);

        // If using the Region us-east-1, and server-side encryption with AWS
        KMS, you must specify Signature Version 4.
        // Region us-east-1 defaults to Signature Version 2 unless explicitly
        set to Version 4 as shown below.
        // For more details, see https://docs.aws.amazon.com/AmazonS3/latest/
        // and https://docs.aws.amazon.com/sdkfornet/v3/apidocs/items/Amazon/
        TAWSConfigsS3.html
        AWSConfigsS3.UseSignatureVersion4 = true;
        IAmazonS3 client = new AmazonS3Client(RegionEndpoint.USEast1);

        var url = GeneratePreSignedURL(client, bucketName, keyName,
        timeoutDuration);
        var success = await UploadObject(filePath, url);

        if (success)
        {
            Console.WriteLine("Upload succeeded.");
        }
        else
        {
            Console.WriteLine("Upload failed.");
        }
    }

    /// <summary>
    /// Uploads an object to an Amazon S3 bucket using the presigned URL passed
in
    /// the url parameter.
    /// </summary>
    /// <param name="filePath">The path (including file name) to the local
    /// file you want to upload.</param>
    /// <param name="url">The presigned URL that will be used to upload the

```

```

    /// file to the Amazon S3 bucket.</param>
    /// <returns>A Boolean value indicating the success or failure of the
    /// operation, based on the HttpResponseMessage.</returns>
    public static async Task<bool> UploadObject(string filePath, string url)
    {
        using var streamContent = new StreamContent(
            new FileStream(filePath, FileMode.Open, FileAccess.Read));

        var response = await httpClient.PutAsync(url, streamContent);
        return response.IsSuccessStatusCode;
    }

    /// <summary>
    /// Generates a presigned URL which will be used to upload an object to
    /// an Amazon S3 bucket.
    /// </summary>
    /// <param name="client">The initialized Amazon S3 client object used to
call
    /// GetPreSignedURL.</param>
    /// <param name="bucketName">The name of the Amazon S3 bucket to which the
    /// presigned URL will point.</param>
    /// <param name="objectKey">The name of the file that will be uploaded.</
param>
    /// <param name="duration">How long (in hours) the presigned URL will
    /// be valid.</param>
    /// <returns>The generated URL.</returns>
    public static string GeneratePreSignedURL(
        IAmazonS3 client,
        string bucketName,
        string objectKey,
        double duration)
    {
        var request = new GetPreSignedUrlRequest
        {
            BucketName = bucketName,
            Key = objectKey,
            Verb = HttpVerb.PUT,
            Expires = DateTime.UtcNow.AddHours(duration),
        };

        string url = client.GetPreSignedURL(request);
        return url;
    }
}

```


建立無伺服器應用程式來管理相片

下列程式碼範例示範如何建立無伺服器應用程式，讓使用者以標籤管理相片。

適用於 .NET 的 SDK

顯示如何開發照片資產管理應用程式，以便使用 Amazon Rekognition 偵測圖片中的標籤，並將其儲存以供日後擷取。

如需完整的原始碼和如何設定及執行的指示，請參閱 [GitHub](#) 上的完整範例。

如要深入探索此範例的來源，請參閱 [AWS 社群](#) 上的文章。

此範例中使用的服務

- API Gateway
- DynamoDB
- Lambda
- Amazon Rekognition
- Amazon S3
- Amazon SNS

偵測映像中的物件

下列程式碼範例示範如何建置應用程式，該應用程式可使用 Amazon Rekognition 依影像中的類別偵測物件。

適用於 .NET 的 SDK

說明如何使用 Amazon Rekognition .NET API 建立應用程式，該應用程式可使用 Amazon Rekognition 對 Amazon Simple Storage Service (Amazon S3) 儲存貯體中的映像按類別識別物件。此應用程式可使用 Amazon Simple Email Service (Amazon SES) 向管理員傳送包含結果的電子郵件通知。

如需完整的原始碼和如何設定及執行的指示，請參閱 [GitHub](#) 上的完整範例。

此範例中使用的服務

- Amazon Rekognition
- Amazon S3
- Amazon SES

開始使用加密

下列程式碼範例示範如何開始使用 Amazon S3 物件的加密。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
using System;
using System.IO;
using System.Security.Cryptography;
using System.Threading.Tasks;
using Amazon.S3;
using Amazon.S3.Model;

/// <summary>
/// This example shows how to apply client encryption to an object in an
/// Amazon Simple Storage Service (Amazon S3) bucket.
/// </summary>
public class SSEClientEncryption
{
    public static async Task Main()
    {
        string bucketName = "amzn-s3-demo-bucket";
        string keyName = "exampleobject.txt";
        string copyTargetKeyName = "examplecopy.txt";

        // If the AWS Region defined for your default user is different
        // from the Region where your Amazon S3 bucket is located,
        // pass the Region name to the Amazon S3 client object's constructor.
        // For example: RegionEndpoint.USSouth1.
    }
}
```

```

    IAmazonS3 client = new AmazonS3Client();

    try
    {
        // Create an encryption key.
        Aes aesEncryption = Aes.Create();
        aesEncryption.KeySize = 256;
        aesEncryption.GenerateKey();
        string base64Key = Convert.ToBase64String(aesEncryption.Key);

        // Upload the object.
        PutObjectRequest putObjectRequest = await UploadObjectAsync(client,
bucketName, keyName, base64Key);

        // Download the object and verify that its contents match what you
uploaded.
        await DownloadObjectAsync(client, bucketName, keyName, base64Key,
putObjectRequest);

        // Get object metadata and verify that the object uses AES-256
encryption.
        await GetObjectMetadataAsync(client, bucketName, keyName,
base64Key);

        // Copy both the source and target objects using server-side
encryption with
        // an encryption key.
        await CopyObjectAsync(client, bucketName, keyName,
copyTargetKeyName, aesEncryption, base64Key);
    }
    catch (AmazonS3Exception ex)
    {
        Console.WriteLine($"Error: {ex.Message}");
    }
}

/// <summary>
/// Uploads an object to an Amazon S3 bucket.
/// </summary>
/// <param name="client">The initialized Amazon S3 client object used to
call
/// PutObjectAsync.</param>
/// <param name="bucketName">The name of the Amazon S3 bucket to which the
/// object will be uploaded.</param>

```

```

    /// <param name="keyName">The name of the object to upload to the Amazon S3
    /// bucket.</param>
    /// <param name="base64Key">The encryption key.</param>
    /// <returns>The PutObjectRequest object for use by DownloadObjectAsync.</
returns>
    public static async Task<PutObjectRequest> UploadObjectAsync(
        IAmazonS3 client,
        string bucketName,
        string keyName,
        string base64Key)
    {
        PutObjectRequest putObjectRequest = new PutObjectRequest
        {
            BucketName = bucketName,
            Key = keyName,
            ContentBody = "sample text",
            ServerSideEncryptionCustomerMethod =
ServerSideEncryptionCustomerMethod.AES256,
            ServerSideEncryptionCustomerProvidedKey = base64Key,
        };
        PutObjectResponse putObjectResponse = await
client.PutObjectAsync(putObjectRequest);
        return putObjectRequest;
    }

    /// <summary>
    /// Downloads an encrypted object from an Amazon S3 bucket.
    /// </summary>
    /// <param name="client">The initialized Amazon S3 client object used to
call
    /// GetObjectAsync.</param>
    /// <param name="bucketName">The name of the Amazon S3 bucket where the
object
    /// is located.</param>
    /// <param name="keyName">The name of the Amazon S3 object to download.</
param>
    /// <param name="base64Key">The encryption key used to encrypt the
    /// object.</param>
    /// <param name="putObjectRequest">The PutObjectRequest used to upload
    /// the object.</param>
    public static async Task DownloadObjectAsync(
        IAmazonS3 client,
        string bucketName,
        string keyName,

```

```

        string base64Key,
        PutObjectRequest putObjectRequest)
    {
        GetObjectRequest getObjectRequest = new GetObjectRequest
        {
            BucketName = bucketName,
            Key = keyName,

            // Provide encryption information for the object stored in Amazon
S3.
            ServerSideEncryptionCustomerMethod =
ServerSideEncryptionCustomerMethod.AES256,
            ServerSideEncryptionCustomerProvidedKey = base64Key,
        };

        using (GetObjectResponse getResponse = await
client.GetObjectAsync(getObjectRequest))
            using (StreamReader reader = new
StreamReader(getResponse.ResponseStream))
            {
                string content = reader.ReadToEnd();
                if (string.Compare(putObjectRequest.ContentBody, content) == 0)
                {
                    Console.WriteLine("Object content is same as we uploaded");
                }
                else
                {
                    Console.WriteLine("Error...Object content is not same.");
                }

                if (getResponse.ServerSideEncryptionCustomerMethod ==
ServerSideEncryptionCustomerMethod.AES256)
                {
                    Console.WriteLine("Object encryption method is AES256, same as
we set");
                }
                else
                {
                    Console.WriteLine("Error...Object encryption method is not the
same as AES256 we set");
                }
            }
    }
}

```

```

    /// <summary>
    /// Retrieves the metadata associated with an Amazon S3 object.
    /// </summary>
    /// <param name="client">The initialized Amazon S3 client object used
    /// to call GetObjectMetadataAsync.</param>
    /// <param name="bucketName">The name of the Amazon S3 bucket containing the
    /// object for which we want to retrieve metadata.</param>
    /// <param name="keyName">The name of the object for which we wish to
    /// retrieve the metadata.</param>
    /// <param name="base64Key">The encryption key associated with the
    /// object.</param>
    public static async Task GetObjectMetadataAsync(
        IAmazonS3 client,
        string bucketName,
        string keyName,
        string base64Key)
    {
        GetObjectMetadataRequest getObjectMetadataRequest = new
GetObjectMetadataRequest
        {
            BucketName = bucketName,
            Key = keyName,

            // The object stored in Amazon S3 is encrypted, so provide the
            necessary encryption information.
            ServerSideEncryptionCustomerMethod =
ServerSideEncryptionCustomerMethod.AES256,
            ServerSideEncryptionCustomerProvidedKey = base64Key,
        };

        GetObjectMetadataResponse getObjectMetadataResponse = await
client.GetObjectMetadataAsync(getObjectMetadataRequest);
        Console.WriteLine("The object metadata show encryption method used is:
{0}", getObjectMetadataResponse.ServerSideEncryptionCustomerMethod);
    }

    /// <summary>
    /// Copies an encrypted object from one Amazon S3 bucket to another.
    /// </summary>
    /// <param name="client">The initialized Amazon S3 client object used to
call
    /// CopyObjectAsync.</param>
    /// <param name="bucketName">The Amazon S3 bucket containing the object
    /// to copy.</param>

```

```
/// <param name="keyName">The name of the object to copy.</param>
/// <param name="copyTargetKeyName">The Amazon S3 bucket to which the object
/// will be copied.</param>
/// <param name="aesEncryption">The encryption type to use.</param>
/// <param name="base64Key">The encryption key to use.</param>
public static async Task CopyObjectAsync(
    IAmazonS3 client,
    string bucketName,
    string keyName,
    string copyTargetKeyName,
    Aes aesEncryption,
    string base64Key)
{
    aesEncryption.GenerateKey();
    string copyBase64Key = Convert.ToBase64String(aesEncryption.Key);

    CopyObjectRequest copyRequest = new CopyObjectRequest
    {
        SourceBucket = bucketName,
        SourceKey = keyName,
        DestinationBucket = bucketName,
        DestinationKey = copyTargetKeyName,

        // Information about the source object's encryption.
        CopySourceServerSideEncryptionCustomerMethod =
ServerSideEncryptionCustomerMethod.AES256,
        CopySourceServerSideEncryptionCustomerProvidedKey = base64Key,

        // Information about the target object's encryption.
        ServerSideEncryptionCustomerMethod =
ServerSideEncryptionCustomerMethod.AES256,
        ServerSideEncryptionCustomerProvidedKey = copyBase64Key,
    };
    await client.CopyObjectAsync(copyRequest);
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的下列主題。
 - [CopyObject](#)
 - [GetObject](#)

- [GetObjectMetadata](#)

開始使用索引標籤

下列程式碼範例示範如何開始使用 Amazon S3 物件的索引標籤。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
using System;
using System.Collections.Generic;
using System.Threading.Tasks;
using Amazon;
using Amazon.S3;
using Amazon.S3.Model;

/// <summary>
/// This example shows how to work with tags in Amazon Simple Storage
/// Service (Amazon S3) objects.
/// </summary>
public class ObjectTag
{
    public static async Task Main()
    {
        string bucketName = "amzn-s3-demo-bucket";
        string keyName = "newobject.txt";
        string filePath = @"*** file path ***";

        // Specify your bucket region (an example region is shown).
        RegionEndpoint bucketRegion = RegionEndpoint.USSouth1;

        var client = new AmazonS3Client(bucketRegion);
        await PutObjectsWithTagsAsync(client, bucketName, keyName, filePath);
    }

    /// <summary>
    /// This method uploads an object with tags. It then shows the tag
```



```
/// values, changes the tags, and shows the new tags.
/// </summary>
/// <param name="client">The Initialized Amazon S3 client object used
/// to call the methods to create and change an objects tags.</param>
/// <param name="bucketName">A string representing the name of the
/// bucket where the object will be stored.</param>
/// <param name="keyName">A string representing the key name of the
/// object to be tagged.</param>
/// <param name="filePath">The directory location and file name of the
/// object to be uploaded to the Amazon S3 bucket.</param>
public static async Task PutObjectsWithTagsAsync(IAmazonS3 client, string
bucketName, string keyName, string filePath)
{
    try
    {
        // Create an object with tags.
        var putRequest = new PutObjectRequest
        {
            BucketName = bucketName,
            Key = keyName,
            FilePath = filePath,
            TagSet = new List<Tag>
            {
                new Tag { Key = "Keyx1", Value = "Value1" },
                new Tag { Key = "Keyx2", Value = "Value2" },
            },
        };

        PutObjectResponse response = await
client.PutObjectAsync(putRequest);

        // Now retrieve the new object's tags.
        GetObjectTaggingRequest getTagsRequest = new
GetObjectTaggingRequest()
        {
            BucketName = bucketName,
            Key = keyName,
        };

        GetObjectTaggingResponse objectTags = await
client.GetObjectTaggingAsync(getTagsRequest);

        // Display the tag values.
        objectTags.Tagging
```

```

        .ForEach(t => Console.WriteLine($"Key: {t.Key}, Value:
{t.Value}"));

        Tagging newTagSet = new Tagging()
        {
            TagSet = new List<Tag>
            {
                new Tag { Key = "Key3", Value = "Value3" },
                new Tag { Key = "Key4", Value = "Value4" },
            },
        };

        PutObjectTaggingRequest putObjTagsRequest = new
PutObjectTaggingRequest()
        {
            BucketName = bucketName,
            Key = keyName,
            Tagging = newTagSet,
        };

        PutObjectTaggingResponse response2 = await
client.PutObjectTaggingAsync(putObjTagsRequest);

        // Retrieve the tags again and show the values.
        GetObjectTaggingRequest getTagsRequest2 = new
GetObjectTaggingRequest()
        {
            BucketName = bucketName,
            Key = keyName,
        };
        GetObjectTaggingResponse objectTags2 = await
client.GetObjectTaggingAsync(getTagsRequest2);

        objectTags2.Tagging
            .ForEach(t => Console.WriteLine($"Key: {t.Key}, Value:
{t.Value}"));
    }
    catch (AmazonS3Exception ex)
    {
        Console.WriteLine(
            $"Error: '{ex.Message}'");
    }
}
}

```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [GetObjectTagging](#)。

鎖定 Amazon S3 物件

下列程式碼範例示範如何使用 S3 物件鎖定功能。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

執行展示 Amazon S3 物件鎖定功能的互動式情境。

```
using Amazon.S3;
using Amazon.S3.Model;
using Microsoft.Extensions.Configuration;
using Microsoft.Extensions.DependencyInjection;
using Microsoft.Extensions.Hosting;
using Microsoft.Extensions.Logging;
using Microsoft.Extensions.Logging.Console;
using Microsoft.Extensions.Logging.Debug;

namespace S3ObjectLockScenario;

public static class S3ObjectLockWorkflow
{
    /*
        Before running this .NET code example, set up your development environment,
        including your credentials.

        This .NET example performs the following tasks:
        1. Create test Amazon Simple Storage Service (S3) buckets with different
        lock policies.
        2. Upload sample objects to each bucket.
        3. Set some Legal Hold and Retention Periods on objects and buckets.
```

4. Investigate lock policies by viewing settings or attempting to delete or overwrite objects.
5. Clean up objects and buckets.

```

*/

public static S3ActionsWrapper _s3ActionsWrapper = null!;
public static IConfiguration _configuration = null!;
private static string _resourcePrefix = null!;
private static string noLockBucketName = null!;
private static string lockEnabledBucketName = null!;
private static string retentionAfterCreationBucketName = null!;
private static List<string> bucketNames = new List<string>();
private static List<string> fileNames = new List<string>();

public static async Task Main(string[] args)
{
    // Set up dependency injection for the Amazon service.
    using var host = Host.CreateDefaultBuilder(args)
        .ConfigureLogging(logging =>
            logging.AddFilter("System", LogLevel.Debug)
                .AddFilter<DebugLoggerProvider>("Microsoft",
LogLevel.Information)
                .AddFilter<ConsoleLoggerProvider>("Microsoft", LogLevel.Trace))
        .ConfigureServices((_, services) =>
            services.AddAWSService<IAmazonS3>()
                .AddTransient<S3ActionsWrapper>()
        )
        .Build();

    _configuration = new ConfigurationBuilder()
        .SetBasePath(Directory.GetCurrentDirectory())
        .AddJsonFile("settings.json") // Load settings from .json file.
        .AddJsonFile("settings.local.json",
            true) // Optionally, load local settings.
        .Build();

    ConfigurationSetup();

    ServicesSetup(host);

    try
    {
        Console.WriteLine(new string('-', 80));
    }
}

```

```

        Console.WriteLine("Welcome to the Amazon Simple Storage Service (S3)
Object Locking Feature Scenario.");
        Console.WriteLine(new string('-', 80));
        await Setup(true);

        await DemoActionChoices();

        Console.WriteLine(new string('-', 80));
        Console.WriteLine("Cleaning up resources.");
        Console.WriteLine(new string('-', 80));
        await Cleanup(true);

        Console.WriteLine(new string('-', 80));
        Console.WriteLine("Amazon S3 Object Locking Scenario is complete.");
        Console.WriteLine(new string('-', 80));
    }
    catch (Exception ex)
    {
        Console.WriteLine(new string('-', 80));
        Console.WriteLine($"There was a problem: {ex.Message}");
        await Cleanup(true);
        Console.WriteLine(new string('-', 80));
    }
}

/// <summary>
/// Populate the services for use within the console application.
/// </summary>
/// <param name="host">The services host.</param>
private static void ServicesSetup(IHost host)
{
    _s3ActionsWrapper = host.Services.GetRequiredService<S3ActionsWrapper>();
}

/// <summary>
/// Any setup operations needed.
/// </summary>
public static void ConfigurationSetup()
{
    _resourcePrefix = _configuration["resourcePrefix"] ?? "dotnet-example";

    noLockBucketName = _resourcePrefix + "-no-lock";
    lockEnabledBucketName = _resourcePrefix + "-lock-enabled";
}

```

```

        retentionAfterCreationBucketName = _resourcePrefix + "-retention-after-creation";

        bucketNames.Add(noLockBucketName);
        bucketNames.Add(lockEnabledBucketName);
        bucketNames.Add(retentionAfterCreationBucketName);
    }

    /// <summary>
    /// Deploy necessary resources for the scenario.
    /// </summary>
    /// <param name="interactive">True to run as interactive.</param>
    /// <returns>True if successful.</returns>
    public static async Task<bool> Setup(bool interactive)
    {
        Console.WriteLine(
            "\nFor this scenario, we will use the AWS SDK for .NET to create several
S3\n" +
            "buckets and files to demonstrate working with S3 locking features.\n");

        Console.WriteLine(new string('-', 80));
        Console.WriteLine("Press Enter when you are ready to start.");
        if (interactive)
            Console.ReadLine();

        Console.WriteLine("\nS3 buckets can be created either with or without object
lock enabled.");
        await _s3ActionsWrapper.CreateBucketWithObjectLock(noLockBucketName, false);
        await _s3ActionsWrapper.CreateBucketWithObjectLock(lockEnabledBucketName,
true);
        await
_s3ActionsWrapper.CreateBucketWithObjectLock(retentionAfterCreationBucketName,
false);

        Console.WriteLine("Press Enter to continue.");
        if (interactive)
            Console.ReadLine();

        Console.WriteLine("\nA bucket can be configured to use object locking with a
default retention period.");
        await
_s3ActionsWrapper.ModifyBucketDefaultRetention(retentionAfterCreationBucketName,
true,
            ObjectLockRetentionMode.Governance, DateTime.UtcNow.AddDays(1));
    }

```

```
Console.WriteLine("Press Enter to continue.");
if (interactive)
    Console.ReadLine();

Console.WriteLine("\nObject lock policies can also be added to existing
buckets.");
await _s3ActionsWrapper.EnableObjectLockOnBucket(lockEnabledBucketName);

Console.WriteLine("Press Enter to continue.");
if (interactive)
    Console.ReadLine();

// Upload some files to the buckets.
Console.WriteLine("\nNow let's add some test files:");
var fileName = _configuration["exampleFileName"] ?? "exampleFile.txt";
int fileCount = 2;
// Create the file if it does not already exist.
if (!File.Exists(fileName))
{
    await using StreamWriter sw = File.CreateText(fileName);
    await sw.WriteLineAsync(
        "This is a sample file for uploading to a bucket.");
}

foreach (var bucketName in bucketNames)
{
    for (int i = 0; i < fileCount; i++)
    {
        var numberedFileName = Path.GetFileNameWithoutExtension(fileName) +
i + Path.GetExtension(fileName);
        fileNames.Add(numberedFileName);
        await _s3ActionsWrapper.UploadFileAsync(bucketName,
numberedFileName, fileName);
    }
}
Console.WriteLine("Press Enter to continue.");
if (interactive)
    Console.ReadLine();

if (!interactive)
    return true;
Console.WriteLine("\nNow we can set some object lock policies on individual
files:");
```

```

foreach (var bucketName in bucketNames)
{
    for (int i = 0; i < fileNames.Count; i++)
    {
        // No modifications to the objects in the first bucket.
        if (bucketName != bucketNames[0])
        {
            var exampleFileName = fileNames[i];
            switch (i)
            {
                case 0:
                {
                    var question =
                        $"Would you like to add a legal hold to
{exampleFileName} in {bucketName}? (y/n)";
                    if (GetYesNoResponse(question))
                    {
                        // Set a legal hold.
                        await
_s3ActionsWrapper.ModifyObjectLegalHold(bucketName, exampleFileName,
ObjectLockLegalHoldStatus.On);
                    }
                    break;
                }
                case 1:
                {
                    var question =
                        $"Would you like to add a 1 day Governance
retention period to {exampleFileName} in {bucketName}? (y/n)" +
                        "\nReminder: Only a user with the
s3:BypassGovernanceRetention permission will be able to delete this file or its
bucket until the retention period has expired.";
                    if (GetYesNoResponse(question))
                    {
                        // Set a Governance mode retention period for 1
day.
                        await
_s3ActionsWrapper.ModifyObjectRetentionPeriod(
                            bucketName, exampleFileName,
                            ObjectLockRetentionMode.Governance,
                            DateTime.UtcNow.AddDays(1));
                    }
                    break;
                }
            }
        }
    }
}

```



```

        }
    }
}

}

Console.WriteLine(new string('-', 80));
return true;
}

// <summary>
/// List all of the current buckets and objects.
/// </summary>
/// <param name="interactive">True to run as interactive.</param>
/// <returns>The list of buckets and objects.</returns>
public static async Task<List<S3ObjectVersion>> ListBucketsAndObjects(bool
interactive)
{
    var allObjects = new List<S3ObjectVersion>();
    foreach (var bucketName in bucketNames)
    {
        var objectsInBucket = await
_s3ActionsWrapper.ListBucketObjectsAndVersions(bucketName);
        foreach (var objectKey in objectsInBucket.Versions)
        {
            allObjects.Add(objectKey);
        }
    }

    if (interactive)
    {
        Console.WriteLine("\nCurrent buckets and objects:\n");
        int i = 0;
        foreach (var bucketObject in allObjects)
        {
            i++;
            Console.WriteLine(
                $"{i}: {bucketObject.Key} \n\tBucket:
{bucketObject.BucketName}\n\tVersion: {bucketObject.VersionId}");
        }
    }

    return allObjects;
}

```

```

/// <summary>
/// Present the user with the demo action choices.
/// </summary>
/// <returns>Async task.</returns>
public static async Task<bool> DemoActionChoices()
{
    var choices = new string[]{
        "List all files in buckets.",
        "Attempt to delete a file.",
        "Attempt to delete a file with retention period bypass.",
        "Attempt to overwrite a file.",
        "View the object and bucket retention settings for a file.",
        "View the legal hold settings for a file.",
        "Finish the scenario."};

    var choice = 0;
    // Keep asking the user until they choose to move on.
    while (choice != 6)
    {
        Console.WriteLine(new string('-', 80));
        choice = GetChoiceResponse(
            "\nExplore the S3 locking features by selecting one of the following
choices:"
            , choices);
        Console.WriteLine(new string('-', 80));
        switch (choice)
        {
            case 0:
            {
                await ListBucketsAndObjects(true);
                break;
            }
            case 1:
            {
                Console.WriteLine("\nEnter the number of the object to
delete:");

                var allFiles = await ListBucketsAndObjects(true);
                var fileChoice = GetChoiceResponse(null, allFiles.Select(f
=> f.Key).ToArray());

                await
                _s3ActionsWrapper.DeleteObjectFromBucket(allFiles[fileChoice].BucketName,
allFiles[fileChoice].Key, false, allFiles[fileChoice].VersionId);
                break;
            }
        }
    }
}

```

```

        case 2:
        {
            Console.WriteLine("\nEnter the number of the object to
delete:");

            var allFiles = await ListBucketsAndObjects(true);
            var fileChoice = GetChoiceResponse(null, allFiles.Select(f
=> f.Key).ToArray());

            await
_s3ActionsWrapper.DeleteObjectFromBucket(allFiles[fileChoice].BucketName,
allFiles[fileChoice].Key, true, allFiles[fileChoice].VersionId);
            break;
        }
        case 3:
        {
            var allFiles = await ListBucketsAndObjects(true);
            Console.WriteLine("\nEnter the number of the object to
overwrite:");

            var fileChoice = GetChoiceResponse(null, allFiles.Select(f
=> f.Key).ToArray());

            // Create the file if it does not already exist.
            if (!File.Exists(allFiles[fileChoice].Key))
            {
                await using StreamWriter sw =
File.CreateText(allFiles[fileChoice].Key);
                await sw.WriteLineAsync(
                    "This is a sample file for uploading to a bucket.");
            }
            await
_s3ActionsWrapper.UploadFileAsync(allFiles[fileChoice].BucketName,
allFiles[fileChoice].Key, allFiles[fileChoice].Key);
            break;
        }
        case 4:
        {
            var allFiles = await ListBucketsAndObjects(true);
            Console.WriteLine("\nEnter the number of the object and
bucket to view:");

            var fileChoice = GetChoiceResponse(null, allFiles.Select(f
=> f.Key).ToArray());

            await
_s3ActionsWrapper.GetObjectRetention(allFiles[fileChoice].BucketName,
allFiles[fileChoice].Key);
            await
_s3ActionsWrapper.GetBucketObjectLockConfiguration(allFiles[fileChoice].BucketName);

```

```

                break;
            }
        case 5:
        {
            var allFiles = await ListBucketsAndObjects(true);
            Console.WriteLine("\nEnter the number of the object to
view:");

            var fileChoice = GetChoiceResponse(null, allFiles.Select(f
=> f.Key).ToArray());

            await
_s3ActionsWrapper.GetObjectLegalHold(allFiles[fileChoice].BucketName,
allFiles[fileChoice].Key);
            break;
        }
    }
}
return true;
}

// <summary>
/// Clean up the resources from the scenario.
/// </summary>
/// <param name="interactive">True to run as interactive.</param>
/// <returns>True if successful.</returns>
public static async Task<bool> Cleanup(bool interactive)
{
    Console.WriteLine(new string('-', 80));

    if (!interactive || GetYesNoResponse("Do you want to clean up all files and
buckets? (y/n) "))
    {
        // Remove all locks and delete all buckets and objects.
        var allFiles = await ListBucketsAndObjects(false);
        foreach (var fileInfo in allFiles)
        {
            // Check for a legal hold.
            var legalHold = await
_s3ActionsWrapper.GetObjectLegalHold(fileInfo.BucketName, fileInfo.Key);
            if (legalHold?.Status?.Value == ObjectLockLegalHoldStatus.On)
            {
                await
_s3ActionsWrapper.ModifyObjectLegalHold(fileInfo.BucketName, fileInfo.Key,
ObjectLockLegalHoldStatus.Off);
            }
        }
    }
}

```

```

        // Check for a retention period.
        var retention = await
_s3ActionsWrapper.GetObjectRetention(fileInfo.BucketName, fileInfo.Key);
        var hasRetentionPeriod = retention?.Mode ==
ObjectLockRetentionMode.Governance && retention.RetainUntilDate >
DateTime.UtcNow.Date;
        await _s3ActionsWrapper.DeleteObjectFromBucket(fileInfo.BucketName,
fileInfo.Key, hasRetentionPeriod, fileInfo.VersionId);
    }

    foreach (var bucketName in bucketNames)
    {
        await _s3ActionsWrapper.DeleteBucketByName(bucketName);
    }

}
else
{
    Console.WriteLine(
        "Ok, we'll leave the resources intact.\n" +
        "Don't forget to delete them when you're done with them or you might
incur unexpected charges."
    );
}

Console.WriteLine(new string('-', 80));
return true;
}

/// <summary>
/// Helper method to get a yes or no response from the user.
/// </summary>
/// <param name="question">The question string to print on the console.</param>
/// <returns>True if the user responds with a yes.</returns>
private static bool GetYesNoResponse(string question)
{
    Console.WriteLine(question);
    var ynResponse = Console.ReadLine();
    var response = ynResponse != null && ynResponse.Equals("y",
StringComparison.InvariantCultureIgnoreCase);
    return response;
}

```

```

    /// <summary>
    /// Helper method to get a choice response from the user.
    /// </summary>
    /// <param name="question">The question string to print on the console.</param>
    /// <param name="choices">The choices to print on the console.</param>
    /// <returns>The index of the selected choice</returns>
    private static int GetChoiceResponse(string? question, string[] choices)
    {
        if (question != null)
        {
            Console.WriteLine(question);

            for (int i = 0; i < choices.Length; i++)
            {
                Console.WriteLine($"{i + 1}. {choices[i]}");
            }
        }

        var choiceNumber = 0;
        while (choiceNumber < 1 || choiceNumber > choices.Length)
        {
            var choice = Console.ReadLine();
            Int32.TryParse(choice, out choiceNumber);
        }

        return choiceNumber - 1;
    }
}

```

S3 函數的包裝函式類別。

```

using System.Net;
using Amazon.S3;
using Amazon.S3.Model;
using Microsoft.Extensions.Configuration;

namespace S3ObjectLockScenario;

/// <summary>
/// Encapsulate the Amazon S3 operations.
/// </summary>

```

```

public class S3ActionsWrapper
{
    private readonly IAmazonS3 _amazonS3;

    /// <summary>
    /// Constructor for the S3ActionsWrapper.
    /// </summary>
    /// <param name="amazonS3">The injected S3 client.</param>
    public S3ActionsWrapper(IAmazonS3 amazonS3, IConfiguration configuration)
    {
        _amazonS3 = amazonS3;
    }

    /// <summary>
    /// Create a new Amazon S3 bucket with object lock actions.
    /// </summary>
    /// <param name="bucketName">The name of the bucket to create.</param>
    /// <param name="enableObjectLock">True to enable object lock on the bucket.</
param>
    /// <returns>True if successful.</returns>
    public async Task<bool> CreateBucketWithObjectLock(string bucketName, bool
enableObjectLock)
    {
        Console.WriteLine($"\\tCreating bucket {bucketName} with object lock
{enableObjectLock}.");
        try
        {
            var request = new PutBucketRequest
            {
                BucketName = bucketName,
                UseClientRegion = true,
                ObjectLockEnabledForBucket = enableObjectLock,
            };

            var response = await _amazonS3.PutBucketAsync(request);

            return response.HttpStatusCode == System.Net.HttpStatusCode.OK;
        }
        catch (AmazonS3Exception ex)
        {
            Console.WriteLine($"Error creating bucket: '{ex.Message}'");
            return false;
        }
    }
}

```

```

    /// <summary>
    /// Enable object lock on an existing bucket.
    /// </summary>
    /// <param name="bucketName">The name of the bucket to modify.</param>
    /// <returns>True if successful.</returns>
    public async Task<bool> EnableObjectLockOnBucket(string bucketName)
    {
        try
        {
            // First, enable Versioning on the bucket.
            await _amazonS3.PutBucketVersioningAsync(new
PutBucketVersioningRequest()
            {
                BucketName = bucketName,
                VersioningConfig = new S3BucketVersioningConfig()
                {
                    EnableMfaDelete = false,
                    Status = VersionStatus.Enabled
                }
            });

            var request = new PutObjectLockConfigurationRequest()
            {
                BucketName = bucketName,
                ObjectLockConfiguration = new ObjectLockConfiguration()
                {
                    ObjectLockEnabled = new ObjectLockEnabled("Enabled"),
                },
            };

            var response = await _amazonS3.PutObjectLockConfigurationAsync(request);
            Console.WriteLine($"\\tAdded an object lock policy to bucket
{bucketName}.");
            return response.HttpStatusCode == System.Net.HttpStatusCode.OK;
        }
        catch (AmazonS3Exception ex)
        {
            Console.WriteLine($"Error modifying object lock: '{ex.Message}'");
            return false;
        }
    }

    /// <summary>

```



```

    /// Set or modify a retention period on an object in an S3 bucket.
    /// </summary>
    /// <param name="bucketName">The bucket of the object.</param>
    /// <param name="objectKey">The key of the object.</param>
    /// <param name="retention">The retention mode.</param>
    /// <param name="retainUntilDate">The date retention expires.</param>
    /// <returns>True if successful.</returns>
    public async Task<bool> ModifyObjectRetentionPeriod(string bucketName,
        string objectKey, ObjectLockRetentionMode retention, DateTime
retainUntilDate)
    {
        try
        {
            var request = new PutObjectRetentionRequest()
            {
                BucketName = bucketName,
                Key = objectKey,
                Retention = new ObjectLockRetention()
                {
                    Mode = retention,
                    RetainUntilDate = retainUntilDate
                }
            };

            var response = await _amazonS3.PutObjectRetentionAsync(request);
            Console.WriteLine($"\\tSet retention for {objectKey} in {bucketName}
until {retainUntilDate:d}.");
            return response.HttpStatusCode == System.Net.HttpStatusCode.OK;
        }
        catch (AmazonS3Exception ex)
        {
            Console.WriteLine($"\\tError modifying retention period:
'{ex.Message}'");
            return false;
        }
    }

    /// <summary>
    /// Set or modify a retention period on an S3 bucket.
    /// </summary>
    /// <param name="bucketName">The bucket to modify.</param>
    /// <param name="retention">The retention mode.</param>
    /// <param name="retainUntilDate">The date for retention until.</param>
    /// <returns>True if successful.</returns>

```

```

public async Task<bool> ModifyBucketDefaultRetention(string bucketName, bool
enableObjectLock, ObjectLockRetentionMode retention, DateTime retainUntilDate)
{
    var enabledString = enableObjectLock ? "Enabled" : "Disabled";
    var timeDifference = retainUntilDate.Subtract(DateTime.Now);
    try
    {
        // First, enable Versioning on the bucket.
        await _amazonS3.PutBucketVersioningAsync(new
PutBucketVersioningRequest()
        {
            BucketName = bucketName,
            VersioningConfig = new S3BucketVersioningConfig()
            {
                EnableMfaDelete = false,
                Status = VersionStatus.Enabled
            }
        });

        var request = new PutObjectLockConfigurationRequest()
        {
            BucketName = bucketName,
            ObjectLockConfiguration = new ObjectLockConfiguration()
            {
                ObjectLockEnabled = new ObjectLockEnabled(enabledString),
                Rule = new ObjectLockRule()
                {
                    DefaultRetention = new DefaultRetention()
                    {
                        Mode = retention,
                        Days = timeDifference.Days // Can be specified in days
or years but not both.
                    }
                }
            }
        };

        var response = await _amazonS3.PutObjectLockConfigurationAsync(request);
        Console.WriteLine($"{bucketName}\tAdded a default retention to bucket
{bucketName}.");
        return response.HttpStatusCode == System.Net.HttpStatusCode.OK;
    }
    catch (AmazonS3Exception ex)
    {

```

```

        Console.WriteLine($"\\tError modifying object lock: '{ex.Message}'");
        return false;
    }
}

/// <summary>
/// Get the retention period for an S3 object.
/// </summary>
/// <param name="bucketName">The bucket of the object.</param>
/// <param name="objectKey">The object key.</param>
/// <returns>The object retention details.</returns>
public async Task<ObjectLockRetention> GetObjectRetention(string bucketName,
    string objectKey)
{
    try
    {
        var request = new GetObjectRetentionRequest()
        {
            BucketName = bucketName,
            Key = objectKey
        };

        var response = await _amazonS3.GetObjectRetentionAsync(request);
        Console.WriteLine($"\\tObject retention for {objectKey} in {bucketName}:
" +
                        $"\\n\\t{response.Retention.Mode} until
{response.Retention.RetainUntilDate:d}."");
        return response.Retention;
    }
    catch (AmazonS3Exception ex)
    {
        Console.WriteLine($"\\tUnable to fetch object lock retention:
'{ex.Message}'");
        return new ObjectLockRetention();
    }
}

/// <summary>
/// Set or modify a legal hold on an object in an S3 bucket.
/// </summary>
/// <param name="bucketName">The bucket of the object.</param>
/// <param name="objectKey">The key of the object.</param>
/// <param name="holdStatus">The On or Off status for the legal hold.</param>
/// <returns>True if successful.</returns>

```

```

public async Task<bool> ModifyObjectLegalHold(string bucketName,
    string objectKey, ObjectLockLegalHoldStatus holdStatus)
{
    try
    {
        var request = new PutObjectLegalHoldRequest()
        {
            BucketName = bucketName,
            Key = objectKey,
            LegalHold = new ObjectLockLegalHold()
            {
                Status = holdStatus
            }
        };

        var response = await _amazonS3.PutObjectLegalHoldAsync(request);
        Console.WriteLine($"\\tModified legal hold for {objectKey} in
{bucketName}.");
        return response.HttpStatusCode == System.Net.HttpStatusCode.OK;
    }
    catch (AmazonS3Exception ex)
    {
        Console.WriteLine($"\\tError modifying legal hold: '{ex.Message}'");
        return false;
    }
}

/// <summary>
/// Get the legal hold details for an S3 object.
/// </summary>
/// <param name="bucketName">The bucket of the object.</param>
/// <param name="objectKey">The object key.</param>
/// <returns>The object legal hold details.</returns>
public async Task<ObjectLockLegalHold> GetObjectLegalHold(string bucketName,
    string objectKey)
{
    try
    {
        var request = new GetObjectLegalHoldRequest()
        {
            BucketName = bucketName,
            Key = objectKey
        };
    }
}

```

```

        var response = await _amazonS3.GetObjectLegalHoldAsync(request);
        Console.WriteLine($"\\tObject legal hold for {objectKey} in {bucketName}:
" +
            $"\\n\\tStatus: {response.LegalHold.Status}");
        return response.LegalHold;
    }
    catch (AmazonS3Exception ex)
    {
        Console.WriteLine($"\\tUnable to fetch legal hold: '{ex.Message}'");
        return new ObjectLockLegalHold();
    }
}

/// <summary>
/// Get the object lock configuration details for an S3 bucket.
/// </summary>
/// <param name="bucketName">The bucket to get details.</param>
/// <returns>The bucket's object lock configuration details.</returns>
public async Task<ObjectLockConfiguration>
GetBucketObjectLockConfiguration(string bucketName)
{
    try
    {
        var request = new GetObjectLockConfigurationRequest()
        {
            BucketName = bucketName
        };

        var response = await _amazonS3.GetObjectLockConfigurationAsync(request);
        Console.WriteLine($"\\tBucket object lock config for {bucketName} in
{bucketName}: " +
            $"\\n\\tEnabled:
{response.ObjectLockConfiguration.ObjectLockEnabled}" +
            $"\\n\\tRule:
{response.ObjectLockConfiguration.Rule?.DefaultRetention}");

        return response.ObjectLockConfiguration;
    }
    catch (AmazonS3Exception ex)
    {
        Console.WriteLine($"\\tUnable to fetch object lock config:
'{ex.Message}'");
        return new ObjectLockConfiguration();
    }
}

```

```

    }

    /// <summary>
    /// Upload a file from the local computer to an Amazon S3 bucket.
    /// </summary>
    /// <param name="bucketName">The Amazon S3 bucket to use.</param>
    /// <param name="objectName">The object to upload.</param>
    /// <param name="filePath">The path, including file name, of the object to
upload.</param>
    /// <returns>True if success.</returns>
    public async Task<bool> UploadFileAsync(string bucketName, string objectName,
string filePath)
    {
        var request = new PutObjectRequest
        {
            BucketName = bucketName,
            Key = objectName,
            FilePath = filePath,
            ChecksumAlgorithm = ChecksumAlgorithm.SHA256
        };

        var response = await _amazonS3.PutObjectAsync(request);
        if (response.HttpStatusCode == System.Net.HttpStatusCode.OK)
        {
            Console.WriteLine($"\\tSuccessfully uploaded {objectName} to
{bucketName}.");
            return true;
        }
        else
        {
            Console.WriteLine($"\\tCould not upload {objectName} to {bucketName}.");
            return false;
        }
    }

    /// <summary>
    /// List bucket objects and versions.
    /// </summary>
    /// <param name="bucketName">The Amazon S3 bucket to use.</param>
    /// <returns>The list of objects and versions.</returns>
    public async Task<ListVersionsResponse> ListBucketObjectsAndVersions(string
bucketName)
    {
        var request = new ListVersionsRequest()

```

```

    {
        BucketName = bucketName
    };

    var response = await _amazonS3.ListVersionsAsync(request);
    return response;
}

/// <summary>
/// Delete an object from a specific bucket.
/// </summary>
/// <param name="bucketName">The Amazon S3 bucket to use.</param>
/// <param name="objectKey">The key of the object to delete.</param>
/// <param name="hasRetention">True if the object has retention settings.</
param>
/// <param name="versionId">Optional versionId.</param>
/// <returns>True if successful.</returns>
public async Task<bool> DeleteObjectFromBucket(string bucketName, string
objectKey, bool hasRetention, string? versionId = null)
{
    try
    {
        var request = new DeleteObjectRequest()
        {
            BucketName = bucketName,
            Key = objectKey,
            VersionId = versionId,
        };
        if (hasRetention)
        {
            // Set the BypassGovernanceRetention header
            // if the file has retention settings.
            request.BypassGovernanceRetention = true;
        }
        await _amazonS3.DeleteObjectAsync(request);
        Console.WriteLine(
            $"Deleted {objectKey} in {bucketName}.");
        return true;
    }
    catch (AmazonS3Exception ex)
    {
        Console.WriteLine($"Unable to delete object {objectKey} in bucket
{bucketName}: " + ex.Message);
        return false;
    }
}

```

```

    }
}

/// <summary>
/// Delete a specific bucket.
/// </summary>
/// <param name="bucketName">The Amazon S3 bucket to use.</param>
/// <param name="objectKey">The key of the object to delete.</param>
/// <param name="versionId">Optional versionId.</param>
/// <returns>True if successful.</returns>
public async Task<bool> DeleteBucketByName(string bucketName)
{
    try
    {
        var request = new DeleteBucketRequest() { BucketName = bucketName, };
        var response = await _amazonS3.DeleteBucketAsync(request);
        Console.WriteLine($"\\tDelete for {bucketName} complete.");
        return response.HttpStatusCode == HttpStatusCode.OK;
    }
    catch (AmazonS3Exception ex)
    {
        Console.WriteLine($"\\tUnable to delete bucket {bucketName}: " +
ex.Message);
        return false;
    }
}
}

```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的下列主題。

- [GetObjectLegalHold](#)
- [GetObjectLockConfiguration](#)
- [GetObjectRetention](#)
- [PutObjectLegalHold](#)
- [PutObjectLockConfiguration](#)
- [PutObjectRetention](#)

提出條件式請求

下列程式碼範例示範如何將先決條件新增至 Amazon S3 請求。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

執行展示 Amazon S3 條件式請求功能的互動式情境。

```
using Amazon.S3;
using Microsoft.Extensions.Configuration;
using Microsoft.Extensions.DependencyInjection;
using Microsoft.Extensions.Hosting;
using Microsoft.Extensions.Logging;
using Microsoft.Extensions.Logging.Console;
using Microsoft.Extensions.Logging.Debug;

namespace S3ConditionalRequestsScenario;

public static class S3ConditionalRequestsScenario
{
    /*
     Before running this .NET code example, set up your development environment,
     including your credentials.

     This example demonstrates the use of conditional requests for S3 operations.
     You can use conditional requests to add preconditions to S3 read requests to
     return or copy
     an object based on its Entity tag (ETag), or last modified date.
     You can use a conditional write requests to prevent overwrites by ensuring
     there is no existing object with the same key.
    */

    public static S3ActionsWrapper _s3ActionsWrapper = null!;
    public static IConfiguration _configuration = null!;
    public static string _resourcePrefix = null!;
    public static string _sourceBucketName = null!;
```

```
public static string _destinationBucketName = null!;  
public static string _sampleObjectKey = null!;  
public static string _sampleObjectEtag = null!;  
public static bool _interactive = true;  
  
public static async Task Main(string[] args)  
{  
    // Set up dependency injection for the Amazon service.  
    using var host = Host.CreateDefaultBuilder(args)  
        .ConfigureLogging(logging =>  
            logging.AddFilter("System", LogLevel.Debug)  
                .AddFilter<DebugLoggerProvider>("Microsoft",  
LogLevel.Information)  
                .AddFilter<ConsoleLoggerProvider>("Microsoft", LogLevel.Trace))  
        .ConfigureServices((_, services) =>  
            services.AddAWSService<IAmazonS3>()  
                .AddTransient<S3ActionsWrapper>()  
        )  
        .Build();  
  
    _configuration = new ConfigurationBuilder()  
        .SetBasePath(Directory.GetCurrentDirectory())  
        .AddJsonFile("settings.json") // Load settings from .json file.  
        .AddJsonFile("settings.local.json",  
            true) // Optionally, load local settings.  
        .Build();  
  
    ServicesSetup(host);  
  
    try  
    {  
        Console.WriteLine(new string('-', 80));  
        Console.WriteLine("Welcome to the Amazon Simple Storage Service (S3)  
Conditional Requests Feature Scenario.");  
        Console.WriteLine(new string('-', 80));  
        ConfigurationSetup();  
        _sampleObjectEtag = await Setup(_sourceBucketName,  
_destinationBucketName, _sampleObjectKey);  
  
        await DisplayDemoChoices(_sourceBucketName, _destinationBucketName,  
_sampleObjectKey, _sampleObjectEtag, 0);  
  
        Console.WriteLine(new string('-', 80));
```

```

        Console.WriteLine("Cleaning up resources.");
        Console.WriteLine(new string('-', 80));
        await Cleanup(true);

        Console.WriteLine(new string('-', 80));
        Console.WriteLine("Amazon S3 Conditional Requests Feature Scenario is
complete.");
        Console.WriteLine(new string('-', 80));
    }
    catch (Exception ex)
    {
        Console.WriteLine(new string('-', 80));
        Console.WriteLine($"There was a problem: {ex.Message}");
        await CleanupScenario(_sourceBucketName, _destinationBucketName);
        Console.WriteLine(new string('-', 80));
    }
}

/// <summary>
/// Populate the services for use within the console application.
/// </summary>
/// <param name="host">The services host.</param>
private static void ServicesSetup(IHost host)
{
    _s3ActionsWrapper = host.Services.GetRequiredService<S3ActionsWrapper>();
}

/// <summary>
/// Any setup operations needed.
/// </summary>
public static void ConfigurationSetup()
{
    _resourcePrefix = _configuration["resourcePrefix"] ?? "dotnet-example";

    _sourceBucketName = _resourcePrefix + "-source";
    _destinationBucketName = _resourcePrefix + "-dest";
    _sampleObjectKey = _resourcePrefix + "-sample-object.txt";
}

/// <summary>
/// Sets up the scenario by creating a source and destination bucket, and
uploading a test file to the source bucket.
/// </summary>
/// <param name="sourceBucket">The name of the source bucket.</param>

```

```

    /// <param name="destBucket">The name of the destination bucket.</param>
    /// <param name="objectKey">The name of the test file to add to the source
    bucket.</param>
    /// <returns>The ETag of the uploaded test file.</returns>
    public static async Task<string> Setup(string sourceBucket, string destBucket,
    string objectKey)
    {
        Console.WriteLine(
            "\nFor this scenario, we will use the AWS SDK for .NET to create several
    S3\n" +
            "buckets and files to demonstrate working with S3 conditional requests.
\n" +
            "This example demonstrates the use of conditional requests for S3
    operations.\r\n" +
            "You can use conditional requests to add preconditions to S3 read
    requests to return or copy\r\n" +
            "an object based on its Entity tag (ETag), or last modified date. \r\n"
    +
            "You can use a conditional write requests to prevent overwrites by
    ensuring \r\n" +
            "there is no existing object with the same key. \r\n\r\n" +
            "This example will allow you to perform conditional reads\r\n" +
            "and writes that will succeed or fail based on your selected options.\r
\n\r\n" +
            "Sample buckets and a sample object will be created as part of the
    example.");

        Console.WriteLine(new string('-', 80));
        Console.WriteLine("Press Enter when you are ready to start.");
        if (_interactive)
            Console.ReadLine();

        await _s3ActionsWrapper.CreateBucketWithName(sourceBucket);
        await _s3ActionsWrapper.CreateBucketWithName(destBucket);

        var eTag = await _s3ActionsWrapper.PutObjectConditional(objectKey,
    sourceBucket,
        "Test file content.");

        return eTag;
    }

    /// <summary>
    /// Cleans up the scenario by deleting the source and destination buckets.

```

```

    /// </summary>
    /// <param name="sourceBucket">The name of the source bucket.</param>
    /// <param name="destBucket">The name of the destination bucket.</param>
    public static async Task CleanupScenario(string sourceBucket, string destBucket)
    {
        await _s3ActionsWrapper.CleanupBucketByName(sourceBucket);
        await _s3ActionsWrapper.CleanupBucketByName(destBucket);
    }

    /// <summary>
    /// Displays a list of the objects in the test buckets.
    /// </summary>
    /// <param name="sourceBucket">The name of the source bucket.</param>
    /// <param name="destBucket">The name of the destination bucket.</param>
    public static async Task DisplayBuckets(string sourceBucket, string destBucket)
    {
        await _s3ActionsWrapper.ListBucketContentsByName(sourceBucket);
        await _s3ActionsWrapper.ListBucketContentsByName(destBucket);
    }

    /// <summary>
    /// Displays the menu of conditional request options for the user.
    /// </summary>
    /// <param name="sourceBucket">The name of the source bucket.</param>
    /// <param name="destBucket">The name of the destination bucket.</param>
    /// <param name="objectKey">The key of the test object in the source bucket.</
param>
    /// <param name="etag">The ETag of the test object in the source bucket.</param>
    public static async Task DisplayDemoChoices(string sourceBucket, string
destBucket, string objectKey, string etag, int defaultChoice)
    {
        var actions = new[]
        {
            "Print a list of bucket items.",
            "Perform a conditional read.",
            "Perform a conditional copy.",
            "Perform a conditional write.",
            "Clean up and exit."
        };

        var conditions = new[]
        {
            "If-Match: using the object's ETag. This condition should succeed.",
            "If-None-Match: using the object's ETag. This condition should fail.",

```

```

        "If-Modified-Since: using yesterday's date. This condition should
succeed.",
        "If-Unmodified-Since: using yesterday's date. This condition should
fail."
    };

    var conditionTypes = new[]
    {
        S3ConditionType.IfMatch,
        S3ConditionType.IfNoneMatch,
        S3ConditionType.IfModifiedSince,
        S3ConditionType.IfUnmodifiedSince,
    };

    var yesterdayDate = DateTime.UtcNow.AddDays(-1);

    int choice;
    while ((choice = GetChoiceResponse("\nExplore the S3 conditional request
features by selecting one of the following choices:", actions, defaultChoice)) !=
4)
    {
        switch (choice)
        {
            case 0:
                Console.WriteLine("Listing the objects and buckets.");
                await DisplayBuckets(sourceBucket, destBucket);
                break;
            case 1:
                int conditionTypeIndex = GetChoiceResponse("Perform a
conditional read:", conditions, 1);
                if (conditionTypeIndex == 0 || conditionTypeIndex == 1)
                {
                    await _s3ActionsWrapper.GetObjectConditional(objectKey,
sourceBucket, conditionTypes[conditionTypeIndex], null, _sampleObjectEtag);
                }
                else if (conditionTypeIndex == 2 || conditionTypeIndex == 3)
                {
                    await _s3ActionsWrapper.GetObjectConditional(objectKey,
sourceBucket, conditionTypes[conditionTypeIndex], yesterdayDate);
                }
                break;
            case 2:
                int copyConditionTypeIndex = GetChoiceResponse("Perform a
conditional copy:", conditions, 1);

```

```

        string destKey = GetStringResponse("Enter an object key:",
"sampleObjectKey");
        if (copyConditionTypeIndex == 0 || copyConditionTypeIndex == 1)
        {
            await _s3ActionsWrapper.CopyObjectConditional(objectKey,
destKey, sourceBucket, destBucket, conditionTypes[copyConditionTypeIndex], null,
etag);
        }
        else if (copyConditionTypeIndex == 2 || copyConditionTypeIndex
== 3)
        {
            await _s3ActionsWrapper.CopyObjectConditional(objectKey,
destKey, sourceBucket, destBucket, conditionTypes[copyConditionTypeIndex],
yesterdayDate);
        }
        break;
    case 3:
        Console.WriteLine("Perform a conditional write using IfNoneMatch
condition on the object key.");
        Console.WriteLine("If the key is a duplicate, the write will
fail.");
        string newObjectKey = GetStringResponse("Enter an object key:",
"newObjectKey");
        await _s3ActionsWrapper.PutObjectConditional(newObjectKey,
sourceBucket, "Conditional write example data.");
        break;
    }

    if (!_interactive)
    {
        break;
    }
}

Console.WriteLine("Proceeding to cleanup.");
}

/// <summary>
/// Clean up the resources from the scenario.
/// </summary>
/// <param name="interactive">True to run as interactive.</param>
/// <returns>True if successful.</returns>
public static async Task<bool> Cleanup(bool interactive)
{

```

```

        Console.WriteLine(new string('-', 80));

        if (!interactive || GetYesNoResponse("Do you want to clean up all files and
buckets? (y/n) "))
        {
            await _s3ActionsWrapper.CleanUpBucketByName(_sourceBucketName);
            await _s3ActionsWrapper.CleanUpBucketByName(_destinationBucketName);

        }
        else
        {
            Console.WriteLine(
                "Ok, we'll leave the resources intact.\n" +
                "Don't forget to delete them when you're done with them or you might
incur unexpected charges."
            );
        }

        Console.WriteLine(new string('-', 80));
        return true;
    }

    /// <summary>
    /// Helper method to get a yes or no response from the user.
    /// </summary>
    /// <param name="question">The question string to print on the console.</param>
    /// <returns>True if the user responds with a yes.</returns>
    private static bool GetYesNoResponse(string question)
    {
        Console.WriteLine(question);
        var ynResponse = Console.ReadLine();
        var response = ynResponse != null && ynResponse.Equals("y",
StringComparison.InvariantCultureIgnoreCase);
        return response;
    }

    /// <summary>
    /// Helper method to get a choice response from the user.
    /// </summary>
    /// <param name="question">The question string to print on the console.</param>
    /// <param name="choices">The choices to print on the console.</param>
    /// <returns>The index of the selected choice</returns>
    private static int GetChoiceResponse(string? question, string[] choices, int
defaultChoice)

```



```

{
    if (question != null)
    {
        Console.WriteLine(question);

        for (int i = 0; i < choices.Length; i++)
        {
            Console.WriteLine($"{i + 1}. {choices[i]}");
        }
    }

    if (!_interactive)
        return defaultChoice;

    var choiceNumber = 0;
    while (choiceNumber < 1 || choiceNumber > choices.Length)
    {
        var choice = Console.ReadLine();
        Int32.TryParse(choice, out choiceNumber);
    }

    return choiceNumber - 1;
}

/// <summary>
/// Get a string response from the user.
/// </summary>
/// <param name="question">The question to print.</param>
/// <param name="defaultAnswer">A default answer to use when not interactive.</
param>
/// <returns>The string response.</returns>
public static string GetStringResponse(string? question, string defaultAnswer)
{
    string? answer = "";
    if (!_interactive)
    {
        do
        {
            Console.WriteLine(question);
            answer = Console.ReadLine();
        } while (string.IsNullOrEmpty(answer));
    }
    else
    {

```

```
        answer = defaultAnswer;
    }

    return answer;
}
}
```

S3 函數的包裝函式類別。

```
using System.Net;
using Amazon.S3;
using Amazon.S3.Model;
using Microsoft.Extensions.Logging;

namespace S3ConditionalRequestsScenario;

/// <summary>
/// Encapsulate the Amazon S3 operations.
/// </summary>
public class S3ActionsWrapper
{
    private readonly IAmazonS3 _amazonS3;
    private readonly ILogger<S3ActionsWrapper> _logger;

    /// <summary>
    /// Constructor for the S3ActionsWrapper.
    /// </summary>
    /// <param name="amazonS3">The injected S3 client.</param>
    /// <param name="logger">The class logger.</param>
    public S3ActionsWrapper(IAmazonS3 amazonS3, ILogger<S3ActionsWrapper> logger)
    {
        _amazonS3 = amazonS3;
        _logger = logger;
    }

    /// <summary>
    /// Retrieves an object from Amazon S3 with a conditional request.
    /// </summary>
    /// <param name="objectKey">The key of the object to retrieve.</param>
    /// <param name="sourceBucket">The source bucket of the object.</param>
```

```

    /// <param name="conditionType">The type of condition: 'IfMatch', 'IfNoneMatch',
    'IfModifiedSince', 'IfUnmodifiedSince'.</param>
    /// <param name="conditionDateValue">The value to use for the condition for
    dates.</param>
    /// <param name="etagConditionalValue">The value to use for the condition for
    etags.</param>
    /// <returns>True if the conditional read is successful, False otherwise.</
returns>
    public async Task<bool> GetObjectConditional(string objectKey, string
sourceBucket,
        S3ConditionType conditionType, DateTime? conditionDateValue = null, string?
etagConditionalValue = null)
    {
        try
        {
            var getObjectRequest = new GetObjectRequest
            {
                BucketName = sourceBucket,
                Key = objectKey
            };

            switch (conditionType)
            {
                case S3ConditionType.IfMatch:
                    getObjectRequest.EtagToMatch = etagConditionalValue;
                    break;
                case S3ConditionType.IfNoneMatch:
                    getObjectRequest.EtagToNotMatch = etagConditionalValue;
                    break;
                case S3ConditionType.IfModifiedSince:
                    getObjectRequest.ModifiedSinceDateUtc =
conditionDateValue.GetValueOrDefault();
                    break;
                case S3ConditionType.IfUnmodifiedSince:
                    getObjectRequest.UnmodifiedSinceDateUtc =
conditionDateValue.GetValueOrDefault();
                    break;
                default:
                    throw new ArgumentOutOfRangeException(nameof(conditionType),
conditionType, null);
            }

            var response = await _amazonS3.GetObjectAsync(getObjectRequest);
            var sampleBytes = new byte[20];

```

```

        await response.ResponseStream.ReadAsync(sampleBytes, 0, 20);
        _logger.LogInformation($"Conditional read successful. Here are the first
20 bytes of the object:\n{System.Text.Encoding.UTF8.GetString(sampleBytes)}");
        return true;
    }
    catch (AmazonS3Exception e)
    {
        if (e.ErrorCode == "PreconditionFailed")
        {
            _logger.LogError("Conditional read failed: Precondition failed");
        }
        else if (e.ErrorCode == "NotModified")
        {
            _logger.LogError("Conditional read failed: Object not modified");
        }
        else
        {
            _logger.LogError($"Unexpected error: {e.ErrorCode}");
            throw;
        }
        return false;
    }
}

/// <summary>
/// Uploads an object to Amazon S3 with a conditional request. Prevents
overwrite using an IfNoneMatch condition for the object key.
/// </summary>
/// <param name="objectKey">The key of the object to upload.</param>
/// <param name="bucket">The source bucket of the object.</param>
/// <param name="content">The content to upload as a string.</param>
/// <returns>The ETag if the conditional write is successful, empty otherwise.</
returns>
    public async Task<string> PutObjectConditional(string objectKey, string bucket,
string content)
    {
        try
        {
            var putObjectRequest = new PutObjectRequest
            {
                BucketName = bucket,
                Key = objectKey,
                ContentBody = content,
                IfNoneMatch = "*"
            }
        }
    }
}

```

```

        };

        var putResult = await _amazonS3.PutObjectAsync(putObjectRequest);
        _logger.LogInformation($"Conditional write successful for key
{objectKey} in bucket {bucket}.");
        return putResult.ETag;
    }
    catch (AmazonS3Exception e)
    {
        if (e.ErrorCode == "PreconditionFailed")
        {
            _logger.LogError("Conditional write failed: Precondition failed");
        }
        else
        {
            _logger.LogError($"Unexpected error: {e.ErrorCode}");
            throw;
        }
        return string.Empty;
    }
}

/// <summary>
/// Copies an object from one Amazon S3 bucket to another with a conditional
request.
/// </summary>
/// <param name="sourceKey">The key of the source object to copy.</param>
/// <param name="destKey">The key of the destination object.</param>
/// <param name="sourceBucket">The source bucket of the object.</param>
/// <param name="destBucket">The destination bucket of the object.</param>
/// <param name="conditionType">The type of condition to apply, e.g.
'CopySourceIfMatch', 'CopySourceIfNoneMatch', 'CopySourceIfModifiedSince',
'CopySourceIfUnmodifiedSince'.</param>
/// <param name="conditionDateValue">The value to use for the condition for
dates.</param>
/// <param name="etagConditionalValue">The value to use for the condition for
etags.</param>
/// <returns>True if the conditional copy is successful, False otherwise.</
returns>
public async Task<bool> CopyObjectConditional(string sourceKey, string destKey,
string sourceBucket, string destBucket,
    S3ConditionType conditionType, DateTime? conditionDateValue = null, string?
etagConditionalValue = null)
{

```

```
try
{
    var copyObjectRequest = new CopyObjectRequest
    {
        DestinationBucket = destBucket,
        DestinationKey = destKey,
        SourceBucket = sourceBucket,
        SourceKey = sourceKey
    };

    switch (conditionType)
    {
        case S3ConditionType.IfMatch:
            copyObjectRequest.ETagToMatch = etagConditionalValue;
            break;
        case S3ConditionType.IfNoneMatch:
            copyObjectRequest.ETagToNotMatch = etagConditionalValue;
            break;
        case S3ConditionType.IfModifiedSince:
            copyObjectRequest.ModifiedSinceDateUtc =
conditionDateValue.GetValueOrDefault();
            break;
        case S3ConditionType.IfUnmodifiedSince:
            copyObjectRequest.UnmodifiedSinceDateUtc =
conditionDateValue.GetValueOrDefault();
            break;
        default:
            throw new ArgumentOutOfRangeException(nameof(conditionType),
conditionType, null);
    }

    await _amazonS3.CopyObjectAsync(copyObjectRequest);
    _logger.LogInformation($"Conditional copy successful for key {destKey}
in bucket {destBucket}.");
    return true;
}
catch (AmazonS3Exception e)
{
    if (e.ErrorCode == "PreconditionFailed")
    {
        _logger.LogError("Conditional copy failed: Precondition failed");
    }
    else if (e.ErrorCode == "304")
    {

```

```

        _logger.LogError("Conditional copy failed: Object not modified");
    }
    else
    {
        _logger.LogError($"Unexpected error: {e.ErrorCode}");
        throw;
    }
    return false;
}
}

/// <summary>
/// Create a new Amazon S3 bucket with a specified name and check that the
bucket is ready.
/// </summary>
/// <param name="bucketName">The name of the bucket to create.</param>
/// <returns>True if successful.</returns>
public async Task<bool> CreateBucketWithName(string bucketName)
{
    Console.WriteLine($"\\tCreating bucket {bucketName}.");
    try
    {
        var request = new PutBucketRequest
        {
            BucketName = bucketName,
            UseClientRegion = true
        };

        await _amazonS3.PutBucketAsync(request);
        var bucketReady = false;
        var retries = 5;
        while (!bucketReady && retries > 0)
        {
            Thread.Sleep(5000);
            bucketReady = await
Amazon.S3.Util.AmazonS3Util.DoesS3BucketExistV2Async(_amazonS3, bucketName);
            retries--;
        }

        return bucketReady;
    }
    catch (BucketAlreadyExistsException ex)
    {
        Console.WriteLine($"Bucket already exists: '{ex.Message}'");
    }
}

```

```

        return true;
    }
    catch (AmazonS3Exception ex)
    {
        Console.WriteLine($"Error creating bucket: '{ex.Message}'");
        return false;
    }
}

/// <summary>
/// Cleans up objects and deletes the bucket by name.
/// </summary>
/// <param name="bucketName">The name of the bucket.</param>
/// <returns>Async task.</returns>
public async Task CleanupBucketByName(string bucketName)
{
    try
    {
        var listObjectsResponse = await _amazonS3.ListObjectsV2Async(new
ListObjectsV2Request { BucketName = bucketName });
        foreach (var obj in listObjectsResponse.S3Objects)
        {
            await _amazonS3.DeleteObjectAsync(new DeleteObjectRequest
{ BucketName = bucketName, Key = obj.Key });
        }
        await _amazonS3.DeleteBucketAsync(new DeleteBucketRequest { BucketName =
bucketName });
        Console.WriteLine($"Cleaned up bucket: {bucketName}.");
    }
    catch (AmazonS3Exception e)
    {
        if (e.ErrorCode == "NoSuchBucket")
        {
            Console.WriteLine($"Bucket {bucketName} does not exist, skipping
cleanup.");
        }
        else
        {
            Console.WriteLine($"Error deleting bucket: {e.ErrorCode}");
            throw;
        }
    }
}
}

```



```
/// <summary>
/// List the contents of the bucket with their ETag.
/// </summary>
/// <param name="bucketName">The name of the bucket.</param>
/// <returns>Async task.</returns>
public async Task<List<S3Object>> ListBucketContentsByName(string bucketName)
{
    var results = new List<S3Object>();
    try
    {
        Console.WriteLine($"\\t Items in bucket {bucketName}");
        var listObjectsResponse = await _amazonS3.ListObjectsV2Async(new
ListObjectsV2Request { BucketName = bucketName });
        if (listObjectsResponse.S3Objects.Count == 0)
        {
            Console.WriteLine("\\t\\tNo objects found.");
        }
        else
        {
            foreach (var obj in listObjectsResponse.S3Objects)
            {
                Console.WriteLine($"\\t\\t object: {obj.Key} ETag {obj.ETag}");
            }
        }
        results = listObjectsResponse.S3Objects;
    }
    catch (AmazonS3Exception e)
    {
        if (e.ErrorCode == "NoSuchBucket")
        {
            _logger.LogError($"Bucket {bucketName} does not exist.");
        }
        else
        {
            _logger.LogError($"Error listing bucket and objects:
{e.ErrorCode}");
            throw;
        }
    }

    return results;
}
```

```

    /// <summary>
    /// Delete an object from a specific bucket.
    /// </summary>
    /// <param name="bucketName">The Amazon S3 bucket to use.</param>
    /// <param name="objectKey">The key of the object to delete.</param>
    /// <returns>True if successful.</returns>
    public async Task<bool> DeleteObjectFromBucket(string bucketName, string
objectKey)
    {
        try
        {
            var request = new DeleteObjectRequest()
            {
                BucketName = bucketName,
                Key = objectKey
            };
            await _amazonS3.DeleteObjectAsync(request);
            Console.WriteLine($"Deleted {objectKey} in {bucketName}.");
            return true;
        }
        catch (AmazonS3Exception ex)
        {
            Console.WriteLine($"Unable to delete object {objectKey} in bucket
{bucketName}: " + ex.Message);
            return false;
        }
    }

    /// <summary>
    /// Delete a specific bucket by deleting the objects and then the bucket itself.
    /// </summary>
    /// <param name="bucketName">The Amazon S3 bucket to use.</param>
    /// <param name="objectKey">The key of the object to delete.</param>
    /// <param name="versionId">Optional versionId.</param>
    /// <returns>True if successful.</returns>
    public async Task<bool> CleanUpBucketByName(string bucketName)
    {
        try
        {
            var allFiles = await ListBucketContentsByName(bucketName);

            foreach (var fileInfo in allFiles)
            {
                await DeleteObjectFromBucket(fileInfo.BucketName, fileInfo.Key);
            }
        }
    }

```

```
    }

    var request = new DeleteBucketRequest() { BucketName = bucketName, };
    var response = await _amazonS3.DeleteBucketAsync(request);
    Console.WriteLine($"{Environment.NewLine}Delete for {bucketName} complete.");
    return response.HttpStatusCode == HttpStatusCode.OK;
}
catch (AmazonS3Exception ex)
{
    Console.WriteLine($"{Environment.NewLine}Unable to delete bucket {bucketName}: " +
ex.Message);
    return false;
}

}

}
```

• 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的下列主題。

- [CopyObject](#)
- [GetObject](#)
- [PutObject](#)

管理存取控制清單 (ACL)

下列程式碼範例示範如何管理 Amazon S3 儲存體的存取控制清單 (ACL)。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
using System;
using System.Collections.Generic;
using System.Threading.Tasks;
using Amazon.S3;
```

```

using Amazon.S3.Model;

/// <summary>
/// This example shows how to manage Amazon Simple Storage Service
/// (Amazon S3) access control lists (ACLs) to control Amazon S3 bucket
/// access.
/// </summary>
public class ManageACLs
{
    public static async Task Main()
    {
        string bucketName = "amzn-s3-demo-bucket1";
        string newBucketName = "amzn-s3-demo-bucket2";
        string keyName = "sample-object.txt";
        string emailAddress = "someone@example.com";

        // If the AWS Region where your bucket is located is different from
        // the Region defined for the default user, pass the Amazon S3 bucket's
        // name to the client constructor. It should look like this:
        // RegionEndpoint bucketRegion = RegionEndpoint.USEast1;
        IAmazonS3 client = new AmazonS3Client();

        await TestBucketObjectACLsAsync(client, bucketName, newBucketName,
keyName, emailAddress);
    }

    /// <summary>
    /// Creates a new Amazon S3 bucket with a canned ACL, then retrieves the ACL
    /// information and then adds a new ACL to one of the objects in the
    /// Amazon S3 bucket.
    /// </summary>
    /// <param name="client">The initialized Amazon S3 client object used to
call
    /// methods to create a bucket, get an ACL, and add a different ACL to
    /// one of the objects.</param>
    /// <param name="bucketName">A string representing the original Amazon S3
    /// bucket name.</param>
    /// <param name="newBucketName">A string representing the name of the
    /// new bucket that will be created.</param>
    /// <param name="keyName">A string representing the key name of an Amazon S3
    /// object for which we will change the ACL.</param>
    /// <param name="emailAddress">A string representing the email address
    /// belonging to the person to whom access to the Amazon S3 bucket will be
    /// granted.</param>

```

```

    public static async Task TestBucketObjectACLsAsync(
        IAmazonS3 client,
        string bucketName,
        string newBucketName,
        string keyName,
        string emailAddress)
    {
        try
        {
            // Create a new Amazon S3 bucket and specify canned ACL.
            var success = await CreateBucketWithCannedACLAsync(client,
newBucketName);

            // Get the ACL on a bucket.
            await GetBucketACLAsync(client, bucketName);

            // Add (replace) the ACL on an object in a bucket.
            await AddACLToExistingObjectAsync(client, bucketName, keyName,
emailAddress);
        }
        catch (AmazonS3Exception amazonS3Exception)
        {
            Console.WriteLine($"Exception: {amazonS3Exception.Message}");
        }
    }

    /// <summary>
    /// Creates a new Amazon S3 bucket with a canned ACL attached.
    /// </summary>
    /// <param name="client">The initialized client object used to call
    /// PutBucketAsync.</param>
    /// <param name="newBucketName">A string representing the name of the
    /// new Amazon S3 bucket.</param>
    /// <returns>Returns a boolean value indicating success or failure.</
returns>
    public static async Task<bool> CreateBucketWithCannedACLAsync(IAmazonS3
client, string newBucketName)
    {
        var request = new PutBucketRequest()
        {
            BucketName = newBucketName,
            BucketRegion = S3Region.EUWest1,

            // Add a canned ACL.

```

```

        CannedACL = S3CannedACL.LogDeliveryWrite,
    };

    var response = await client.PutBucketAsync(request);
    return response.HttpStatusCode == System.Net.HttpStatusCode.OK;
}

/// <summary>
/// Retrieves the ACL associated with the Amazon S3 bucket name in the
/// bucketName parameter.
/// </summary>
/// <param name="client">The initialized client object used to call
/// PutBucketAsync.</param>
/// <param name="bucketName">The Amazon S3 bucket for which we want to get
the
/// ACL list.</param>
/// <returns>Returns an S3AccessControlList returned from the call to
/// GetACLAsync.</returns>
public static async Task<S3AccessControlList> GetBucketACLAsync(IAmazonS3
client, string bucketName)
{
    GetACLResponse response = await client.GetACLAsync(new GetACLRequest
    {
        BucketName = bucketName,
    });

    return response.AccessControlList;
}

/// <summary>
/// Adds a new ACL to an existing object in the Amazon S3 bucket.
/// </summary>
/// <param name="client">The initialized client object used to call
/// PutBucketAsync.</param>
/// <param name="bucketName">A string representing the name of the Amazon S3
param>
/// bucket containing the object to which we want to apply a new ACL.</
param>
/// <param name="keyName">A string representing the name of the object
/// to which we want to apply the new ACL.</param>
/// <param name="emailAddress">The email address of the person to whom
/// we will be applying to whom access will be granted.</param>

```

```
public static async Task AddACLToExistingObjectAsync(IAmazonS3 client,
string bucketName, string keyName, string emailAddress)
{
    // Retrieve the ACL for an object.
    GetACLResponse aclResponse = await client.GetACLAsync(new GetACLRequest
    {
        BucketName = bucketName,
        Key = keyName,
    });

    S3AccessControlList acl = aclResponse.AccessControlList;

    // Retrieve the owner.
    Owner owner = acl.Owner;

    // Clear existing grants.
    acl.Grants.Clear();

    // Add a grant to reset the owner's full permission
    // (the previous clear statement removed all permissions).
    var fullControlGrant = new S3Grant
    {
        Grantee = new S3Grantee { CanonicalUser = acl.Owner.Id },
    };
    acl.AddGrant(fullControlGrant.Grantee, S3Permission.FULL_CONTROL);

    // Specify email to identify grantee for granting permissions.
    var grantUsingEmail = new S3Grant
    {
        Grantee = new S3Grantee { EmailAddress = emailAddress },
        Permission = S3Permission.WRITE_ACP,
    };

    // Specify log delivery group as grantee.
    var grantLogDeliveryGroup = new S3Grant
    {
        Grantee = new S3Grantee { URI = "http://acs.amazonaws.com/groups/s3/
LogDelivery" },
        Permission = S3Permission.WRITE,
    };

    // Create a new ACL.
    var newAcl = new S3AccessControlList
    {
```

```
        Grants = new List<S3Grant> { grantUsingEmail,
grantLogDeliveryGroup },
        Owner = owner,
    };

    // Set the new ACL. We're throwing away the response here.
    _ = await client.PutACLAsync(new PutACLRequest
    {
        BucketName = bucketName,
        Key = keyName,
        AccessControlList = newAcl,
    });
}

}
```

• 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的下列主題。

- [GetBucketAcl](#)
- [GetObjectAcl](#)
- [PutBucketAcl](#)
- [PutObjectAcl](#)

執行分段複製

下列程式碼範例示範如何執行 Amazon S3 物件的分段複製。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
using System;
using System.Collections.Generic;
using System.Threading.Tasks;
using Amazon.S3;
```



```
using Amazon.S3.Model;

/// <summary>
/// This example shows how to perform a multi-part copy from one Amazon
/// Simple Storage Service (Amazon S3) bucket to another.
/// </summary>
public class MPUapiCopyObj
{
    private const string SourceBucket = "amzn-s3-demo-bucket1";
    private const string TargetBucket = "amzn-s3-demo-bucket2";
    private const string SourceObjectKey = "example.mov";
    private const string TargetObjectKey = "copied_video_file.mov";

    /// <summary>
    /// This method starts the multi-part upload.
    /// </summary>
    public static async Task Main()
    {
        var s3Client = new AmazonS3Client();
        Console.WriteLine("Copying object...");
        await MPUCopyObjectAsync(s3Client);
    }

    /// <summary>
    /// This method uses the passed client object to perform a multipart
    /// copy operation.
    /// </summary>
    /// <param name="client">An Amazon S3 client object that will be used
    /// to perform the copy.</param>
    public static async Task MPUCopyObjectAsync(AmazonS3Client client)
    {
        // Create a list to store the copy part responses.
        var copyResponses = new List<CopyPartResponse>();

        // Setup information required to initiate the multipart upload.
        var initiateRequest = new InitiateMultipartUploadRequest
        {
            BucketName = TargetBucket,
            Key = TargetObjectKey,
        };

        // Initiate the upload.
        InitiateMultipartUploadResponse initResponse =
            await client.InitiateMultipartUploadAsync(initiateRequest);
```

```
// Save the upload ID.
string uploadId = initResponse.UploadId;

try
{
    // Get the size of the object.
    var metadataRequest = new GetObjectMetadataRequest
    {
        BucketName = SourceBucket,
        Key = SourceObjectKey,
    };

    GetObjectMetadataResponse metadataResponse =
        await client.GetObjectMetadataAsync(metadataRequest);
    var objectSize = metadataResponse.ContentLength; // Length in bytes.

    // Copy the parts.
    var partSize = 5 * (long)Math.Pow(2, 20); // Part size is 5 MB.

    long bytePosition = 0;
    for (int i = 1; bytePosition < objectSize; i++)
    {
        var copyRequest = new CopyPartRequest
        {
            DestinationBucket = TargetBucket,
            DestinationKey = TargetObjectKey,
            SourceBucket = SourceBucket,
            SourceKey = SourceObjectKey,
            UploadId = uploadId,
            FirstByte = bytePosition,
            LastByte = bytePosition + partSize - 1 >= objectSize ?
objectSize - 1 : bytePosition + partSize - 1,
            PartNumber = i,
        };

        copyResponses.Add(await client.CopyPartAsync(copyRequest));

        bytePosition += partSize;
    }

    // Set up to complete the copy.
    var completeRequest = new CompleteMultipartUploadRequest
    {
```

```
        BucketName = TargetBucket,
        Key = TargetObjectKey,
        UploadId = initResponse.UploadId,
    };
    completeRequest.AddPartETags(copyResponses);

    // Complete the copy.
    CompleteMultipartUploadResponse completeUploadResponse =
        await client.CompleteMultipartUploadAsync(completeRequest);
    }
    catch (AmazonS3Exception e)
    {
        Console.WriteLine($"Error encountered on server.
Message: '{e.Message}' when writing an object");
    }
    catch (Exception e)
    {
        Console.WriteLine($"Unknown encountered on server.
Message: '{e.Message}' when writing an object");
    }
    }
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的下列主題。
 - [CompleteMultipartUpload](#)
 - [CreateMultipartUpload](#)
 - [GetObjectMetadata](#)
 - [UploadPartCopy](#)

使用 S3 Object Lambda 轉換資料

下列程式碼範例示範如何使用 S3 Object Lambda 轉換應用程式的資料。

適用於 .NET 的 SDK

展示如何將自訂程式碼新增至標準 S3 GET 請求，以修改從 S3 擷取的請求物件，如此一來，物件方能符合請求用戶端或應用程式的需求。

如需完整的原始碼和如何設定及執行的指示，請參閱 [GitHub](#) 上的完整範例。

此範例中使用的服務

- Lambda
- Amazon S3

上傳或下載大型檔案

下列程式碼範例示範如何將大型檔案上傳至 Amazon S3，以及從中下載大型檔案。

如需詳細資訊，請參閱[使用分段上傳以上傳物件](#)。

適用於 .NET 的 SDK

 Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

使用 Amazon S3 TransferUtility 呼叫可在 S3 儲存貯體之間傳輸檔案的函數。

```
global using System.Text;
global using Amazon.S3;
global using Amazon.S3.Model;
global using Amazon.S3.Transfer;
global using TransferUtilityBasics;

// This Amazon S3 client uses the default user credentials
// defined for this computer.
using Microsoft.Extensions.Configuration;

IAmazonS3 client = new AmazonS3Client();
var transferUtil = new TransferUtility(client);
IConfiguration _configuration;

_configuration = new ConfigurationBuilder()
    .SetBasePath(Directory.GetCurrentDirectory())
    .AddJsonFile("settings.json") // Load test settings from JSON file.
    .AddJsonFile("settings.local.json",
        true) // Optionally load local settings.
```

```
.Build();

// Edit the values in settings.json to use an S3 bucket and files that
// exist on your AWS account and on the local computer where you
// run this scenario.
var bucketName = _configuration["BucketName"];
var localPath =
    $"{Environment.GetFolderPath(Environment.SpecialFolder.ApplicationData)}\
\TransferFolder";

DisplayInstructions();

PressEnter();

Console.WriteLine();

// Upload a single file to an S3 bucket.
DisplayTitle("Upload a single file");

var fileToUpload = _configuration["FileToUpload"];
Console.WriteLine($"Uploading {fileToUpload} to the S3 bucket, {bucketName}.");

var success = await TransferMethods.UploadSingleFileAsync(transferUtil, bucketName,
    fileToUpload, localPath);
if (success)
{
    Console.WriteLine($"Successfully uploaded the file, {fileToUpload} to
    {bucketName}.");
}

PressEnter();

// Upload a local directory to an S3 bucket.
DisplayTitle("Upload all files from a local directory");
Console.WriteLine("Upload all the files in a local folder to an S3 bucket.");
const string keyPrefix = "UploadFolder";
var uploadPath = $"{localPath}\\UploadFolder";

Console.WriteLine($"Uploading the files in {uploadPath} to {bucketName}");
DisplayTitle($"{uploadPath} files");
DisplayLocalFiles(uploadPath);
Console.WriteLine();

PressEnter();
```

```
success = await TransferMethods.UploadFullDirectoryAsync(transferUtil, bucketName,
    keyPrefix, uploadPath);
if (success)
{
    Console.WriteLine($"Successfully uploaded the files in {uploadPath} to
{bucketName}.");
    Console.WriteLine($"{bucketName} currently contains the following files:");
    await DisplayBucketFiles(client, bucketName, keyPrefix);
    Console.WriteLine();
}

PressEnter();

// Download a single file from an S3 bucket.
DisplayTitle("Download a single file");
Console.WriteLine("Now we will download a single file from an S3 bucket.");

var keyName = _configuration["FileToDownload"];

Console.WriteLine($"Downloading {keyName} from {bucketName}.");

success = await TransferMethods.DownloadSingleFileAsync(transferUtil, bucketName,
    keyName, localPath);
if (success)
{
    Console.WriteLine($"Successfully downloaded the file, {keyName} from
{bucketName}.");
}

PressEnter();

// Download the contents of a directory from an S3 bucket.
DisplayTitle("Download the contents of an S3 bucket");
var s3Path = _configuration["S3Path"];
var downloadPath = $"{localPath}\\{s3Path}";

Console.WriteLine($"Downloading the contents of {bucketName}\\{s3Path}");
Console.WriteLine($"{bucketName}\\{s3Path} contains the following files:");
await DisplayBucketFiles(client, bucketName, s3Path);
Console.WriteLine();

success = await TransferMethods.DownloadS3DirectoryAsync(transferUtil, bucketName,
    s3Path, downloadPath);
```

```
if (success)
{
    Console.WriteLine($"Downloaded the files in {bucketName} to {downloadPath}.");
    Console.WriteLine($"{downloadPath} now contains the following files:");
    DisplayLocalFiles(downloadPath);
}

Console.WriteLine("\nThe TransferUtility Basics application has completed.");
PressEnter();

// Displays the title for a section of the scenario.
static void DisplayTitle(string titleText)
{
    var sepBar = new string('-', Console.WindowWidth);

    Console.WriteLine(sepBar);
    Console.WriteLine(CenterText(titleText));
    Console.WriteLine(sepBar);
}

// Displays a description of the actions to be performed by the scenario.
static void DisplayInstructions()
{
    var sepBar = new string('-', Console.WindowWidth);

    DisplayTitle("Amazon S3 Transfer Utility Basics");
    Console.WriteLine("This program shows how to use the Amazon S3 Transfer
Utility.");
    Console.WriteLine("It performs the following actions:");
    Console.WriteLine("\t1. Upload a single object to an S3 bucket.");
    Console.WriteLine("\t2. Upload an entire directory from the local computer to an
\n\t S3 bucket.");
    Console.WriteLine("\t3. Download a single object from an S3 bucket.");
    Console.WriteLine("\t4. Download the objects in an S3 bucket to a local
directory.");
    Console.WriteLine($"
\n{sepBar}");
}

// Pauses the scenario.
static void PressEnter()
{
    Console.WriteLine("Press <Enter> to continue.");
    _ = Console.ReadLine();
    Console.WriteLine("
\n");
}
```

```
}

// Returns the string textToCenter, padded on the left with spaces
// that center the text on the console display.
static string CenterText(string textToCenter)
{
    var centeredText = new StringBuilder();
    var screenWidth = Console.WindowWidth;
    centeredText.Append(new string(' ', (int)(screenWidth - textToCenter.Length) /
2));
    centeredText.Append(textToCenter);
    return centeredText.ToString();
}

// Displays a list of file names included in the specified path.
static void DisplayLocalFiles(string localPath)
{
    var fileList = Directory.GetFiles(localPath);
    if (fileList.Length > 0)
    {
        foreach (var fileName in fileList)
        {
            Console.WriteLine(fileName);
        }
    }
}

// Displays a list of the files in the specified S3 bucket and prefix.
static async Task DisplayBucketFiles(IAmazonS3 client, string bucketName, string
s3Path)
{
    ListObjectsV2Request request = new()
    {
        BucketName = bucketName,
        Prefix = s3Path,
        MaxKeys = 5,
    };

    var response = new ListObjectsV2Response();

    do
    {
        response = await client.ListObjectsV2Async(request);
    }
```



```

        response.S3Objects
            .ForEach(obj => Console.WriteLine($"{obj.Key}"));

        // If the response is truncated, set the request ContinuationToken
        // from the NextContinuationToken property of the response.
        request.ContinuationToken = response.NextContinuationToken;
    } while (response.IsTruncated);
}

```

上傳單一檔案。

```

/// <summary>
/// Uploads a single file from the local computer to an S3 bucket.
/// </summary>
/// <param name="transferUtil">The transfer initialized TransferUtility
/// object.</param>
/// <param name="bucketName">The name of the S3 bucket where the file
/// will be stored.</param>
/// <param name="fileName">The name of the file to upload.</param>
/// <param name="localPath">The local path where the file is stored.</param>
/// <returns>A boolean value indicating the success of the action.</returns>
public static async Task<bool> UploadSingleFileAsync(
    TransferUtility transferUtil,
    string bucketName,
    string fileName,
    string localPath)
{
    if (File.Exists($"{localPath}\\{fileName}"))
    {
        try
        {
            await transferUtil.UploadAsync(new TransferUtilityUploadRequest
            {
                BucketName = bucketName,
                Key = fileName,
                FilePath = $"{localPath}\\{fileName}",
            });

            return true;
        }
    }
}

```

```

        catch (AmazonS3Exception s3Ex)
        {
            Console.WriteLine($"Could not upload {fileName} from {localPath}
because:");
            Console.WriteLine(s3Ex.Message);
            return false;
        }
    }
    else
    {
        Console.WriteLine($"{fileName} does not exist in {localPath}");
        return false;
    }
}

```

上傳整個本機目錄。

```

/// <summary>
/// Uploads all the files in a local directory to a directory in an S3
/// bucket.
/// </summary>
/// <param name="transferUtil">The transfer initialized TransferUtility
/// object.</param>
/// <param name="bucketName">The name of the S3 bucket where the files
/// will be stored.</param>
/// <param name="keyPrefix">The key prefix is the S3 directory where
/// the files will be stored.</param>
/// <param name="localPath">The local directory that contains the files
/// to be uploaded.</param>
/// <returns>A Boolean value representing the success of the action.</
returns>
public static async Task<bool> UploadFullDirectoryAsync(
    TransferUtility transferUtil,
    string bucketName,
    string keyPrefix,
    string localPath)
{
    if (Directory.Exists(localPath))
    {
        try
        {

```

```

        await transferUtil.UploadDirectoryAsync(new
TransferUtilityUploadDirectoryRequest
        {
            BucketName = bucketName,
            KeyPrefix = keyPrefix,
            Directory = localPath,
        });

        return true;
    }
    catch (AmazonS3Exception s3Ex)
    {
        Console.WriteLine($"Can't upload the contents of {localPath}
because:");

        Console.WriteLine(s3Ex?.Message);
        return false;
    }
}
else
{
    Console.WriteLine($"The directory {localPath} does not exist.");
    return false;
}
}

```

下載單一檔案。

```

/// <summary>
/// Download a single file from an S3 bucket to the local computer.
/// </summary>
/// <param name="transferUtil">The transfer initialized TransferUtility
/// object.</param>
/// <param name="bucketName">The name of the S3 bucket containing the
/// file to download.</param>
/// <param name="keyName">The name of the file to download.</param>
/// <param name="localPath">The path on the local computer where the
/// downloaded file will be saved.</param>
/// <returns>A Boolean value indicating the results of the action.</returns>
public static async Task<bool> DownloadSingleFileAsync(
TransferUtility transferUtil,

```

```

        string bucketName,
        string keyName,
        string localPath)
    {
        await transferUtil.DownloadAsync(new TransferUtilityDownloadRequest
        {
            BucketName = bucketName,
            Key = keyName,
            FilePath = $"{localPath}\\{keyName}",
        });

        return (File.Exists($"{localPath}\\{keyName}"));
    }

```

下載 S3 儲存貯體的內容。

```

    /// <summary>
    /// Downloads the contents of a directory in an S3 bucket to a
    /// directory on the local computer.
    /// </summary>
    /// <param name="transferUtil">The transfer initialized TransferUtility
    /// object.</param>
    /// <param name="bucketName">The bucket containing the files to download.</
param>
    /// <param name="s3Path">The S3 directory where the files are located.</
param>
    /// <param name="localPath">The local path to which the files will be
    /// saved.</param>
    /// <returns>A Boolean value representing the success of the action.</
returns>
    public static async Task<bool> DownloadS3DirectoryAsync(
        TransferUtility transferUtil,
        string bucketName,
        string s3Path,
        string localPath)
    {
        int fileCount = 0;

        // If the directory doesn't exist, it will be created.
        if (Directory.Exists(s3Path))

```

```

        {
            var files = Directory.GetFiles(localPath);
            fileCount = files.Length;
        }

        await transferUtil.DownloadDirectoryAsync(new
TransferUtilityDownloadDirectoryRequest
        {
            BucketName = bucketName,
            LocalDirectory = localPath,
            S3Directory = s3Path,
        });

        if (Directory.Exists(localPath))
        {
            var files = Directory.GetFiles(localPath);
            if (files.Length > fileCount)
            {
                return true;
            }

            // No change in the number of files. Assume
            // the download failed.
            return false;
        }

        // The local directory doesn't exist. No files
        // were downloaded.
        return false;
    }
}

```

使用傳 TransferUtility 追蹤上傳進度。

```

using System;
using System.Threading.Tasks;
using Amazon.S3;
using Amazon.S3.Transfer;

/// <summary>
/// This example shows how to track the progress of a multipart upload
/// using the Amazon Simple Storage Service (Amazon S3) TransferUtility to

```

```

/// upload to an Amazon S3 bucket.
/// </summary>
public class TrackMPUUsingHighLevelAPI
{
    public static async Task Main()
    {
        string bucketName = "amzn-s3-demo-bucket";
        string keyName = "sample_pic.png";
        string path = "filepath/directory/";
        string filePath = $"{path}{keyName}";

        // If the AWS Region defined for your default user is different
        // from the Region where your Amazon S3 bucket is located,
        // pass the Region name to the Amazon S3 client object's constructor.
        // For example: RegionEndpoint.USSouth1 or RegionEndpoint.USEast2.
        IAmazonS3 client = new AmazonS3Client();

        await TrackMPUAsync(client, bucketName, filePath, keyName);
    }

    /// <summary>
    /// Starts an Amazon S3 multipart upload and assigns an event handler to
    /// track the progress of the upload.
    /// </summary>
    /// <param name="client">The initialized Amazon S3 client object used to
    /// perform the multipart upload.</param>
    /// <param name="bucketName">The name of the bucket to which to upload
    /// the file.</param>
    /// <param name="filePath">The path, including the file name of the
    /// file to be uploaded to the Amazon S3 bucket.</param>
    /// <param name="keyName">The file name to be used in the
    /// destination Amazon S3 bucket.</param>
    public static async Task TrackMPUAsync(
        IAmazonS3 client,
        string bucketName,
        string filePath,
        string keyName)
    {
        try
        {
            var fileTransferUtility = new TransferUtility(client);

            // Use TransferUtilityUploadRequest to configure options.
            // In this example we subscribe to an event.

```

```

        var uploadRequest =
            new TransferUtilityUploadRequest
            {
                BucketName = bucketName,
                FilePath = filePath,
                Key = keyName,
            };

        uploadRequest.UploadProgressEvent +=
            new EventHandler<UploadProgressArgs>(
                UploadRequest_UploadPartProgressEvent);

        await fileTransferUtility.UploadAsync(uploadRequest);
        Console.WriteLine("Upload completed");
    }
    catch (AmazonS3Exception ex)
    {
        Console.WriteLine($"Error:: {ex.Message}");
    }
}

/// <summary>
/// Event handler to check the progress of the multipart upload.
/// </summary>
/// <param name="sender">The object that raised the event.</param>
/// <param name="e">The object that contains multipart upload
/// information.</param>
public static void UploadRequest_UploadPartProgressEvent(object sender,
UploadProgressArgs e)
{
    // Process event.
    Console.WriteLine($"{e.TransferredBytes}/{e.TotalBytes}");
}
}

```

使用加密上傳物件。

```

using System;
using System.Collections.Generic;
using System.IO;
using System.Security.Cryptography;

```

```
using System.Threading.Tasks;
using Amazon.S3;
using Amazon.S3.Model;

/// <summary>
/// Uses the Amazon Simple Storage Service (Amazon S3) low level API to
/// perform a multipart upload to an Amazon S3 bucket.
/// </summary>
public class SSECLowLevelMPUCopyObject
{
    public static async Task Main()
    {
        string existingBucketName = "amzn-s3-demo-bucket";
        string sourceKeyName = "sample_file.txt";
        string targetKeyName = "sample_file_copy.txt";
        string filePath = $"sample\\{targetKeyName}";

        // If the AWS Region defined for your default user is different
        // from the Region where your Amazon S3 bucket is located,
        // pass the Region name to the Amazon S3 client object's constructor.
        // For example: RegionEndpoint.USEast1.
        IAmazonS3 client = new AmazonS3Client();

        // Create the encryption key.
        var base64Key = CreateEncryptionKey();

        await CreateSampleObjUsingClientEncryptionKeyAsync(
            client,
            existingBucketName,
            sourceKeyName,
            filePath,
            base64Key);
    }

    /// <summary>
    /// Creates the encryption key to use with the multipart upload.
    /// </summary>
    /// <returns>A string containing the base64-encoded key for encrypting
    /// the multipart upload.</returns>
    public static string CreateEncryptionKey()
    {
        Aes aesEncryption = Aes.Create();
        aesEncryption.KeySize = 256;
        aesEncryption.GenerateKey();
    }
}
```



```

        string base64Key = Convert.ToBase64String(aesEncryption.Key);
        return base64Key;
    }

    /// <summary>
    /// Creates and uploads an object using a multipart upload.
    /// </summary>
    /// <param name="client">The initialized Amazon S3 object used to
    /// initialize and perform the multipart upload.</param>
    /// <param name="existingBucketName">The name of the bucket to which
    /// the object will be uploaded.</param>
    /// <param name="sourceKeyName">The source object name.</param>
    /// <param name="filePath">The location of the source object.</param>
    /// <param name="base64Key">The encryption key to use with the upload.</
param>
    public static async Task CreateSampleObjUsingClientEncryptionKeyAsync(
        IAmazonS3 client,
        string existingBucketName,
        string sourceKeyName,
        string filePath,
        string base64Key)
    {
        List<UploadPartResponse> uploadResponses = new
List<UploadPartResponse>();

        InitiateMultipartUploadRequest initiateRequest = new
InitiateMultipartUploadRequest
        {
            BucketName = existingBucketName,
            Key = sourceKeyName,
            ServerSideEncryptionCustomerMethod =
ServerSideEncryptionCustomerMethod.AES256,
            ServerSideEncryptionCustomerProvidedKey = base64Key,
        };

        InitiateMultipartUploadResponse initResponse =
            await client.InitiateMultipartUploadAsync(initiateRequest);

        long contentLength = new FileInfo(filePath).Length;
        long partSize = 5 * (long)Math.Pow(2, 20); // 5 MB

        try
        {
            long filePosition = 0;

```

```

        for (int i = 1; filePosition < contentLength; i++)
        {
            UploadPartRequest uploadRequest = new UploadPartRequest
            {
                BucketName = existingBucketName,
                Key = sourceKeyName,
                UploadId = initResponse.UploadId,
                PartNumber = i,
                PartSize = partSize,
                FilePosition = filePosition,
                FilePath = filePath,
                ServerSideEncryptionCustomerMethod =
ServerSideEncryptionCustomerMethod.AES256,
                ServerSideEncryptionCustomerProvidedKey = base64Key,
            };

            // Upload part and add response to our list.
            uploadResponses.Add(await
client.UploadPartAsync(uploadRequest));

            filePosition += partSize;
        }

        CompleteMultipartUploadRequest completeRequest = new
CompleteMultipartUploadRequest
        {
            BucketName = existingBucketName,
            Key = sourceKeyName,
            UploadId = initResponse.UploadId,
        };
        completeRequest.AddPartETags(uploadResponses);

        CompleteMultipartUploadResponse completeUploadResponse =
            await client.CompleteMultipartUploadAsync(completeRequest);
    }
    catch (Exception exception)
    {
        Console.WriteLine($"Exception occurred: {exception.Message}");

        // If there was an error, abort the multipart upload.
        AbortMultipartUploadRequest abortMPURRequest = new
AbortMultipartUploadRequest
        {
            BucketName = existingBucketName,

```

```
                Key = sourceKeyName,
                UploadId = initResponse.UploadId,
            };

            await client.AbortMultipartUploadAsync(abortMPURequest);
        }
    }
}
```

無伺服器範例

使用 Amazon S3 觸發條件調用 Lambda 函數

下列程式碼範例示範如何實作 Lambda 函式，該函式接收透過上傳物件至 S3 儲存貯體時所觸發的事件。此函數會從事件參數擷取 S3 儲存貯體名稱和物件金鑰，並呼叫 Amazon S3 API 以擷取和記錄物件的內容類型。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在[無伺服器範例](#)儲存庫中設定和執行。

使用 .NET 搭配 Lambda 來使用 S3 事件。

```
// Copyright Amazon.com, Inc. or its affiliates. All Rights Reserved.
// SPDX-License-Identifier: Apache-2.0
using System.Threading.Tasks;
using Amazon.Lambda.Core;
using Amazon.S3;
using System;
using Amazon.Lambda.S3Events;
using System.Web;

// Assembly attribute to enable the Lambda function's JSON input to be converted
into a .NET class.
```

```
[assembly:
    LambdaSerializer(typeof(Amazon.Lambda.Serialization.SystemTextJson.DefaultLambdaJsonSeriali

namespace S3Integration
{
    public class Function
    {
        private static AmazonS3Client _s3Client;
        public Function() : this(null)
        {
        }

        internal Function(AmazonS3Client s3Client)
        {
            _s3Client = s3Client ?? new AmazonS3Client();
        }

        public async Task<string> Handler(S3Event evt, ILambdaContext context)
        {
            try
            {
                if (evt.Records.Count <= 0)
                {
                    context.Logger.LogLine("Empty S3 Event received");
                    return string.Empty;
                }

                var bucket = evt.Records[0].S3.Bucket.Name;
                var key = HttpUtility.UrlDecode(evt.Records[0].S3.Object.Key);

                context.Logger.LogLine($"Request is for {bucket} and {key}");

                var objectResult = await _s3Client.GetObjectAsync(bucket, key);

                context.Logger.LogLine($"Returning {objectResult.Key}");

                return objectResult.Key;
            }
            catch (Exception e)
            {
                context.Logger.LogLine($"Error processing request - {e.Message}");

                return string.Empty;
            }
        }
    }
}
```

```
}  
}  
}
```

使用的 SageMaker AI 範例 適用於 .NET 的 SDK

下列程式碼範例示範如何使用 適用於 .NET 的 AWS SDK 搭配 SageMaker AI 來執行動作和實作常見案例。

Actions 是大型程式的程式碼摘錄，必須在內容中執行。雖然動作會告訴您如何呼叫個別服務函數，但您可以在其相關情境中查看內容中的動作。

案例是向您展示如何呼叫服務中的多個函數或與其他 AWS 服務組合來完成特定任務的程式碼範例。

每個範例均包含完整原始碼的連結，您可在連結中找到如何設定和執行內容中程式碼的相關指示。

主題

- [開始使用](#)
- [動作](#)
- [案例](#)

開始使用

Hello SageMaker AI

下列程式碼範例示範如何開始使用 SageMaker AI。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
using Amazon.SageMaker;  
using Amazon.SageMaker.Model;
```

```
namespace SageMakerActions;

public static class HelloSageMaker
{
    static async Task Main(string[] args)
    {
        var sageMakerClient = new AmazonSageMakerClient();

        Console.WriteLine($"Hello Amazon SageMaker! Let's list some of your notebook instances:");
        Console.WriteLine();

        // You can use await and any of the async methods to get a response.
        // Let's get the first five notebook instances.
        var response = await sageMakerClient.ListNotebookInstancesAsync(
            new ListNotebookInstancesRequest()
            {
                MaxResults = 5
            });

        if (!response.NotebookInstances.Any())
        {
            Console.WriteLine($"No notebook instances found.");
            Console.WriteLine("See https://docs.aws.amazon.com/sagemaker/latest/dg/howitworks-create-ws.html to create one.");
        }

        foreach (var notebookInstance in response.NotebookInstances)
        {
            Console.WriteLine($"\\tInstance: {notebookInstance.NotebookInstanceName}");
            Console.WriteLine($"\\tArn: {notebookInstance.NotebookInstanceArn}");
            Console.WriteLine($"\\tCreation Date: {notebookInstance.CreationTime.ToShortDateString()}");
            Console.WriteLine();
        }
    }
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [ListNotebookInstances](#)。

動作

CreatePipeline

以下程式碼範例顯示如何使用 CreatePipeline。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Create a pipeline from a JSON definition, or update it if the pipeline
already exists.
/// </summary>
/// <returns>The Amazon Resource Name (ARN) of the pipeline.</returns>
public async Task<string> SetupPipeline(string pipelineJson, string roleArn,
string name, string description, string displayName)
{
    try
    {
        var updateResponse = await _amazonSageMaker.UpdatePipelineAsync(
            new UpdatePipelineRequest()
            {
                PipelineDefinition = pipelineJson,
                PipelineDescription = description,
                PipelineDisplayName = displayName,
                PipelineName = name,
                RoleArn = roleArn
            });
        return updateResponse.PipelineArn;
    }
    catch (Amazon.SageMaker.Model.ResourceNotFoundException)
    {
        var createResponse = await _amazonSageMaker.CreatePipelineAsync(
            new CreatePipelineRequest()
            {
                PipelineDefinition = pipelineJson,
                PipelineDescription = description,
```

```

        PipelineDisplayName = displayName,
        PipelineName = name,
        RoleArn = roleArn
    });

    return createResponse.PipelineArn;
}
}

```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [CreatePipeline](#)。

DeletePipeline

以下程式碼範例顯示如何使用 DeletePipeline。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```

/// <summary>
/// Delete a SageMaker pipeline by name.
/// </summary>
/// <param name="pipelineName">The name of the pipeline to delete.</param>
/// <returns>The ARN of the pipeline.</returns>
public async Task<string> DeletePipelineByName(string pipelineName)
{
    var deleteResponse = await _amazonSageMaker.DeletePipelineAsync(
        new DeletePipelineRequest()
        {
            PipelineName = pipelineName
        });

    return deleteResponse.PipelineArn;
}

```


- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [DeletePipeline](#)。

DescribePipelineExecution

以下程式碼範例顯示如何使用 DescribePipelineExecution。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Check the status of a run.
/// </summary>
/// <param name="pipelineExecutionArn">The ARN.</param>
/// <returns>The status of the pipeline.</returns>
public async Task<PipelineExecutionStatus> CheckPipelineExecutionStatus(string
pipelineExecutionArn)
{
    var describeResponse = await
_amazonSageMaker.DescribePipelineExecutionAsync(
    new DescribePipelineExecutionRequest()
    {
        PipelineExecutionArn = pipelineExecutionArn
    });

    return describeResponse.PipelineExecutionStatus;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [DescribePipelineExecution](#)。

StartPipelineExecution

以下程式碼範例顯示如何使用 StartPipelineExecution。

適用於 .NET 的 SDK

 Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Run a pipeline with input and output file locations.
/// </summary>
/// <param name="queueUrl">The URL for the queue to use for pipeline
callbacks.</param>
/// <param name="inputLocationUrl">The input location in Amazon Simple Storage
Service (Amazon S3).</param>
/// <param name="outputLocationUrl">The output location in Amazon S3.</param>
/// <param name="pipelineName">The name of the pipeline.</param>
/// <param name="executionRoleArn">The ARN of the role.</param>
/// <returns>The ARN of the pipeline run.</returns>
public async Task<string> ExecutePipeline(
    string queueUrl,
    string inputLocationUrl,
    string outputLocationUrl,
    string pipelineName,
    string executionRoleArn)
{
    var inputConfig = new VectorEnrichmentJobInputConfig()
    {
        DataSourceConfig = new()
        {
            S3Data = new VectorEnrichmentJobS3Data()
            {
                S3Uri = inputLocationUrl
            }
        },
        DocumentType = VectorEnrichmentJobDocumentType.CSV
    };

    var exportConfig = new ExportVectorEnrichmentJobOutputConfig()
    {
        S3Data = new VectorEnrichmentJobS3Data()
    {
```

```

        S3Uri = outputLocationUrl
    }
};

var jobConfig = new VectorEnrichmentJobConfig()
{
    ReverseGeocodingConfig = new ReverseGeocodingConfig()
    {
        XAttributeName = "Longitude",
        YAttributeName = "Latitude"
    }
};

#pragma warning disable SageMaker1002 // Property value does not match required
pattern is allowed here to match the pipeline definition.
var startExecutionResponse = await
    _amazonSageMaker.StartPipelineExecutionAsync(
        new StartPipelineExecutionRequest()
        {
            PipelineName = pipelineName,
            PipelineExecutionDisplayName = pipelineName + "-example-execution",
            PipelineParameters = new List<Parameter>()
            {
                new Parameter() { Name = "parameter_execution_role", Value =
executionRoleArn },
                new Parameter() { Name = "parameter_queue_url", Value =
queueUrl },
                new Parameter() { Name = "parameter_vej_input_config", Value =
JsonSerializer.Serialize(inputConfig) },
                new Parameter() { Name = "parameter_vej_export_config", Value =
JsonSerializer.Serialize(exportConfig) },
                new Parameter() { Name = "parameter_step_1_vej_config", Value =
JsonSerializer.Serialize(jobConfig) }
            }
        });
#pragma warning restore SageMaker1002
return startExecutionResponse.PipelineExecutionArn;
}

```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [StartPipelineExecution](#)。

UpdatePipeline

以下程式碼範例顯示如何使用 UpdatePipeline。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Create a pipeline from a JSON definition, or update it if the pipeline
already exists.
/// </summary>
/// <returns>The Amazon Resource Name (ARN) of the pipeline.</returns>
public async Task<string> SetupPipeline(string pipelineJson, string roleArn,
string name, string description, string displayName)
{
    try
    {
        var updateResponse = await _amazonSageMaker.UpdatePipelineAsync(
            new UpdatePipelineRequest()
            {
                PipelineDefinition = pipelineJson,
                PipelineDescription = description,
                PipelineDisplayName = displayName,
                PipelineName = name,
                RoleArn = roleArn
            });
        return updateResponse.PipelineArn;
    }
    catch (Amazon.SageMaker.Model.ResourceNotFoundException)
    {
        var createResponse = await _amazonSageMaker.CreatePipelineAsync(
            new CreatePipelineRequest()
            {
                PipelineDefinition = pipelineJson,
                PipelineDescription = description,
                PipelineDisplayName = displayName,
                PipelineName = name,
                RoleArn = roleArn
            });
    }
}
```

```
        });  
  
        return createResponse.PipelineArn;  
    }  
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [UpdatePipeline](#)。

案例

開始使用地理空間任務和管道

以下程式碼範例顯示做法：

- 設定管道的資源。
- 設定執行地理空間任務的管道。
- 啟動管道執行。
- 監控執行的狀態。
- 檢視管道的輸出。
- 清除資源。

如需詳細資訊，請參閱[在 `Community.aws` 上使用 AWS SDKs 建立和執行 SageMaker 管道](#)。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

建立包裝 SageMaker AI 操作的類別。

```
using System.Text.Json;  
using Amazon.SageMaker;  
using Amazon.SageMaker.Model;  
using Amazon.SageMakerGeospatial;
```

```
using Amazon.SageMakerGeospatial.Model;

namespace SageMakerActions;

/// <summary>
/// Wrapper class for Amazon SageMaker actions and logic.
/// </summary>
public class SageMakerWrapper
{
    private readonly IAmazonSageMaker _amazonSageMaker;
    public SageMakerWrapper(IAmazonSageMaker amazonSageMaker)
    {
        _amazonSageMaker = amazonSageMaker;
    }

    /// <summary>
    /// Create a pipeline from a JSON definition, or update it if the pipeline
    already exists.
    /// </summary>
    /// <returns>The Amazon Resource Name (ARN) of the pipeline.</returns>
    public async Task<string> SetupPipeline(string pipelineJson, string roleArn,
string name, string description, string displayName)
    {
        try
        {
            var updateResponse = await _amazonSageMaker.UpdatePipelineAsync(
                new UpdatePipelineRequest()
                {
                    PipelineDefinition = pipelineJson,
                    PipelineDescription = description,
                    PipelineDisplayName = displayName,
                    PipelineName = name,
                    RoleArn = roleArn
                });
            return updateResponse.PipelineArn;
        }
        catch (Amazon.SageMaker.Model.ResourceNotFoundException)
        {
            var createResponse = await _amazonSageMaker.CreatePipelineAsync(
                new CreatePipelineRequest()
                {
                    PipelineDefinition = pipelineJson,
                    PipelineDescription = description,
                    PipelineDisplayName = displayName,
```

```

        PipelineName = name,
        RoleArn = roleArn
    });

    return createResponse.PipelineArn;
}
}

/// <summary>
/// Run a pipeline with input and output file locations.
/// </summary>
/// <param name="queueUrl">The URL for the queue to use for pipeline
callbacks.</param>
/// <param name="inputLocationUrl">The input location in Amazon Simple Storage
Service (Amazon S3).</param>
/// <param name="outputLocationUrl">The output location in Amazon S3.</param>
/// <param name="pipelineName">The name of the pipeline.</param>
/// <param name="executionRoleArn">The ARN of the role.</param>
/// <returns>The ARN of the pipeline run.</returns>
public async Task<string> ExecutePipeline(
    string queueUrl,
    string inputLocationUrl,
    string outputLocationUrl,
    string pipelineName,
    string executionRoleArn)
{
    var inputConfig = new VectorEnrichmentJobInputConfig()
    {
        DataSourceConfig = new()
        {
            S3Data = new VectorEnrichmentJobS3Data()
            {
                S3Uri = inputLocationUrl
            }
        },
        DocumentType = VectorEnrichmentJobDocumentType.CSV
    };

    var exportConfig = new ExportVectorEnrichmentJobOutputConfig()
    {
        S3Data = new VectorEnrichmentJobS3Data()
        {
            S3Uri = outputLocationUrl
        }
    }
}

```

```

    };

    var jobConfig = new VectorEnrichmentJobConfig()
    {
        ReverseGeocodingConfig = new ReverseGeocodingConfig()
        {
            XAttributeName = "Longitude",
            YAttributeName = "Latitude"
        }
    };

#pragma warning disable SageMaker1002 // Property value does not match required
pattern is allowed here to match the pipeline definition.
    var startExecutionResponse = await
    _amazonSageMaker.StartPipelineExecutionAsync(
        new StartPipelineExecutionRequest()
        {
            PipelineName = pipelineName,
            PipelineExecutionDisplayName = pipelineName + "-example-execution",
            PipelineParameters = new List<Parameter>()
            {
                new Parameter() { Name = "parameter_execution_role", Value =
executionRoleArn },
                new Parameter() { Name = "parameter_queue_url", Value =
queueUrl },
                new Parameter() { Name = "parameter_vej_input_config", Value =
JsonSerializer.Serialize(inputConfig) },
                new Parameter() { Name = "parameter_vej_export_config", Value =
JsonSerializer.Serialize(exportConfig) },
                new Parameter() { Name = "parameter_step_1_vej_config", Value =
JsonSerializer.Serialize(jobConfig) }
            }
        });
#pragma warning restore SageMaker1002
    return startExecutionResponse.PipelineExecutionArn;
}

/// <summary>
/// Check the status of a run.
/// </summary>
/// <param name="pipelineExecutionArn">The ARN.</param>
/// <returns>The status of the pipeline.</returns>
public async Task<PipelineExecutionStatus> CheckPipelineExecutionStatus(string
pipelineExecutionArn)

```



```

    {
        var describeResponse = await
            _amazonSageMaker.DescribePipelineExecutionAsync(
                new DescribePipelineExecutionRequest()
                {
                    PipelineExecutionArn = pipelineExecutionArn
                });

        return describeResponse.PipelineExecutionStatus;
    }

    /// <summary>
    /// Delete a SageMaker pipeline by name.
    /// </summary>
    /// <param name="pipelineName">The name of the pipeline to delete.</param>
    /// <returns>The ARN of the pipeline.</returns>
    public async Task<string> DeletePipelineByName(string pipelineName)
    {
        var deleteResponse = await _amazonSageMaker.DeletePipelineAsync(
            new DeletePipelineRequest()
            {
                PipelineName = pipelineName
            });

        return deleteResponse.PipelineArn;
    }
}

```

建立處理 SageMaker AI 管道回呼的函數。

```

using System.Text.Json;
using Amazon.Lambda.Core;
using Amazon.Lambda.SQSEvents;
using Amazon.SageMaker;
using Amazon.SageMaker.Model;
using Amazon.SageMakerGeospatial;
using Amazon.SageMakerGeospatial.Model;

// Assembly attribute to enable the AWS Lambda function's JSON input to be converted
// into a .NET class.

```

```

[assembly:
    LambdaSerializer(typeof(Amazon.Lambda.Serialization.SystemTextJson.DefaultLambdaJsonSerializer))]

namespace SageMakerLambda;

/// <summary>
/// The AWS Lambda function handler for the Amazon SageMaker pipeline.
/// </summary>
public class SageMakerLambdaFunction
{
    /// <summary>
    /// Default constructor. This constructor is used by AWS Lambda to construct the
    instance. When invoked in a Lambda environment
    /// the AWS credentials will come from the AWS Identity and Access Management
    (IAM) role associated with the function. The AWS Region will be set to the
    /// Region that the Lambda function is running in.
    /// </summary>
    public SageMakerLambdaFunction()
    {
    }

    /// <summary>
    /// The AWS Lambda function handler that processes events from the SageMaker
    pipeline and starts a job or export.
    /// </summary>
    /// <param name="request">The custom SageMaker pipeline request object.</param>
    /// <param name="context">The Lambda context.</param>
    /// <returns>The dictionary of output parameters.</returns>
    public async Task<Dictionary<string, string>> FunctionHandler(PipelineRequest
    request, ILambdaContext context)
    {
        var geoSpatialClient = new AmazonSageMakerGeospatialClient();
        var sageMakerClient = new AmazonSageMakerClient();
        var responseDictionary = new Dictionary<string, string>();
        context.Logger.LogInformation("Function handler started with request: " +
        JsonSerializer.Serialize(request));
        if (request.Records != null && request.Records.Any())
        {
            context.Logger.LogInformation("Records found, this is a queue event.
            Processing the queue records.");
            foreach (var message in request.Records)
            {
                await ProcessMessageAsync(message, context, geoSpatialClient,
                sageMakerClient);
            }
        }
    }
}

```

```

    }
}
else if (!string.IsNullOrEmpty(request.vej_export_config))
{
    context.Logger.LogInformation("Export configuration found, this is an
export. Start the Vector Enrichment Job (VEJ) export.");

    var outputConfig =
        JsonSerializer.Deserialize<ExportVectorEnrichmentJobOutputConfig>(
            request.vej_export_config);

    var exportResponse = await
geoSpatialClient.ExportVectorEnrichmentJobAsync(
    new ExportVectorEnrichmentJobRequest()
    {
        Arn = request.vej_arn,
        ExecutionRoleArn = request.Role,
        OutputConfig = outputConfig
    });
    context.Logger.LogInformation($"Export response:
{JsonSerializer.Serialize(exportResponse)}");
    responseDictionary = new Dictionary<string, string>
    {
        { "export_eoj_status", exportResponse.ExportStatus.ToString() },
        { "vej_arn", exportResponse.Arn }
    };
}
else if (!string.IsNullOrEmpty(request.vej_name))
{
    context.Logger.LogInformation("Vector Enrichment Job name found,
starting the job.");
    var inputConfig =
        JsonSerializer.Deserialize<VectorEnrichmentJobInputConfig>(
            request.vej_input_config);

    var jobConfig =
        JsonSerializer.Deserialize<VectorEnrichmentJobConfig>(
            request.vej_config);

    var jobResponse = await geoSpatialClient.StartVectorEnrichmentJobAsync(
        new StartVectorEnrichmentJobRequest()
        {
            ExecutionRoleArn = request.Role,
            InputConfig = inputConfig,

```

```

        Name = request.vej_name,
        JobConfig = jobConfig

    });
    context.Logger.LogInformation("Job response: " +
    JsonSerializer.Serialize(jobResponse));
    responseDictionary = new Dictionary<string, string>
    {
        { "vej_arn", jobResponse.Arn },
        { "statusCode", jobResponse.HttpStatusCode.ToString() }
    };
    }
    return responseDictionary;
}

/// <summary>
/// Process a queue message and check the status of a SageMaker job.
/// </summary>
/// <param name="message">The queue message.</param>
/// <param name="context">The Lambda context.</param>
/// <param name="geoClient">The SageMaker GeoSpatial client.</param>
/// <param name="sageMakerClient">The SageMaker client.</param>
/// <returns>Async task.</returns>
private async Task ProcessMessageAsync(SQSEvent.SQSMessage message,
ILambdaContext context,
    AmazonSageMakerGeospatialClient geoClient, AmazonSageMakerClient
sageMakerClient)
{
    context.Logger.LogInformation($"Processed message {message.Body}");

    // Get information about the SageMaker job.
    var payload = JsonSerializer.Deserialize<QueuePayload>(message.Body);
    context.Logger.LogInformation($"Payload token {payload!.token}");
    var token = payload.token;

    if (payload.arguments.ContainsKey("vej_arn"))
    {
        // Use the job ARN and the token to get the job status.
        var job_arn = payload.arguments["vej_arn"];
        context.Logger.LogInformation($"Token: {token}, arn {job_arn}");

        var jobInfo = geoClient.GetVectorEnrichmentJobAsync(
            new GetVectorEnrichmentJobRequest()
            {

```

```

        Arn = job_arn
    });
    context.Logger.LogInformation("Job info: " +
    JsonSerializer.Serialize(jobInfo));
    if (jobInfo.Result.Status == VectorEnrichmentJobStatus.COMPLETED)
    {
        context.Logger.LogInformation($"Status completed, resuming
pipeline...");
        await sagemakerClient.SendPipelineExecutionStepSuccessAsync(
            new SendPipelineExecutionStepSuccessRequest()
            {
                CallbackToken = token,
                OutputParameters = new List<OutputParameter>()
                {
                    new OutputParameter()
                    { Name = "export_status", Value =
jobInfo.Result.Status }
                }
            });
    }
    else if (jobInfo.Result.Status == VectorEnrichmentJobStatus.FAILED)
    {
        context.Logger.LogInformation($"Status failed, stopping
pipeline...");
        await sagemakerClient.SendPipelineExecutionStepFailureAsync(
            new SendPipelineExecutionStepFailureRequest()
            {
                CallbackToken = token,
                FailureReason = jobInfo.Result.ErrorDetails.ErrorMessage
            });
    }
    else if (jobInfo.Result.Status == VectorEnrichmentJobStatus.IN_PROGRESS)
    {
        // Put this message back in the queue to reprocess later.
        context.Logger.LogInformation(
            $"Status still in progress, check back later.");
        throw new("Job still running.");
    }
    }
}
}
}

```

在命令提示中執行互動式案例。

```
public static class PipelineWorkflow
{
    public static IAmazonIdentityManagementService _iamClient = null!;
    public static SageMakerWrapper _sageMakerWrapper = null!;
    public static IAmazonSQS _sqsClient = null!;
    public static IAmazonS3 _s3Client = null!;
    public static IAmazonLambda _lambdaClient = null!;
    public static IConfiguration _configuration = null!;

    public static string lambdaFunctionName = "SageMakerExampleFunction";
    public static string sageMakerRoleName = "SageMakerExampleRole";
    public static string lambdaRoleName = "SageMakerExampleLambdaRole";

    private static string[] lambdaRolePolicies = null!;
    private static string[] sageMakerRolePolicies = null!;

    static async Task Main(string[] args)
    {
        var options = new AWSOptions() { Region = RegionEndpoint.USWest2 };
        // Set up dependency injection for the AWS service.
        using var host = Host.CreateDefaultBuilder(args)
            .ConfigureLogging(logging =>
                logging.AddFilter("System", LogLevel.Debug)
                    .AddFilter<DebugLoggerProvider>("Microsoft",
                        LogLevel.Information)
                    .AddFilter<ConsoleLoggerProvider>("Microsoft", LogLevel.Trace))
            .ConfigureServices((_, services) =>
                services.AddAWSService<IAmazonIdentityManagementService>(options)
                    .AddAWSService<IAmazonEC2>(options)
                    .AddAWSService<IAmazonSageMaker>(options)
                    .AddAWSService<IAmazonSageMakerGeospatial>(options)
                    .AddAWSService<IAmazonSQS>(options)
                    .AddAWSService<IAmazonS3>(options)
                    .AddAWSService<IAmazonLambda>(options)
                    .AddTransient<SageMakerWrapper>()
                )
            .Build();

        _configuration = new ConfigurationBuilder()
            .SetBasePath(Directory.GetCurrentDirectory())
            .AddJsonFile("settings.json") // Load settings from .json file.
            .AddJsonFile("settings.local.json",
```

```

        true) // Optionally, load local settings.
        .Build();

    ServicesSetup(host);
    string queueUrl = "";
    string queueName = _configuration["queueName"];
    string bucketName = _configuration["bucketName"];
    var pipelineName = _configuration["pipelineName"];

    try
    {
        Console.WriteLine(new string('-', 80));
        Console.WriteLine(
            "Welcome to the Amazon SageMaker pipeline example scenario.");
        Console.WriteLine(
            "\nThis example scenario will guide you through setting up and
running an" +
            "\nAmazon SageMaker pipeline. The pipeline uses an AWS Lambda
function and an" +
            "\nAmazon SQS Queue. It runs a vector enrichment reverse geocode job
to" +
            "\nreverse geocode addresses in an input file and store the results
in an export file.");
        Console.WriteLine(new string('-', 80));

        Console.WriteLine(new string('-', 80));
        Console.WriteLine(
            "First, we will set up the roles, functions, and queue needed by the
SageMaker pipeline.");
        Console.WriteLine(new string('-', 80));

        var lambdaRoleArn = await CreateLambdaRole();
        var sageMakerRoleArn = await CreateSageMakerRole();
        var functionArn = await SetupLambda(lambdaRoleArn, true);
        queueUrl = await SetupQueue(queueName);
        await SetupBucket(bucketName);

        Console.WriteLine(new string('-', 80));
        Console.WriteLine("Now we can create and run our pipeline.");
        Console.WriteLine(new string('-', 80));

        await SetupPipeline(sageMakerRoleArn, functionArn, pipelineName);
        var executionArn = await ExecutePipeline(queueUrl, sageMakerRoleArn,
pipelineName, bucketName);
    }

```

```

        await WaitForPipelineExecution(executionArn);

        await GetOutputResults(bucketName);

        Console.WriteLine(new string('-', 80));
        Console.WriteLine("The pipeline has completed. To view the pipeline and
runs " +
                           "in SageMaker Studio, follow these instructions:" +
                           "\nhttps://docs.aws.amazon.com/sagemaker/latest/dg/
pipelines-studio.html");
        Console.WriteLine(new string('-', 80));

        Console.WriteLine(new string('-', 80));
        Console.WriteLine("Finally, let's clean up our resources.");
        Console.WriteLine(new string('-', 80));

        await CleanupResources(true, queueUrl, pipelineName, bucketName);

        Console.WriteLine(new string('-', 80));
        Console.WriteLine("SageMaker pipeline scenario is complete.");
        Console.WriteLine(new string('-', 80));
    }
    catch (Exception ex)
    {
        Console.WriteLine(new string('-', 80));
        Console.WriteLine($"There was a problem running the scenario:
{ex.Message}");
        await CleanupResources(true, queueUrl, pipelineName, bucketName);
        Console.WriteLine(new string('-', 80));
    }
}

/// <summary>
/// Populate the services for use within the console application.
/// </summary>
/// <param name="host">The services host.</param>
private static void ServicesSetup(IHost host)
{
    _sageMakerWrapper = host.Services.GetRequiredService<SageMakerWrapper>();
    _iamClient =
host.Services.GetRequiredService<IAmazonIdentityManagementService>();
    _sqsClient = host.Services.GetRequiredService<IAmazonSQS>();
    _s3Client = host.Services.GetRequiredService<IAmazonS3>();
    _lambdaClient = host.Services.GetRequiredService<IAmazonLambda>();
}

```



```

    }

    /// <summary>
    /// Set up AWS Lambda, either by updating an existing function or creating a new
    function.
    /// </summary>
    /// <param name="roleArn">The role Amazon Resource Name (ARN) to use for the
    Lambda function.</param>
    /// <param name="askUser">True to ask the user before updating.</param>
    /// <returns>The ARN of the function.</returns>
    public static async Task<string> SetupLambda(string roleArn, bool askUser)
    {
        Console.WriteLine(new string('-', 80));
        Console.WriteLine("Setting up the Lambda function for the pipeline.");
        var handlerName =
            "SageMakerLambda::SageMakerLambda.SageMakerLambdaFunction::FunctionHandler";
        var functionArn = "";
        try
        {
            var functionInfo = await _lambdaClient.GetFunctionAsync(new
            GetFunctionRequest()
            {
                FunctionName = lambdaFunctionName
            });

            var updateFunction = true;
            if (askUser)
            {
                updateFunction = GetYesNoResponse(
                    $"\\tThe Lambda function {lambdaFunctionName} already exists, do
you want to update it?");
            }

            if (updateFunction)
            {
                // Update the Lambda function.
                using var zipMemoryStream = new MemoryStream(await
                File.ReadAllBytesAsync("SageMakerLambda.zip"));
                await _lambdaClient.UpdateFunctionCodeAsync(
                    new UpdateFunctionCodeRequest()
                    {
                        FunctionName = lambdaFunctionName,
                        ZipFile = zipMemoryStream,
                    });
            }
        }
    }

```

```

    }

    functionArn = functionInfo.Configuration.FunctionArn;
}
catch (ResourceNotFoundException)
{
    Console.WriteLine($"\\tThe Lambda function {lambdaFunctionName} was not
found, creating the new function.");

    // Create the function if it does not already exist.
    using var zipMemoryStream = new MemoryStream(await
File.ReadAllBytesAsync("SageMakerLambda.zip"));
    var createResult = await _lambdaClient.CreateFunctionAsync(
        new CreateFunctionRequest()
        {
            FunctionName = lambdaFunctionName,
            Runtime = Runtime.Dotnet6,
            Description = "SageMaker example function.",
            Code = new FunctionCode()
            {
                ZipFile = zipMemoryStream
            },
            Handler = handlerName,
            Role = roleArn,
            Timeout = 30
        });

    functionArn = createResult.FunctionArn;
}

Console.WriteLine($"\\tLambda ready with ARN {functionArn}.");
Console.WriteLine(new string('-', 80));
return functionArn;
}

/// <summary>
/// Create a role to be used by AWS Lambda. Does not create the role if it
already exists.
/// </summary>
/// <returns>The role ARN.</returns>
public static async Task<string> CreateLambdaRole()
{
    Console.WriteLine(new string('-', 80));

```

```

        lambdaRolePolicies = new string[]{
            "arn:aws:iam::aws:policy/AmazonSageMakerFullAccess",
            "arn:aws:iam::aws:policy/AmazonSQSFullAccess",
            "arn:aws:iam::aws:policy/service-role/" +
            "AmazonSageMakerGeospatialFullAccess",
            "arn:aws:iam::aws:policy/service-role/" +
            "AmazonSageMakerServiceCatalogProductsLambdaServiceRolePolicy",
            "arn:aws:iam::aws:policy/service-role/" +
            "AWSLambdaSQSQueueExecutionRole"
        };

        var roleArn = await GetRoleArnIfExists(lambdaRoleName);
        if (!string.IsNullOrEmpty(roleArn))
        {
            return roleArn;
        }

        Console.WriteLine("\tCreating a role to for AWS Lambda to use.");

        var assumeRolePolicy = "{" +
            "\"Version\": \"2012-10-17\", " +
            "\"Statement\": [{" +
                "\"Effect\": \"Allow\", " +
                "\"Principal\": {" +
                    "\"Service\": [" +
                        "\"sagemaker.amazonaws.com\", " +
                        "\"sagemaker-geospatial.amazonaws.com"
                    +
                        "\"lambda.amazonaws.com\", " +
                        "\"s3.amazonaws.com\"" +
                    "]" +
                "}, " +
                "\"Action\": \"sts:AssumeRole\"" +
            "}] " +
            "};

        var roleResult = await _iamClient!.CreateRoleAsync(
            new CreateRoleRequest()
            {
                AssumeRolePolicyDocument = assumeRolePolicy,
                Path = "/",
                RoleName = lambdaRoleName
            });
        foreach (var policy in lambdaRolePolicies)

```

```

    {
        await _iamClient.AttachRolePolicyAsync(
            new AttachRolePolicyRequest()
            {
                PolicyArn = policy,
                RoleName = lambdaRoleName
            });
    }

    // Allow time for the role to be ready.
    Thread.Sleep(10000);
    Console.WriteLine($"\\tRole ready with ARN {roleResult.Role.Arn}.");
    Console.WriteLine(new string('-', 80));

    return roleResult.Role.Arn;
}

/// <summary>
/// Create a role to be used by SageMaker.
/// </summary>
/// <returns>The role Amazon Resource Name (ARN).</returns>
public static async Task<string> CreateSageMakerRole()
{
    Console.WriteLine(new string('-', 80));

    sageMakerRolePolicies = new string[]{
        "arn:aws:iam::aws:policy/AmazonSageMakerFullAccess",
        "arn:aws:iam::aws:policy/AmazonSageMakerGeospatialFullAccess",
    };

    var roleArn = await GetRoleArnIfExists(sageMakerRoleName);
    if (!string.IsNullOrEmpty(roleArn))
    {
        return roleArn;
    }

    Console.WriteLine("\\tCreating a role to use with SageMaker.");

    var assumeRolePolicy = "{" +
        "\\\"Version\\\": \\\"2012-10-17\\\", \" +
        "\\\"Statement\\\": [{\" +
            "\\\"Effect\\\": \\\"Allow\\\", \" +
            "\\\"Principal\\\": {\" +

```

```

        $"\"Service\": [" +
            "\"sagemaker.amazonaws.com\", " +
            "\"sagemaker-geospatial.amazonaws.com\", " +
            "\"lambda.amazonaws.com\", " +
            "\"s3.amazonaws.com\" " +
            "]" +
            "}, " +
            "\"Action\": \"sts:AssumeRole\" " +
            "}] " +
            "}";

var roleResult = await _iamClient!.CreateRoleAsync(
    new CreateRoleRequest()
    {
        AssumeRolePolicyDocument = assumeRolePolicy,
        Path = "/",
        RoleName = sageMakerRoleName
    });

foreach (var policy in sageMakerRolePolicies)
{
    await _iamClient.AttachRolePolicyAsync(
        new AttachRolePolicyRequest()
        {
            PolicyArn = policy,
            RoleName = sageMakerRoleName
        });
}

// Allow time for the role to be ready.
Thread.Sleep(10000);
Console.WriteLine($"\\tRole ready with ARN {roleResult.Role.Arn}.");
Console.WriteLine(new string('-', 80));
return roleResult.Role.Arn;
}

/// <summary>
/// Set up the SQS queue to use with the pipeline.
/// </summary>
/// <param name="queueName">The name for the queue.</param>
/// <returns>The URL for the queue.</returns>
public static async Task<string> SetupQueue(string queueName)
{

```

```

        Console.WriteLine(new string('-', 80));
        Console.WriteLine($"Setting up queue {queueName}.");

        try
        {
            var queueInfo = await _sqsClient.GetQueueUrlAsync(new
GetQueueUrlRequest()
            { QueueName = queueName });
            return queueInfo.QueueUrl;
        }
        catch (QueueDoesNotExistException)
        {
            var attrs = new Dictionary<string, string>
            {
                {
                    QueueAttributeName.DelaySeconds,
                    "5"
                },
                {
                    QueueAttributeName.ReceiveMessageWaitTimeSeconds,
                    "5"
                },
                {
                    QueueAttributeName.VisibilityTimeout,
                    "300"
                },
            };

            var request = new CreateQueueRequest
            {
                Attributes = attrs,
                QueueName = queueName,
            };

            var response = await _sqsClient.CreateQueueAsync(request);
            Thread.Sleep(10000);
            await ConnectLambda(response.QueueUrl);
            Console.WriteLine($"\\tQueue ready with Url {response.QueueUrl}.");
            Console.WriteLine(new string('-', 80));
            return response.QueueUrl;
        }
    }

    /// <summary>

```

```

    /// Connect the queue to the Lambda function as an event source.
    /// </summary>
    /// <param name="queueUrl">The URL for the queue.</param>
    /// <returns>Async task.</returns>
    public static async Task ConnectLambda(string queueUrl)
    {
        Console.WriteLine(new string('-', 80));
        Console.WriteLine($"Connecting the Lambda function and queue for the
pipeline.");

        var queueAttributes = await _sqsClient.GetQueueAttributesAsync(
            new GetQueueAttributesRequest() { QueueUrl = queueUrl, AttributeNames =
new List<string>() { "All" } });
        var queueArn = queueAttributes.QueueARN;

        var eventSource = await _lambdaClient.ListEventSourceMappingsAsync(
            new ListEventSourceMappingsRequest()
            {
                FunctionName = lambdaFunctionName
            });

        if (!eventSource.EventSourceMappings.Any())
        {
            // Only add the event source mapping if it does not already exist.
            await _lambdaClient.CreateEventSourceMappingAsync(
                new CreateEventSourceMappingRequest()
                {
                    EventSourceArn = queueArn,
                    FunctionName = lambdaFunctionName,
                    Enabled = true
                });
        }

        Console.WriteLine(new string('-', 80));
    }

    /// <summary>
    /// Set up the bucket to use for pipeline input and output.
    /// </summary>
    /// <param name="bucketName">The name for the bucket.</param>
    /// <returns>Async task.</returns>
    public static async Task SetupBucket(string bucketName)
    {
        Console.WriteLine(new string('-', 80));
    }

```

```

        Console.WriteLine($"Setting up bucket {bucketName}.");

        var bucketExists = await
Amazon.S3.Util.AmazonS3Util.DoesS3BucketExistV2Async(_s3Client,
            bucketName);

        if (!bucketExists)
        {
            await _s3Client.PutBucketAsync(new PutBucketRequest()
            {
                BucketName = bucketName,
                BucketRegion = S3Region.USSouth2
            });

            Thread.Sleep(5000);

            await _s3Client.PutObjectAsync(new PutObjectRequest()
            {
                BucketName = bucketName,
                Key = "samplefiles/latlongtest.csv",
                FilePath = "latlongtest.csv"
            });
        }

        Console.WriteLine($"\\tBucket {bucketName} ready.");
        Console.WriteLine(new string('-', 80));
    }

    /// <summary>
    /// Display some results from the output directory.
    /// </summary>
    /// <param name="bucketName">The name for the bucket.</param>
    /// <returns>Async task.</returns>
    public static async Task<string> GetOutputResults(string bucketName)
    {
        Console.WriteLine(new string('-', 80));
        Console.WriteLine($"Getting output results {bucketName}.");
        string outputKey = "";
        Thread.Sleep(15000);
        var outputFiles = await _s3Client.ListObjectsAsync(
            new ListObjectsRequest()
            {
                BucketName = bucketName,
                Prefix = "outputfiles/"
            }
        );
    }

```



```

        });

        if (outputFiles.S3Objects.Any())
        {
            var sampleOutput = outputFiles.S3Objects.OrderBy(s =>
s.LastModified).Last();
            Console.WriteLine($"\\tOutput file: {sampleOutput.Key}");
            var outputSampleResponse = await _s3Client.GetObjectAsync(
                new GetObjectRequest()
                {
                    BucketName = bucketName,
                    Key = sampleOutput.Key
                });
            outputKey = sampleOutput.Key;
            StreamReader reader = new
StreamReader(outputSampleResponse.ResponseStream);
            await reader.ReadLineAsync();
            Console.WriteLine("\\tOutput file contents: \\n");
            for (int i = 0; i < 10; i++)
            {
                if (!reader.EndOfStream)
                {
                    Console.WriteLine("\\t" + await reader.ReadLineAsync());
                }
            }
        }

        Console.WriteLine(new string('-', 80));
        return outputKey;
    }

    /// <summary>
    /// Create a pipeline from the example pipeline JSON
    /// that includes the Lambda, callback, processing, and export jobs.
    /// </summary>
    /// <param name="roleArn">The ARN of the role for the pipeline.</param>
    /// <param name="functionArn">The ARN of the Lambda function for the pipeline.</
param>
    /// <param name="pipelineName">The name for the pipeline.</param>
    /// <returns>The ARN of the pipeline.</returns>
    public static async Task<string> SetupPipeline(string roleArn, string
functionArn, string pipelineName)
    {
        Console.WriteLine(new string('-', 80));
    }

```

```

        Console.WriteLine($"Setting up the pipeline.");

        var pipelineJson = await File.ReadAllTextAsync("GeoSpatialPipeline.json");

        // Add the correct function ARN instead of the placeholder.
        pipelineJson = pipelineJson.Replace("*FUNCTION_ARN*", functionArn);

        var pipelineArn = await _sageMakerWrapper.SetupPipeline(pipelineJson,
            roleArn, pipelineName,
            "sdk example pipeline", pipelineName);

        Console.WriteLine($"\\tPipeline set up with ARN {pipelineArn}.");
        Console.WriteLine(new string('-', 80));

        return pipelineArn;
    }

    /// <summary>
    /// Start a pipeline run with job configurations.
    /// </summary>
    /// <param name="queueUrl">The URL for the queue used in the pipeline.</param>
    /// <param name="roleArn">The ARN of the role.</param>
    /// <param name="pipelineName">The name of the pipeline.</param>
    /// <param name="bucketName">The name of the bucket.</param>
    /// <returns>The pipeline run ARN.</returns>
    public static async Task<string> ExecutePipeline(
        string queueUrl,
        string roleArn,
        string pipelineName,
        string bucketName)
    {
        Console.WriteLine(new string('-', 80));
        Console.WriteLine($"Starting pipeline execution.");

        var input = $"s3://{bucketName}/samplefiles/latlongtest.csv";
        var output = $"s3://{bucketName}/outputfiles/";

        var executionARN =
            await _sageMakerWrapper.ExecutePipeline(queueUrl, input, output,
                pipelineName, roleArn);

        Console.WriteLine($"\\tRun started with ARN {executionARN}.");
        Console.WriteLine(new string('-', 80));
    }

```

```

        return executionARN;
    }

    /// <summary>
    /// Wait for a pipeline run to complete.
    /// </summary>
    /// <param name="executionArn">The pipeline run ARN.</param>
    /// <returns>Async task.</returns>
    public static async Task WaitForPipelineExecution(string executionArn)
    {
        Console.WriteLine(new string('-', 80));
        Console.WriteLine($"Waiting for pipeline to finish.");

        PipelineExecutionStatus status;
        do
        {
            status = await
_sageMakerWrapper.CheckPipelineExecutionStatus(executionArn);
            Thread.Sleep(30000);
            Console.WriteLine($"\\tStatus is {status}.");
        } while (status == PipelineExecutionStatus.Executing);

        Console.WriteLine($"\\tPipeline finished with status {status}.");
        Console.WriteLine(new string('-', 80));
    }

    /// <summary>
    /// Clean up the resources from the scenario.
    /// </summary>
    /// <param name="askUser">True to ask the user for cleanup.</param>
    /// <param name="queueUrl">The URL of the queue to clean up.</param>
    /// <param name="pipelineName">The name of the pipeline.</param>
    /// <param name="bucketName">The name of the bucket.</param>
    /// <returns>Async task.</returns>
    public static async Task<bool> CleanupResources(
        bool askUser,
        string queueUrl,
        string pipelineName,
        string bucketName)
    {
        Console.WriteLine(new string('-', 80));
        Console.WriteLine($"Clean up resources.");
    }

```

```

        if (!askUser || GetYesNoResponse($"\tDelete pipeline {pipelineName}? (y/n)"))
        {
            Console.WriteLine($" \tDeleting pipeline.");
            // Delete the pipeline.
            await _sageMakerWrapper.DeletePipelineByName(pipelineName);
        }

        if (!string.IsNullOrEmpty(queueUrl) && (!askUser || GetYesNoResponse($" \tDelete queue {queueUrl}? (y/n)")))
        {
            Console.WriteLine($" \tDeleting queue.");
            // Delete the queue.
            await _sqsClient.DeleteQueueAsync(new DeleteQueueRequest(queueUrl));
        }

        if (!askUser || GetYesNoResponse($" \tDelete Amazon S3 bucket {bucketName}? (y/n)"))
        {
            Console.WriteLine($" \tDeleting bucket.");
            // Delete all objects in the bucket.
            var deleteList = await _s3Client.ListObjectsV2Async(new ListObjectsV2Request()
            {
                BucketName = bucketName
            });
            if (deleteList.KeyCount > 0)
            {
                await _s3Client.DeleteObjectsAsync(new DeleteObjectsRequest()
                {
                    BucketName = bucketName,
                    Objects = deleteList.S3Objects
                        .Select(o => new KeyVersion { Key = o.Key }).ToList()
                });
            }

            // Now delete the bucket.
            await _s3Client.DeleteBucketAsync(new DeleteBucketRequest()
            {
                BucketName = bucketName
            });
        }
    }

```

```

        if (!askUser || GetYesNoResponse($"\\tDelete lambda {lambdaFunctionName}? (y/n)"))
        {
            Console.WriteLine($"\\tDeleting lambda function.");

            await _lambdaClient.DeleteFunctionAsync(new DeleteFunctionRequest()
            {
                FunctionName = lambdaFunctionName
            });
        }

        if (!askUser || GetYesNoResponse($"\\tDelete role {lambdaRoleName}? (y/n)"))
        {
            Console.WriteLine($"\\tDetaching policies and deleting role.");

            foreach (var policy in lambdaRolePolicies)
            {
                await _iamClient!.DetachRolePolicyAsync(new
DetachRolePolicyRequest()
                {
                    RoleName = lambdaRoleName,
                    PolicyArn = policy
                });
            }

            await _iamClient!.DeleteRoleAsync(new DeleteRoleRequest()
            {
                RoleName = lambdaRoleName
            });
        }

        if (!askUser || GetYesNoResponse($"\\tDelete role {sageMakerRoleName}? (y/n)"))
        {
            Console.WriteLine($"\\tDetaching policies and deleting role.");

            foreach (var policy in sageMakerRolePolicies)
            {
                await _iamClient!.DetachRolePolicyAsync(new
DetachRolePolicyRequest()
                {
                    RoleName = sageMakerRoleName,
                    PolicyArn = policy
                });
            }
        }
    }
}

```

```

    }

    await _iamClient!.DeleteRoleAsync(new DeleteRoleRequest()
    {
        RoleName = sageMakerRoleName
    });
}

Console.WriteLine(new string('-', 80));
return true;
}

/// <summary>
/// Helper method to get a role's ARN if it already exists.
/// </summary>
/// <param name="roleName">The name of the AWS Identity and Access Management
(IAM) Role to look for.</param>
/// <returns>The role ARN if it exists, otherwise an empty string.</returns>
private static async Task<string> GetRoleArnIfExists(string roleName)
{
    Console.WriteLine($"Checking for role named {roleName}.");

    try
    {
        var existingRole = await _iamClient.GetRoleAsync(new GetRoleRequest()
        {
            RoleName = lambdaRoleName
        });
        return existingRole.Role.Arn;
    }
    catch (NoSuchEntityException)
    {
        return string.Empty;
    }
}

/// <summary>
/// Helper method to get a yes or no response from the user.
/// </summary>
/// <param name="question">The question string to print on the console.</param>
/// <returns>True if the user responds with a yes.</returns>
private static bool GetYesNoResponse(string question)
{
    Console.WriteLine(question);
}

```

```
var ynResponse = Console.ReadLine();
var response = ynResponse != null &&
               ynResponse.Equals("y",
                                StringComparison.InvariantCultureIgnoreCase);
return response;
}
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的下列主題。

- [CreatePipeline](#)
- [DeletePipeline](#)
- [DescribePipelineExecution](#)
- [StartPipelineExecution](#)
- [UpdatePipeline](#)

使用的 Secrets Manager 範例 適用於 .NET 的 SDK

下列程式碼範例示範如何使用 適用於 .NET 的 AWS SDK 搭配 Secrets Manager 來執行動作和實作常見案例。

Actions 是大型程式的程式碼摘錄，必須在內容中執行。雖然動作會告訴您如何呼叫個別服務函數，但您可以在其相關情境中查看內容中的動作。

每個範例均包含完整原始碼的連結，您可在連結中找到如何設定和執行內容中程式碼的相關指示。

主題

- [動作](#)

動作

GetSecretValue

以下程式碼範例顯示如何使用 GetSecretValue。

適用於 .NET 的 SDK

 Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
using System;
using System.IO;
using System.Threading.Tasks;
using Amazon.SecretsManager;
using Amazon.SecretsManager.Model;

/// <summary>
/// This example uses the Amazon Web Service Secrets Manager to retrieve
/// the secret value for the provided secret name.
/// </summary>
public class GetSecretValue
{
    /// <summary>
    /// The main method initializes the necessary values and then calls
    /// the GetSecretAsync and DecodeString methods to get the decoded
    /// secret value for the secret named in secretName.
    /// </summary>
    public static async Task Main()
    {
        string secretName = "<<{{MySecretName}}>>";
        string secret;

        IAmazonSecretsManager client = new AmazonSecretsManagerClient();

        var response = await GetSecretAsync(client, secretName);

        if (response is not null)
        {
            secret = DecodeString(response);

            if (!string.IsNullOrEmpty(secret))
            {
                Console.WriteLine($"The decoded secret value is: {secret}.");
            }
        }
    }
}
```



```

        else
        {
            Console.WriteLine("No secret value was returned.");
        }
    }
}

/// <summary>
/// Retrieves the secret value given the name of the secret to
/// retrieve.
/// </summary>
/// <param name="client">The client object used to retrieve the secret
/// value for the given secret name.</param>
/// <param name="secretName">The name of the secret value to retrieve.</
param>
/// <returns>The GetSecretValueResponse object returned by
/// GetSecretValueAsync.</returns>
public static async Task<GetSecretValueResponse> GetSecretAsync(
    IAmazonSecretsManager client,
    string secretName)
{
    GetSecretValueRequest request = new GetSecretValueRequest()
    {
        SecretId = secretName,
        VersionStage = "AWSCURRENT", // VersionStage defaults to AWSCURRENT
if unspecified.
    };

    GetSecretValueResponse response = null;

    // For the sake of simplicity, this example handles only the most
    // general SecretsManager exception.
    try
    {
        response = await client.GetSecretValueAsync(request);
    }
    catch (AmazonSecretsManagerException e)
    {
        Console.WriteLine($"Error: {e.Message}");
    }

    return response;
}

```

```

    /// <summary>
    /// Decodes the secret returned by the call to GetSecretValueAsync and
    /// returns it to the calling program.
    /// </summary>
    /// <param name="response">A GetSecretValueResponse object containing
    /// the requested secret value returned by GetSecretValueAsync.</param>
    /// <returns>A string representing the decoded secret value.</returns>
    public static string DecodeString(GetSecretValueResponse response)
    {
        // Decrypts secret using the associated AWS Key Management Service
        // Customer Master Key (CMK.) Depending on whether the secret is a
        // string or binary value, one of these fields will be populated.
        if (response.SecretString is not null)
        {
            var secret = response.SecretString;
            return secret;
        }
        else if (response.SecretBinary is not null)
        {
            var memoryStream = response.SecretBinary;
            StreamReader reader = new StreamReader(memoryStream);
            string decodedBinarySecret =
System.Text.Encoding.UTF8.GetString(Convert.FromBase64String(reader.ReadToEnd()));
            return decodedBinarySecret;
        }
        else
        {
            return string.Empty;
        }
    }
}

```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [GetSecretValue](#)。

使用的 Amazon SES 範例 適用於 .NET 的 SDK

下列程式碼範例示範如何使用 適用於 .NET 的 AWS SDK 搭配 Amazon SES 執行動作和實作常見案例。

Actions 是大型程式的程式碼摘錄，必須在內容中執行。雖然動作會告訴您如何呼叫個別服務函數，但您可以在其相關情境中查看內容中的動作。

案例是向您展示如何呼叫服務中的多個函數或與其他 AWS 服務組合來完成特定任務的程式碼範例。

每個範例均包含完整原始碼的連結，您可在連結中找到如何設定和執行內容中程式碼的相關指示。

主題

- [動作](#)
- [案例](#)

動作

CreateTemplate

以下程式碼範例顯示如何使用 CreateTemplate。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Create an email template.
/// </summary>
/// <param name="name">Name of the template.</param>
/// <param name="subject">Email subject.</param>
/// <param name="text">Email body text.</param>
/// <param name="html">Email HTML body text.</param>
/// <returns>True if successful.</returns>
public async Task<bool> CreateEmailTemplateAsync(string name, string subject,
string text,
    string html)
{
    var success = false;
    try
```

```
{
    var response = await _amazonSimpleEmailService.CreateTemplateAsync(
        new CreateTemplateRequest
        {
            Template = new Template
            {
                TemplateName = name,
                SubjectPart = subject,
                TextPart = text,
                HtmlPart = html
            }
        });
    success = response.HttpStatusCode == HttpStatusCode.OK;
}
catch (Exception ex)
{
    Console.WriteLine("CreateEmailTemplateAsync failed with exception: " +
        ex.Message);
}

return success;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [CreateTemplate](#)。

DeleteIdentity

以下程式碼範例顯示如何使用 DeleteIdentity。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Delete an email identity.
```

```

/// </summary>
/// <param name="identityEmail">The identity email to delete.</param>
/// <returns>True if successful.</returns>
public async Task<bool> DeleteIdentityAsync(string identityEmail)
{
    var success = false;
    try
    {
        var response = await _amazonSimpleEmailService.DeleteIdentityAsync(
            new DeleteIdentityRequest
            {
                Identity = identityEmail
            });
        success = response.HttpStatusCode == HttpStatusCode.OK;
    }
    catch (Exception ex)
    {
        Console.WriteLine("DeleteIdentityAsync failed with exception: " +
            ex.Message);
    }

    return success;
}

```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [DeleteIdentity](#)。

DeleteTemplate

以下程式碼範例顯示如何使用 DeleteTemplate。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```

/// <summary>

```

```
/// Delete an email template.
/// </summary>
/// <param name="templateName">Name of the template.</param>
/// <returns>True if successful.</returns>
public async Task<bool> DeleteEmailTemplateAsync(string templateName)
{
    var success = false;
    try
    {
        var response = await _amazonSimpleEmailService.DeleteTemplateAsync(
            new DeleteTemplateRequest
            {
                TemplateName = templateName
            });
        success = response.HttpStatusCode == HttpStatusCode.OK;
    }
    catch (Exception ex)
    {
        Console.WriteLine("DeleteEmailTemplateAsync failed with exception: " +
            ex.Message);
    }

    return success;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [DeleteTemplate](#)。

GetIdentityVerificationAttributes

以下程式碼範例顯示如何使用 GetIdentityVerificationAttributes。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Get identity verification status for an email.
/// </summary>
/// <returns>The verification status of the email.</returns>
public async Task<VerificationStatus> GetIdentityStatusAsync(string email)
{
    var result = VerificationStatus.TemporaryFailure;
    try
    {
        var response =
            await
                _amazonSimpleEmailService.GetIdentityVerificationAttributesAsync(
                    new GetIdentityVerificationAttributesRequest
                    {
                        Identities = new List<string> { email }
                    });

        if (response.VerificationAttributes.ContainsKey(email))
            result = response.VerificationAttributes[email].VerificationStatus;
    }
    catch (Exception ex)
    {
        Console.WriteLine("GetIdentityStatusAsync failed with exception: " +
            ex.Message);
    }

    return result;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [GetIdentityVerificationAttributes](#)。

GetSendQuota

以下程式碼範例顯示如何使用 GetSendQuota。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Get information on the current account's send quota.
/// </summary>
/// <returns>The send quota response data.</returns>
public async Task<GetSendQuotaResponse> GetSendQuotaAsync()
{
    var result = new GetSendQuotaResponse();
    try
    {
        var response = await _amazonSimpleEmailService.GetSendQuotaAsync(
            new GetSendQuotaRequest());
        result = response;
    }
    catch (Exception ex)
    {
        Console.WriteLine("GetSendQuotaAsync failed with exception: " +
ex.Message);
    }

    return result;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [GetSendQuota](#)。

ListIdentities

以下程式碼範例顯示如何使用 ListIdentities。

適用於 .NET 的 SDK

 Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Get the identities of a specified type for the current account.
/// </summary>
/// <param name="identityType">IdentityType to list.</param>
/// <returns>The list of identities.</returns>
public async Task<List<string>> ListIdentitiesAsync(IdentityType identityType)
{
    var result = new List<string>();
    try
    {
        var response = await _amazonSimpleEmailService.ListIdentitiesAsync(
            new ListIdentitiesRequest
            {
                IdentityType = identityType
            });
        result = response.Identities;
    }
    catch (Exception ex)
    {
        Console.WriteLine("ListIdentitiesAsync failed with exception: " +
ex.Message);
    }

    return result;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [ListIdentities](#)。

ListTemplates

以下程式碼範例顯示如何使用 ListTemplates。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// List email templates for the current account.
/// </summary>
/// <returns>A list of template metadata.</returns>
public async Task<List<TemplateMetadata>> ListEmailTemplatesAsync()
{
    var result = new List<TemplateMetadata>();
    try
    {
        var response = await _amazonSimpleEmailService.ListTemplatesAsync(
            new ListTemplatesRequest());
        result = response.TemplatesMetadata;
    }
    catch (Exception ex)
    {
        Console.WriteLine("ListEmailTemplatesAsync failed with exception: " +
ex.Message);
    }

    return result;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [ListTemplates](#)。

SendEmail

以下程式碼範例顯示如何使用 SendEmail。

適用於 .NET 的 SDK

 Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Send an email by using Amazon SES.
/// </summary>
/// <param name="toAddresses">List of recipients.</param>
/// <param name="ccAddresses">List of cc recipients.</param>
/// <param name="bccAddresses">List of bcc recipients.</param>
/// <param name="bodyHtml">Body of the email in HTML.</param>
/// <param name="bodyText">Body of the email in plain text.</param>
/// <param name="subject">Subject line of the email.</param>
/// <param name="senderAddress">From address.</param>
/// <returns>The messageId of the email.</returns>
public async Task<string> SendEmailAsync(List<string> toAddresses,
    List<string> ccAddresses, List<string> bccAddresses,
    string bodyHtml, string bodyText, string subject, string senderAddress)
{
    var messageId = "";
    try
    {
        var response = await _amazonSimpleEmailService.SendEmailAsync(
            new SendEmailRequest
            {
                Destination = new Destination
                {
                    BccAddresses = bccAddresses,
                    CcAddresses = ccAddresses,
                    ToAddresses = toAddresses
                },
                Message = new Message
                {
                    Body = new Body
                    {
                        Html = new Content
                        {
```

```
                Charset = "UTF-8",
                Data = bodyHtml
            },
            Text = new Content
            {
                Charset = "UTF-8",
                Data = bodyText
            }
        },
        Subject = new Content
        {
            Charset = "UTF-8",
            Data = subject
        }
    },
    Source = senderAddress
));
messageId = response.MessageId;
}
catch (Exception ex)
{
    Console.WriteLine("SendEmailAsync failed with exception: " +
ex.Message);
}

return messageId;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [SendEmail](#)。

SendTemplatedEmail

以下程式碼範例顯示如何使用 SendTemplatedEmail。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Send an email using a template.
/// </summary>
/// <param name="sender">Address of the sender.</param>
/// <param name="recipients">Addresses of the recipients.</param>
/// <param name="templateName">Name of the email template.</param>
/// <param name="templateDataObject">Data for the email template.</param>
/// <returns>The messageId of the email.</returns>
public async Task<string> SendTemplateEmailAsync(string sender, List<string>
recipients,
    string templateName, object templateDataObject)
{
    var messageId = "";
    try
    {
        // Template data should be serialized JSON from either a class or a
dynamic object.
        var templateData = JsonSerializer.Serialize(templateDataObject);

        var response = await _amazonSimpleEmailService.SendTemplatedEmailAsync(
            new SendTemplatedEmailRequest
            {
                Source = sender,
                Destination = new Destination
                {
                    ToAddresses = recipients
                },
                Template = templateName,
                TemplateData = templateData
            });
        messageId = response.MessageId;
    }
    catch (Exception ex)
    {
        Console.WriteLine("SendTemplateEmailAsync failed with exception: " +
ex.Message);
    }

    return messageId;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [SendTemplatedEmail](#)。

VerifyEmailIdentity

以下程式碼範例顯示如何使用 VerifyEmailIdentity。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Starts verification of an email identity. This request sends an email
/// from Amazon SES to the specified email address. To complete
/// verification, follow the instructions in the email.
/// </summary>
/// <param name="recipientEmailAddress">Email address to verify.</param>
/// <returns>True if successful.</returns>
public async Task<bool> VerifyEmailIdentityAsync(string recipientEmailAddress)
{
    var success = false;
    try
    {
        var response = await _amazonSimpleEmailService.VerifyEmailIdentityAsync(
            new VerifyEmailIdentityRequest
            {
                EmailAddress = recipientEmailAddress
            });

        success = response.HttpStatusCode == HttpStatusCode.OK;
    }
    catch (Exception ex)
    {
        Console.WriteLine("VerifyEmailIdentityAsync failed with exception: " +
            ex.Message);
    }
}
```

```
        return success;
    }
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [VerifyEmailIdentity](#)。

案例

建立 Web 應用程式以追蹤 DynamoDB 資料

下列程式碼示範如何建立一個 Web 應用程式，該應用程式會追蹤 Amazon DynamoDB 資料表中的工作項目，並使用 Amazon Simple Email Service (Amazon SES) 傳送報告。

適用於 .NET 的 SDK

說明如何使用 Amazon DynamoDB .NET API 來建立可追蹤 DynamoDB 工作資料的動態 Web 應用程式。

如需完整的原始碼和如何設定及執行的指示，請參閱 [GitHub](#) 上的完整範例。

此範例中使用的服務

- DynamoDB
- Amazon SES

建立 Aurora 無伺服器工作項目追蹤器

下列程式碼示範如何建立一個 Web 應用程式，該應用程式會追蹤 Amazon Aurora Serverless 資料庫中的工作項目，並使用 Amazon Simple Email Service (Amazon SES) 傳送報告。

適用於 .NET 的 SDK

示範如何使用 適用於 .NET 的 AWS SDK 建立 Web 應用程式，以使用 Amazon Simple Email Service (Amazon SES) 追蹤 Amazon Aurora 資料庫中的工作項目和電子郵件報告。這個範例使用以 React.js 建置的前端與 RESTful .NET 後端互動。

- 將 React Web 應用程式與 AWS 服務整合。
- 列出、新增、更新和刪除 Aurora 資料表中的項目。
- 使用 Amazon SES 傳送篩選工作項目的電子郵件報告。

- 使用隨附的 AWS CloudFormation 指令碼部署和管理範例資源。

如需完整的原始碼和如何設定及執行的指示，請參閱 [GitHub](#) 上的完整範例。

此範例中使用的服務

- Aurora
- Amazon RDS
- Amazon RDS 資料服務
- Amazon SES

偵測映像中的物件

下列程式碼範例示範如何建置應用程式，該應用程式可使用 Amazon Rekognition 依影像中的類別偵測物件。

適用於 .NET 的 SDK

說明如何使用 Amazon Rekognition .NET API 建立應用程式，該應用程式可使用 Amazon Rekognition 對 Amazon Simple Storage Service (Amazon S3) 儲存貯體中的映像按類別識別物件。此應用程式可使用 Amazon Simple Email Service (Amazon SES) 向管理員傳送包含結果的電子郵件通知。

如需完整的原始碼和如何設定及執行的指示，請參閱 [GitHub](#) 上的完整範例。

此範例中使用的服務

- Amazon Rekognition
- Amazon S3
- Amazon SES

使用的 Amazon SES API v2 範例 適用於 .NET 的 SDK

下列程式碼範例示範如何使用 適用於 .NET 的 AWS SDK 搭配 Amazon SES API v2 執行動作和實作常見案例。

Actions 是大型程式的程式碼摘錄，必須在內容中執行。雖然動作會告訴您如何呼叫個別服務函數，但您可以在其相關情境中查看內容中的動作。

案例是向您展示如何呼叫服務中的多個函數或與其他 AWS 服務組合來完成特定任務的程式碼範例。

每個範例均包含完整原始碼的連結，您可在連結中找到如何設定和執行內容中程式碼的相關指示。

主題

- [動作](#)
- [案例](#)

動作

CreateContact

以下程式碼範例顯示如何使用 CreateContact。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Creates a contact and adds it to the specified contact list.
/// </summary>
/// <param name="emailAddress">The email address of the contact.</param>
/// <param name="contactListName">The name of the contact list.</param>
/// <returns>The response from the CreateContact operation.</returns>
public async Task<bool> CreateContactAsync(string emailAddress, string
contactListName)
{
    var request = new CreateContactRequest
    {
        EmailAddress = emailAddress,
        ContactListName = contactListName
    };

    try
    {
        var response = await _sesClient.CreateContactAsync(request);
        return response.HttpStatusCode == HttpStatusCode.OK;
    }
    catch (AlreadyExistsException ex)
```

```
{
    Console.WriteLine($"Contact with email address {emailAddress} already
exists in the contact list {contactListName}.");
    Console.WriteLine(ex.Message);
    return true;
}
catch (NotFoundException ex)
{
    Console.WriteLine($"The contact list {contactListName} does not
exist.");
    Console.WriteLine(ex.Message);
}
catch (TooManyRequestsException ex)
{
    Console.WriteLine("Too many requests were made. Please try again
later.");
    Console.WriteLine(ex.Message);
}
catch (Exception ex)
{
    Console.WriteLine($"An error occurred while creating the contact:
{ex.Message}");
}
return false;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [CreateContact](#)。

CreateContactList

以下程式碼範例顯示如何使用 CreateContactList。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
```

```

/// Creates a contact list with the specified name.
/// </summary>
/// <param name="contactListName">The name of the contact list.</param>
/// <returns>True if successful.</returns>
public async Task<bool> CreateContactListAsync(string contactListName)
{
    var request = new CreateContactListRequest
    {
        ContactListName = contactListName
    };

    try
    {
        var response = await _sesClient.CreateContactListAsync(request);
        return response.HttpStatusCode == HttpStatusCode.OK;
    }
    catch (AlreadyExistsException ex)
    {
        Console.WriteLine($"Contact list with name {contactListName} already
exists.");
        Console.WriteLine(ex.Message);
        return true;
    }
    catch (LimitExceededException ex)
    {
        Console.WriteLine("The limit for contact lists has been exceeded.");
        Console.WriteLine(ex.Message);
    }
    catch (TooManyRequestsException ex)
    {
        Console.WriteLine("Too many requests were made. Please try again
later.");
        Console.WriteLine(ex.Message);
    }
    catch (Exception ex)
    {
        Console.WriteLine($"An error occurred while creating the contact list:
{ex.Message}");
    }
    return false;
}

```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [CreateContactList](#)。

CreateEmailIdentity

以下程式碼範例顯示如何使用 CreateEmailIdentity。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Creates an email identity (email address or domain) and starts the
verification process.
/// </summary>
/// <param name="emailIdentity">The email address or domain to create and
verify.</param>
/// <returns>The response from the CreateEmailIdentity operation.</returns>
public async Task<CreateEmailIdentityResponse> CreateEmailIdentityAsync(string
emailIdentity)
{
    var request = new CreateEmailIdentityRequest
    {
        EmailIdentity = emailIdentity
    };

    try
    {
        var response = await _sesClient.CreateEmailIdentityAsync(request);
        return response;
    }
    catch (AlreadyExistsException ex)
    {
        Console.WriteLine($"Email identity {emailIdentity} already exists.");
        Console.WriteLine(ex.Message);
        throw;
    }
    catch (ConcurrentModificationException ex)
    {
        Console.WriteLine($"The email identity {emailIdentity} is being modified
by another operation or thread.");
        Console.WriteLine(ex.Message);
    }
}
```

```
        throw;
    }
    catch (LimitExceededException ex)
    {
        Console.WriteLine("The limit for email identities has been exceeded.");
        Console.WriteLine(ex.Message);
        throw;
    }
    catch (NotFoundException ex)
    {
        Console.WriteLine($"The email identity {emailIdentity} does not
exist.");
        Console.WriteLine(ex.Message);
        throw;
    }
    catch (TooManyRequestsException ex)
    {
        Console.WriteLine("Too many requests were made. Please try again
later.");
        Console.WriteLine(ex.Message);
        throw;
    }
    catch (Exception ex)
    {
        Console.WriteLine($"An error occurred while creating the email identity:
{ex.Message}");
        throw;
    }
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [CreateEmailIdentity](#)。

CreateEmailTemplate

以下程式碼範例顯示如何使用 CreateEmailTemplate。

適用於 .NET 的 SDK

 Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Creates an email template with the specified content.
/// </summary>
/// <param name="templateName">The name of the email template.</param>
/// <param name="subject">The subject of the email template.</param>
/// <param name="htmlContent">The HTML content of the email template.</param>
/// <param name="textContent">The text content of the email template.</param>
/// <returns>True if successful.</returns>
public async Task<bool> CreateEmailTemplateAsync(string templateName, string
subject, string htmlContent, string textContent)
{
    var request = new CreateEmailTemplateRequest
    {
        TemplateName = templateName,
        TemplateContent = new EmailTemplateContent
        {
            Subject = subject,
            Html = htmlContent,
            Text = textContent
        }
    };

    try
    {
        var response = await _sesClient.CreateEmailTemplateAsync(request);
        return response.HttpStatusCode == HttpStatusCode.OK;
    }
    catch (AlreadyExistsException ex)
    {
        Console.WriteLine($"Email template with name {templateName} already
exists.");
        Console.WriteLine(ex.Message);
    }
    catch (LimitExceededException ex)
```

```

    {
        Console.WriteLine("The limit for email templates has been exceeded.");
        Console.WriteLine(ex.Message);
    }
    catch (TooManyRequestsException ex)
    {
        Console.WriteLine("Too many requests were made. Please try again
later.");
        Console.WriteLine(ex.Message);
    }
    catch (Exception ex)
    {
        Console.WriteLine($"An error occurred while creating the email template:
{ex.Message}");
    }

    return false;
}

```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [CreateEmailTemplate](#)。

DeleteContactList

以下程式碼範例顯示如何使用 DeleteContactList。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```

/// <summary>
/// Deletes a contact list and all contacts within it.
/// </summary>
/// <param name="contactListName">The name of the contact list to delete.</
param>
/// <returns>True if successful.</returns>

```

```
public async Task<bool> DeleteContactListAsync(string contactListName)
{
    var request = new DeleteContactListRequest
    {
        ContactListName = contactListName
    };

    try
    {
        var response = await _sesClient.DeleteContactListAsync(request);
        return response.HttpStatusCode == HttpStatusCode.OK;
    }
    catch (ConcurrentModificationException ex)
    {
        Console.WriteLine($"The contact list {contactListName} is being modified
by another operation or thread.");
        Console.WriteLine(ex.Message);
    }
    catch (NotFoundException ex)
    {
        Console.WriteLine($"The contact list {contactListName} does not
exist.");
        Console.WriteLine(ex.Message);
    }
    catch (TooManyRequestsException ex)
    {
        Console.WriteLine("Too many requests were made. Please try again
later.");
        Console.WriteLine(ex.Message);
    }
    catch (Exception ex)
    {
        Console.WriteLine($"An error occurred while deleting the contact list:
{ex.Message}");
    }

    return false;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [DeleteContactList](#)。

DeleteEmailIdentity

以下程式碼範例顯示如何使用 DeleteEmailIdentity。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Deletes an email identity (email address or domain).
/// </summary>
/// <param name="emailIdentity">The email address or domain to delete.</param>
/// <returns>True if successful.</returns>
public async Task<bool> DeleteEmailIdentityAsync(string emailIdentity)
{
    var request = new DeleteEmailIdentityRequest
    {
        EmailIdentity = emailIdentity
    };

    try
    {
        var response = await _sesClient.DeleteEmailIdentityAsync(request);
        return response.HttpStatusCode == HttpStatusCode.OK;
    }
    catch (ConcurrentModificationException ex)
    {
        Console.WriteLine($"The email identity {emailIdentity} is being modified
by another operation or thread.");
        Console.WriteLine(ex.Message);
    }
    catch (NotFoundException ex)
    {
        Console.WriteLine($"The email identity {emailIdentity} does not
exist.");
        Console.WriteLine(ex.Message);
    }
    catch (TooManyRequestsException ex)
    {

```

```
        Console.WriteLine("Too many requests were made. Please try again later.");
        Console.WriteLine(ex.Message);
    }
    catch (Exception ex)
    {
        Console.WriteLine($"An error occurred while deleting the email identity: {ex.Message}");
    }

    return false;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [DeleteEmailIdentity](#)。

DeleteEmailTemplate

以下程式碼範例顯示如何使用 DeleteEmailTemplate。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Deletes an email template.
/// </summary>
/// <param name="templateName">The name of the email template to delete.</param>
/// <returns>True if successful.</returns>
public async Task<bool> DeleteEmailTemplateAsync(string templateName)
{
    var request = new DeleteEmailTemplateRequest
    {
        TemplateName = templateName
    };

    try
    {
```

```
        var response = await _sesClient.DeleteEmailTemplateAsync(request);
        return response.HttpStatusCode == HttpStatusCode.OK;
    }
    catch (NotFoundException ex)
    {
        Console.WriteLine($"The email template {templateName} does not exist.");
        Console.WriteLine(ex.Message);
    }
    catch (TooManyRequestsException ex)
    {
        Console.WriteLine("Too many requests were made. Please try again later.");
        Console.WriteLine(ex.Message);
    }
    catch (Exception ex)
    {
        Console.WriteLine($"An error occurred while deleting the email template: {ex.Message}");
    }

    return false;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [DeleteEmailTemplate](#)。

ListContacts

以下程式碼範例顯示如何使用 ListContacts。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Lists the contacts in the specified contact list.
```

```
/// </summary>
/// <param name="contactListName">The name of the contact list.</param>
/// <returns>The list of contacts response from the ListContacts operation.</
returns>
public async Task<List<Contact>> ListContactsAsync(string contactListName)
{
    var request = new ListContactsRequest
    {
        ContactListName = contactListName
    };

    try
    {
        var response = await _sesClient.ListContactsAsync(request);
        return response.Contacts;
    }
    catch (NotFoundException ex)
    {
        Console.WriteLine($"The contact list {contactListName} does not
exist.");
        Console.WriteLine(ex.Message);
    }
    catch (TooManyRequestsException ex)
    {
        Console.WriteLine("Too many requests were made. Please try again
later.");
        Console.WriteLine(ex.Message);
    }
    catch (Exception ex)
    {
        Console.WriteLine($"An error occurred while listing the contacts:
{ex.Message}");
    }

    return new List<Contact>();
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [ListContacts](#)。

SendEmail

以下程式碼範例顯示如何使用 SendEmail。

適用於 .NET 的 SDK

 Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```

    /// <summary>
    /// Sends an email with the specified content and options.
    /// </summary>
    /// <param name="fromEmailAddress">The email address to send the email from.</
param>
    /// <param name="toEmailAddresses">The email addresses to send the email to.</
param>
    /// <param name="subject">The subject of the email.</param>
    /// <param name="htmlContent">The HTML content of the email.</param>
    /// <param name="textContent">The text content of the email.</param>
    /// <param name="templateName">The name of the email template to use
(optional).</param>
    /// <param name="templateData">The data to replace placeholders in the email
template (optional).</param>
    /// <param name="contactListName">The name of the contact list for unsubscribe
functionality (optional).</param>
    /// <returns>The MessageId response from the SendEmail operation.</returns>
    public async Task<string> SendEmailAsync(string fromEmailAddress, List<string>
toEmailAddresses, string? subject,
        string? htmlContent, string? textContent, string? templateName = null,
string? templateData = null, string? contactListName = null)
    {
        var request = new SendEmailRequest
        {
            FromEmailAddress = fromEmailAddress
        };

        if (toEmailAddresses.Any())
        {
            request.Destination = new Destination { ToAddresses =
toEmailAddresses };
        }

        if (!string.IsNullOrEmpty(templateName))

```

```
{
    request.Content = new EmailContent()
    {
        Template = new Template
        {
            TemplateName = templateName,
            TemplateData = templateData
        }
    };
}
else
{
    request.Content = new EmailContent
    {
        Simple = new Message
        {
            Subject = new Content { Data = subject },
            Body = new Body
            {
                Html = new Content { Data = htmlContent },
                Text = new Content { Data = textContent }
            }
        }
    };
}

if (!string.IsNullOrEmpty(contactListName))
{
    request.ListManagementOptions = new ListManagementOptions
    {
        ContactListName = contactListName
    };
}

try
{
    var response = await _sesClient.SendEmailAsync(request);
    return response.MessageId;
}
catch (AccountSuspendedException ex)
{
    Console.WriteLine("The account's ability to send email has been
permanently restricted.");
    Console.WriteLine(ex.Message);
}
```

```
    }
    catch (MailFromDomainNotVerifiedException ex)
    {
        Console.WriteLine("The sending domain is not verified.");
        Console.WriteLine(ex.Message);
    }
    catch (MessageRejectedException ex)
    {
        Console.WriteLine("The message content is invalid.");
        Console.WriteLine(ex.Message);
    }
    catch (SendingPausedException ex)
    {
        Console.WriteLine("The account's ability to send email is currently
paused.");
        Console.WriteLine(ex.Message);
    }
    catch (TooManyRequestsException ex)
    {
        Console.WriteLine("Too many requests were made. Please try again
later.");
        Console.WriteLine(ex.Message);
    }
    catch (Exception ex)
    {
        Console.WriteLine($"An error occurred while sending the email:
{ex.Message}");
    }

    return string.Empty;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [SendEmail](#)。

案例

電子報案例

下列程式碼範例示範如何執行 Amazon SES API v2 電子報案例。

適用於 .NET 的 SDK

 Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

執行案例。

```
using System.Diagnostics;
using System.Text.RegularExpressions;
using Amazon.SimpleEmailV2;
using Amazon.SimpleEmailV2.Model;
using Microsoft.Extensions.DependencyInjection;
using Microsoft.Extensions.Hosting;
using Microsoft.Extensions.Logging;
using Microsoft.Extensions.Logging.Console;
using Microsoft.Extensions.Logging.Debug;

namespace Sesv2Scenario;

public static class NewsletterWorkflow
{
    /*
        This scenario demonstrates how to use the Amazon Simple Email Service (SES) v2
        to send a coupon newsletter to a list of subscribers.
        The scenario performs the following tasks:

        1. Prepare the application:
            - Create a verified email identity for sending and replying to emails.
            - Create a contact list to store the subscribers' email addresses.
            - Create an email template for the coupon newsletter.

        2. Gather subscriber email addresses:
            - Prompt the user for a base email address.
            - Create 3 variants of the email address using subaddress extensions (e.g.,
            user+ses-weekly-newsletter-1@example.com).
            - Add each variant as a contact to the contact list.
            - Send a welcome email to each new contact.

        3. Send the coupon newsletter:
            - Retrieve the list of contacts from the contact list.
```


- Send the coupon newsletter using the email template to each contact.
4. Monitor and review:
 - Provide instructions for the user to review the sending activity and metrics in the AWS console.
 5. Clean up resources:
 - Delete the contact list (which also deletes all contacts within it).
 - Delete the email template.
 - Optionally delete the verified email identity.

```
*/
```

```
public static SESv2Wrapper _sesv2Wrapper;
public static string? _baseEmailAddress = null;
public static string? _verifiedEmail = null;
private static string _contactListName = "weekly-coupons-newsletter";
private static string _templateName = "weekly-coupons";
private static string _subject = "Weekly Coupons Newsletter";
private static string _htmlContentFile = "coupon-newsletter.html";
private static string _textContentFile = "coupon-newsletter.txt";
private static string _htmlWelcomeFile = "welcome.html";
private static string _textWelcomeFile = "welcome.txt";
private static string _couponsDataFile = "sample_coupons.json";

// Relative location of the resources folder.
private static string _resourcesFilePathLocation = "../..../resources/";

public static async Task Main(string[] args)
{
    // Set up dependency injection for the Amazon service.
    using var host = Host.CreateDefaultBuilder(args)
        .ConfigureLogging(logging =>
            logging.AddFilter("System", LogLevel.Debug)
                .AddFilter<DebugLoggerProvider>("Microsoft",
LogLevel.Information)
                .AddFilter<ConsoleLoggerProvider>("Microsoft", LogLevel.Trace))
        .ConfigureServices((_, services) =>
            services.AddAWSService<IAmazonSimpleEmailServiceV2>()
                .AddTransient<SESV2Wrapper>()
        )
        .Build();

    ServicesSetup(host);
}
```

```

        try
        {
            Console.WriteLine(new string('-', 80));
            Console.WriteLine(new string('-', 80));
            Console.WriteLine("Welcome to the Amazon SES v2 Coupon Newsletter
Scenario.");
            Console.WriteLine("This scenario demonstrates how to use the Amazon
Simple Email Service (SES) v2 " +
                            "\r\nto send a coupon newsletter to a list of
subscribers.");

            // Prepare the application.
            var emailIdentity = await PrepareApplication();

            // Gather subscriber email addresses.
            await GatherSubscriberEmailAddresses(emailIdentity);

            // Send the coupon newsletter.
            await SendCouponNewsletter(emailIdentity);

            // Monitor and review.
            MonitorAndReview(true);

            // Clean up resources.
            await Cleanup(emailIdentity, true);

            Console.WriteLine(new string('-', 80));
            Console.WriteLine("Amazon SES v2 Coupon Newsletter scenario is
complete.");
            Console.WriteLine(new string('-', 80));
            Console.WriteLine(new string('-', 80));
        }
        catch (Exception ex)
        {
            Console.WriteLine($"An error occurred: {ex.Message}");
        }
    }

    /// <summary>
    /// Populate the services for use within the console application.
    /// </summary>
    /// <param name="host">The services host.</param>
    private static void ServicesSetup(IHost host)

```

```

{
    _sesv2Wrapper = host.Services.GetRequiredService<SESV2Wrapper>();
}

/// <summary>
/// Set up the resources for the scenario.
/// </summary>
/// <returns>The email address of the verified identity.</returns>
public static async Task<string?> PrepareApplication()
{
    var htmlContent = await File.ReadAllTextAsync(_resourcesFilePathLocation +
_htmlContentFile);
    var textContent = await File.ReadAllTextAsync(_resourcesFilePathLocation +
_textContentFile);

    Console.WriteLine(new string('-', 80));
    Console.WriteLine("1. In this step, we will prepare the application:" +
        "\r\n - Create a verified email identity for sending and
replying to emails." +
        "\r\n - Create a contact list to store the subscribers'
email addresses." +
        "\r\n - Create an email template for the coupon
newsletter.\r\n");

    // Prompt the user for a verified email address.
    while (!IsEmail(_verifiedEmail))
    {
        Console.Write("Enter a verified email address or an email to verify: ");
        _verifiedEmail = Console.ReadLine();
    }

    try
    {
        // Create an email identity and start the verification process.
        await _sesv2Wrapper.CreateEmailIdentityAsync(_verifiedEmail);
        Console.WriteLine($"Identity {_verifiedEmail} created.");
    }
    catch (AlreadyExistsException)
    {
        Console.WriteLine($"Identity {_verifiedEmail} already exists.");
    }
    catch (Exception ex)
    {
        Console.WriteLine($"Error creating email identity: {ex.Message}");
    }
}

```

```

    }

    // Create a contact list.
    try
    {
        await _sesv2Wrapper.CreateContactListAsync(_contactListName);
        Console.WriteLine($"Contact list {_contactListName} created.");
    }
    catch (AlreadyExistsException)
    {
        Console.WriteLine($"Contact list {_contactListName} already exists.");
    }
    catch (Exception ex)
    {
        Console.WriteLine($"Error creating contact list: {ex.Message}");
    }

    // Create an email template.
    try
    {
        await _sesv2Wrapper.CreateEmailTemplateAsync(_templateName, _subject,
htmlContent, textContent);
        Console.WriteLine($"Email template {_templateName} created.");
    }
    catch (AlreadyExistsException)
    {
        Console.WriteLine($"Email template {_templateName} already exists.");
    }
    catch (Exception ex)
    {
        Console.WriteLine($"Error creating email template: {ex.Message}");
    }

    return _verifiedEmail;
}

/// <summary>
/// Generate subscriber addresses and send welcome emails.
/// </summary>
/// <param name="fromEmailAddress">The verified email address from
PrepareApplication.</param>
/// <returns>True if successful.</returns>
public static async Task<bool> GatherSubscriberEmailAddresses(string
fromEmailAddress)

```

```

{
    Console.WriteLine(new string('-', 80));
    Console.WriteLine("2. In Step 2, we will gather subscriber email addresses:"
+
        "\r\n - Prompt the user for a base email address." +
        "\r\n - Create 3 variants of the email address using
subaddress extensions (e.g., user+ses-weekly-newsletter-1@example.com)." +
        "\r\n - Add each variant as a contact to the contact
list." +
        "\r\n - Send a welcome email to each new contact.\r\n");

    // Prompt the user for a base email address.
    while (!IsEmail(_baseEmailAddress))
    {
        Console.Write("Enter a base email address (e.g., user@example.com): ");
        _baseEmailAddress = Console.ReadLine();
    }

    // Create 3 variants of the email address using +ses-weekly-newsletter-1,
+ses-weekly-newsletter-2, etc.
    var baseEmailAddressParts = _baseEmailAddress!.Split("@");
    for (int i = 1; i <= 3; i++)
    {
        string emailAddress = $"{baseEmailAddressParts[0]}+ses-weekly-
newsletter-{i}@{baseEmailAddressParts[1]}";

        try
        {
            // Create a contact with the email address in the contact list.
            await _sesv2Wrapper.CreateContactAsync(emailAddress,
            _contactListName);
            Console.WriteLine($"Contact {emailAddress} added to the
{_contactListName} contact list.");
        }
        catch (AlreadyExistsException)
        {
            Console.WriteLine($"Contact {emailAddress} already exists in the
{_contactListName} contact list.");
        }
        catch (Exception ex)
        {
            Console.WriteLine($"Error creating contact {emailAddress}:
{ex.Message}");
            return false;
        }
    }
}

```

```

    }

    // Send a welcome email to the new contact.
    try
    {
        string subject = "Welcome to the Weekly Coupons Newsletter";
        string htmlContent = await
File.ReadAllTextAsync(_resourcesFilePathLocation + _htmlWelcomeFile);
        string textContent = await
File.ReadAllTextAsync(_resourcesFilePathLocation + _textWelcomeFile);

        await _sesv2Wrapper.SendEmailAsync(fromEmailAddress, new
List<string> { emailAddress }, subject, htmlContent, textContent);
        Console.WriteLine($"Welcome email sent to {emailAddress}.");
    }
    catch (Exception ex)
    {
        Console.WriteLine($"Error sending welcome email to {emailAddress}:
{ex.Message}");
        return false;
    }

    // Wait 2 seconds before sending the next email (if the account is in
the SES Sandbox).
    await Task.Delay(2000);
}

return true;
}

/// <summary>
/// Send the coupon newsletter to the subscribers in the contact list.
/// </summary>
/// <param name="fromEmailAddress">The verified email address from
PrepareApplication.</param>
/// <returns>True if successful.</returns>
public static async Task<bool> SendCouponNewsletter(string fromEmailAddress)
{
    Console.WriteLine(new string('-', 80));
    Console.WriteLine("3. In this step, we will send the coupon newsletter:" +
        "\r\n - Retrieve the list of contacts from the contact
list." +
        "\r\n - Send the coupon newsletter using the email
template to each contact.\r\n");

```

```

        // Retrieve the list of contacts from the contact list.
        var contacts = await _sesv2Wrapper.ListContactsAsync(_contactListName);
        if (!contacts.Any())
        {
            Console.WriteLine($"No contacts found in the {_contactListName} contact
list.");
            return false;
        }

        // Load the coupon data from the sample_coupons.json file.
        string couponsData = await File.ReadAllTextAsync(_resourcesFilePathLocation
+ _couponsDataFile);

        // Send the coupon newsletter to each contact using the email template.
        try
        {
            foreach (var contact in contacts)
            {
                // To use the Contact List for list management, send to only one
address at a time.
                await _sesv2Wrapper.SendEmailAsync(fromEmailAddress,
                    new List<string> { contact.EmailAddress },
                    null, null, null, _templateName, couponsData, _contactListName);
            }

            Console.WriteLine($"Coupon newsletter sent to contact list
{_contactListName}.");
        }
        catch (Exception ex)
        {
            Console.WriteLine($"Error sending coupon newsletter to contact list
{_contactListName}: {ex.Message}");
            return false;
        }

        return true;
    }

    /// <summary>
    /// Provide instructions for monitoring sending activity and metrics.
    /// </summary>
    /// <param name="interactive">True to run in interactive mode.</param>

```

```

    /// <returns>True if successful.</returns>
    public static bool MonitorAndReview(bool interactive)
    {
        Console.WriteLine(new string('-', 80));
        Console.WriteLine("4. In step 4, we will monitor and review:" +
            "\r\n - Provide instructions for the user to review the
sending activity and metrics in the AWS console.\r\n");

        Console.WriteLine("Review your sending activity using the SES Homepage in
the AWS console.");
        Console.WriteLine("Press Enter to open the SES Homepage in your default
browser...");
        if (interactive)
        {
            Console.ReadLine();
            try
            {
                // Open the SES Homepage in the default browser.
                Process.Start(new ProcessStartInfo
                {
                    FileName = "https://console.aws.amazon.com/ses/home",
                    UseShellExecute = true
                });
            }
            catch (Exception ex)
            {
                Console.WriteLine($"Error opening the SES Homepage: {ex.Message}");
                return false;
            }
        }

        Console.WriteLine("Review the sending activity and email metrics, then press
Enter to continue...");
        if (interactive)
            Console.ReadLine();
        return true;
    }

    /// <summary>
    /// Clean up the resources used in the scenario.
    /// </summary>
    /// <param name="verifiedEmailAddress">The verified email address from
PrepareApplication.</param>
    /// <param name="interactive">True if interactive.</param>

```



```

    /// <returns>Async task.</returns>
    public static async Task<bool> Cleanup(string verifiedEmailAddress, bool
interactive)
    {
        Console.WriteLine(new string('-', 80));
        Console.WriteLine("5. Finally, we clean up resources:" +
            "\r\n - Delete the contact list (which also deletes all
contacts within it)." +
            "\r\n - Delete the email template." +
            "\r\n - Optionally delete the verified email identity.\r
\n");

        Console.WriteLine("Cleaning up resources...");

        // Delete the contact list (this also deletes all contacts in the list).
        try
        {
            await _sesv2Wrapper.DeleteContactListAsync(_contactListName);
            Console.WriteLine($"Contact list {_contactListName} deleted.");
        }
        catch (NotFoundException)
        {
            Console.WriteLine($"Contact list {_contactListName} not found.");
        }
        catch (Exception ex)
        {
            Console.WriteLine($"Error deleting contact list {_contactListName}:
{ex.Message}");
            return false;
        }

        // Delete the email template.
        try
        {
            await _sesv2Wrapper.DeleteEmailTemplateAsync(_templateName);
            Console.WriteLine($"Email template {_templateName} deleted.");
        }
        catch (NotFoundException)
        {
            Console.WriteLine($"Email template {_templateName} not found.");
        }
        catch (Exception ex)
        {

```

```

        Console.WriteLine($"Error deleting email template {_templateName}:
{ex.Message}");
        return false;
    }

    // Ask the user if they want to delete the email identity.
    var deleteIdentity = !interactive ||
        GetYesNoResponse(
            $"Do you want to delete the email identity {verifiedEmailAddress}?
(y/n) ");
    if (deleteIdentity)
    {
        try
        {
            await _sesv2Wrapper.DeleteEmailIdentityAsync(verifiedEmailAddress);
            Console.WriteLine($"Email identity {verifiedEmailAddress}
deleted.");
        }
        catch (NotFoundException)
        {
            Console.WriteLine(
                $"Email identity {verifiedEmailAddress} not found.");
        }
        catch (Exception ex)
        {
            Console.WriteLine(
                $"Error deleting email identity {verifiedEmailAddress}:
{ex.Message}");
            return false;
        }
    }
    else
    {
        Console.WriteLine(
            $"Skipping deletion of email identity {verifiedEmailAddress}.");
    }

    return true;
}

/// <summary>
/// Helper method to get a yes or no response from the user.
/// </summary>
/// <param name="question">The question string to print on the console.</param>

```

```

    /// <returns>True if the user responds with a yes.</returns>
    private static bool GetYesNoResponse(string question)
    {
        Console.WriteLine(question);
        var ynResponse = Console.ReadLine();
        var response = ynResponse != null && ynResponse.Equals("y",
StringComparison.InvariantCultureIgnoreCase);
        return response;
    }

    /// <summary>
    /// Simple check to verify a string is an email address.
    /// </summary>
    /// <param name="email">The string to verify.</param>
    /// <returns>True if a valid email.</returns>
    private static bool IsEmail(string? email)
    {
        if (string.IsNullOrEmpty(email))
            return false;
        return Regex.IsMatch(email, @"^[^@\s]+@[^@\s]+\.[^@\s]+$",
RegexOptions.IgnoreCase);
    }
}

```

服務作業的包裝函式。

```

using System.Net;
using Amazon.SimpleEmailV2;
using Amazon.SimpleEmailV2.Model;

namespace Sesev2Scenario;

/// <summary>
/// Wrapper class for Amazon Simple Email Service (SES) v2 operations.
/// </summary>
public class SESv2Wrapper
{
    private readonly IAmazonSimpleEmailServiceV2 _sesClient;

    /// <summary>
    /// Constructor for the SESv2Wrapper.

```

```
/// </summary>
/// <param name="sesClient">The injected SES v2 client.</param>
public SESv2Wrapper(IAmazonSimpleEmailServiceV2 sesClient)
{
    _sesClient = sesClient;
}

/// <summary>
/// Creates a contact and adds it to the specified contact list.
/// </summary>
/// <param name="emailAddress">The email address of the contact.</param>
/// <param name="contactListName">The name of the contact list.</param>
/// <returns>The response from the CreateContact operation.</returns>
public async Task<bool> CreateContactAsync(string emailAddress, string
contactListName)
{
    var request = new CreateContactRequest
    {
        EmailAddress = emailAddress,
        ContactListName = contactListName
    };

    try
    {
        var response = await _sesClient.CreateContactAsync(request);
        return response.HttpStatusCode == HttpStatusCode.OK;
    }
    catch (AlreadyExistsException ex)
    {
        Console.WriteLine($"Contact with email address {emailAddress} already
exists in the contact list {contactListName}.");
        Console.WriteLine(ex.Message);
        return true;
    }
    catch (NotFoundException ex)
    {
        Console.WriteLine($"The contact list {contactListName} does not
exist.");
        Console.WriteLine(ex.Message);
    }
    catch (TooManyRequestsException ex)
    {
        Console.WriteLine("Too many requests were made. Please try again
later.");
    }
}
```

```
        Console.WriteLine(ex.Message);
    }
    catch (Exception ex)
    {
        Console.WriteLine($"An error occurred while creating the contact:
{ex.Message}");
    }
    return false;
}

/// <summary>
/// Creates a contact list with the specified name.
/// </summary>
/// <param name="contactListName">The name of the contact list.</param>
/// <returns>True if successful.</returns>
public async Task<bool> CreateContactListAsync(string contactListName)
{
    var request = new CreateContactListRequest
    {
        ContactListName = contactListName
    };

    try
    {
        var response = await _sesClient.CreateContactListAsync(request);
        return response.HttpStatusCode == HttpStatusCode.OK;
    }
    catch (AlreadyExistsException ex)
    {
        Console.WriteLine($"Contact list with name {contactListName} already
exists.");
        Console.WriteLine(ex.Message);
        return true;
    }
    catch (LimitExceededException ex)
    {
        Console.WriteLine("The limit for contact lists has been exceeded.");
        Console.WriteLine(ex.Message);
    }
    catch (TooManyRequestsException ex)
    {
        Console.WriteLine("Too many requests were made. Please try again
later.");
        Console.WriteLine(ex.Message);
    }
}
```

```
    }
    catch (Exception ex)
    {
        Console.WriteLine($"An error occurred while creating the contact list:
{ex.Message}");
    }
    return false;
}

/// <summary>
/// Creates an email identity (email address or domain) and starts the
verification process.
/// </summary>
/// <param name="emailIdentity">The email address or domain to create and
verify.</param>
/// <returns>The response from the CreateEmailIdentity operation.</returns>
public async Task<CreateEmailIdentityResponse> CreateEmailIdentityAsync(string
emailIdentity)
{
    var request = new CreateEmailIdentityRequest
    {
        EmailIdentity = emailIdentity
    };

    try
    {
        var response = await _sesClient.CreateEmailIdentityAsync(request);
        return response;
    }
    catch (AlreadyExistsException ex)
    {
        Console.WriteLine($"Email identity {emailIdentity} already exists.");
        Console.WriteLine(ex.Message);
        throw;
    }
    catch (ConcurrentModificationException ex)
    {
        Console.WriteLine($"The email identity {emailIdentity} is being modified
by another operation or thread.");
        Console.WriteLine(ex.Message);
        throw;
    }
    catch (LimitExceededException ex)
    {

```

```

        Console.WriteLine("The limit for email identities has been exceeded.");
        Console.WriteLine(ex.Message);
        throw;
    }
    catch (NotFoundException ex)
    {
        Console.WriteLine($"The email identity {emailIdentity} does not
exist.");
        Console.WriteLine(ex.Message);
        throw;
    }
    catch (TooManyRequestsException ex)
    {
        Console.WriteLine("Too many requests were made. Please try again
later.");
        Console.WriteLine(ex.Message);
        throw;
    }
    catch (Exception ex)
    {
        Console.WriteLine($"An error occurred while creating the email identity:
{ex.Message}");
        throw;
    }
}

/// <summary>
/// Creates an email template with the specified content.
/// </summary>
/// <param name="templateName">The name of the email template.</param>
/// <param name="subject">The subject of the email template.</param>
/// <param name="htmlContent">The HTML content of the email template.</param>
/// <param name="textContent">The text content of the email template.</param>
/// <returns>True if successful.</returns>
public async Task<bool> CreateEmailTemplateAsync(string templateName, string
subject, string htmlContent, string textContent)
{
    var request = new CreateEmailTemplateRequest
    {
        TemplateName = templateName,
        TemplateContent = new EmailTemplateContent
        {
            Subject = subject,
            Html = htmlContent,

```

```

        Text = textContent
    }
};

try
{
    var response = await _sesClient.CreateEmailTemplateAsync(request);
    return response.HttpStatusCode == HttpStatusCode.OK;
}
catch (AlreadyExistsException ex)
{
    Console.WriteLine($"Email template with name {templateName} already
exists.");
    Console.WriteLine(ex.Message);
}
catch (LimitExceededException ex)
{
    Console.WriteLine("The limit for email templates has been exceeded.");
    Console.WriteLine(ex.Message);
}
catch (TooManyRequestsException ex)
{
    Console.WriteLine("Too many requests were made. Please try again
later.");
    Console.WriteLine(ex.Message);
}
catch (Exception ex)
{
    Console.WriteLine($"An error occurred while creating the email template:
{ex.Message}");
}

return false;
}

/// <summary>
/// Deletes a contact list and all contacts within it.
/// </summary>
/// <param name="contactListName">The name of the contact list to delete.</
param>
/// <returns>True if successful.</returns>
public async Task<bool> DeleteContactListAsync(string contactListName)
{
    var request = new DeleteContactListRequest

```



```

        {
            ContactListName = contactListName
        };

        try
        {
            var response = await _sesClient.DeleteContactListAsync(request);
            return response.HttpStatusCode == HttpStatusCode.OK;
        }
        catch (ConcurrentModificationException ex)
        {
            Console.WriteLine($"The contact list {contactListName} is being modified
by another operation or thread.");
            Console.WriteLine(ex.Message);
        }
        catch (NotFoundException ex)
        {
            Console.WriteLine($"The contact list {contactListName} does not
exist.");
            Console.WriteLine(ex.Message);
        }
        catch (TooManyRequestsException ex)
        {
            Console.WriteLine("Too many requests were made. Please try again
later.");
            Console.WriteLine(ex.Message);
        }
        catch (Exception ex)
        {
            Console.WriteLine($"An error occurred while deleting the contact list:
{ex.Message}");
        }

        return false;
    }

    /// <summary>
    /// Deletes an email identity (email address or domain).
    /// </summary>
    /// <param name="emailIdentity">The email address or domain to delete.</param>
    /// <returns>True if successful.</returns>
    public async Task<bool> DeleteEmailIdentityAsync(string emailIdentity)
    {
        var request = new DeleteEmailIdentityRequest

```

```

        {
            EmailIdentity = emailIdentity
        };

        try
        {
            var response = await _sesClient.DeleteEmailIdentityAsync(request);
            return response.HttpStatusCode == HttpStatusCode.OK;
        }
        catch (ConcurrentModificationException ex)
        {
            Console.WriteLine($"The email identity {emailIdentity} is being modified
by another operation or thread.");
            Console.WriteLine(ex.Message);
        }
        catch (NotFoundException ex)
        {
            Console.WriteLine($"The email identity {emailIdentity} does not
exist.");
            Console.WriteLine(ex.Message);
        }
        catch (TooManyRequestsException ex)
        {
            Console.WriteLine("Too many requests were made. Please try again
later.");
            Console.WriteLine(ex.Message);
        }
        catch (Exception ex)
        {
            Console.WriteLine($"An error occurred while deleting the email identity:
{ex.Message}");
        }

        return false;
    }

    /// <summary>
    /// Deletes an email template.
    /// </summary>
    /// <param name="templateName">The name of the email template to delete.</param>
    /// <returns>True if successful.</returns>
    public async Task<bool> DeleteEmailTemplateAsync(string templateName)
    {
        var request = new DeleteEmailTemplateRequest

```

```

        {
            TemplateName = templateName
        };

        try
        {
            var response = await _sesClient.DeleteEmailTemplateAsync(request);
            return response.HttpStatusCode == HttpStatusCode.OK;
        }
        catch (NotFoundException ex)
        {
            Console.WriteLine($"The email template {templateName} does not exist.");
            Console.WriteLine(ex.Message);
        }
        catch (TooManyRequestsException ex)
        {
            Console.WriteLine("Too many requests were made. Please try again later.");
            Console.WriteLine(ex.Message);
        }
        catch (Exception ex)
        {
            Console.WriteLine($"An error occurred while deleting the email template: {ex.Message}");
        }

        return false;
    }

    /// <summary>
    /// Lists the contacts in the specified contact list.
    /// </summary>
    /// <param name="contactListName">The name of the contact list.</param>
    /// <returns>The list of contacts response from the ListContacts operation.</returns>
    public async Task<List<Contact>> ListContactsAsync(string contactListName)
    {
        var request = new ListContactsRequest
        {
            ContactListName = contactListName
        };

        try
        {

```

```

        var response = await _sesClient.ListContactsAsync(request);
        return response.Contacts;
    }
    catch (NotFoundException ex)
    {
        Console.WriteLine($"The contact list {contactListName} does not
exist.");
        Console.WriteLine(ex.Message);
    }
    catch (TooManyRequestsException ex)
    {
        Console.WriteLine("Too many requests were made. Please try again
later.");
        Console.WriteLine(ex.Message);
    }
    catch (Exception ex)
    {
        Console.WriteLine($"An error occurred while listing the contacts:
{ex.Message}");
    }

    return new List<Contact>();
}

/// <summary>
/// Sends an email with the specified content and options.
/// </summary>
/// <param name="fromEmailAddress">The email address to send the email from.</
param>
/// <param name="toEmailAddresses">The email addresses to send the email to.</
param>
/// <param name="subject">The subject of the email.</param>
/// <param name="htmlContent">The HTML content of the email.</param>
/// <param name="textContent">The text content of the email.</param>
/// <param name="templateName">The name of the email template to use
(optional).</param>
/// <param name="templateData">The data to replace placeholders in the email
template (optional).</param>
/// <param name="contactListName">The name of the contact list for unsubscribe
functionality (optional).</param>
/// <returns>The MessageId response from the SendEmail operation.</returns>
public async Task<string> SendEmailAsync(string fromEmailAddress, List<string>
toEmailAddresses, string? subject,

```

```
string? htmlContent, string? textContent, string? templateName = null,
string? templateData = null, string? contactListName = null)
{
    var request = new SendEmailRequest
    {
        FromEmailAddress = fromEmailAddress
    };

    if (toEmailAddresses.Any())
    {
        request.Destination = new Destination { ToAddresses =
toEmailAddresses };
    }

    if (!string.IsNullOrEmpty(templateName))
    {
        request.Content = new EmailContent()
        {
            Template = new Template
            {
                TemplateName = templateName,
                TemplateData = templateData
            }
        };
    }
    else
    {
        request.Content = new EmailContent
        {
            Simple = new Message
            {
                Subject = new Content { Data = subject },
                Body = new Body
                {
                    Html = new Content { Data = htmlContent },
                    Text = new Content { Data = textContent }
                }
            }
        };
    }

    if (!string.IsNullOrEmpty(contactListName))
    {
        request.ListManagementOptions = new ListManagementOptions
```

```
        {
            ContactListName = contactListName
        };
    }

    try
    {
        var response = await _sesClient.SendEmailAsync(request);
        return response.MessageId;
    }
    catch (AccountSuspendedException ex)
    {
        Console.WriteLine("The account's ability to send email has been permanently restricted.");
        Console.WriteLine(ex.Message);
    }
    catch (MailFromDomainNotVerifiedException ex)
    {
        Console.WriteLine("The sending domain is not verified.");
        Console.WriteLine(ex.Message);
    }
    catch (MessageRejectedException ex)
    {
        Console.WriteLine("The message content is invalid.");
        Console.WriteLine(ex.Message);
    }
    catch (SendingPausedException ex)
    {
        Console.WriteLine("The account's ability to send email is currently paused.");
        Console.WriteLine(ex.Message);
    }
    catch (TooManyRequestsException ex)
    {
        Console.WriteLine("Too many requests were made. Please try again later.");
        Console.WriteLine(ex.Message);
    }
    catch (Exception ex)
    {
        Console.WriteLine($"An error occurred while sending the email: {ex.Message}");
    }
}
```

```
        return string.Empty;
    }
}
```

• 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的下列主題。

- [CreateContact](#)
- [CreateContactList](#)
- [CreateEmailIdentity](#)
- [CreateEmailTemplate](#)
- [DeleteContactList](#)
- [DeleteEmailIdentity](#)
- [DeleteEmailTemplate](#)
- [ListContacts](#)
- [SendEmail.simple](#)
- [SendEmail.template](#)

使用的 Amazon SNS 範例 適用於 .NET 的 SDK

下列程式碼範例示範如何使用 適用於 .NET 的 AWS SDK 搭配 Amazon SNS 執行動作和實作常見案例。

Actions 是大型程式的程式碼摘錄，必須在內容中執行。雖然動作會告訴您如何呼叫個別服務函數，但您可以在其相關情境中查看內容中的動作。

案例是向您展示如何呼叫服務中的多個函數或與其他 AWS 服務組合來完成特定任務的程式碼範例。

每個範例均包含完整原始碼的連結，您可在連結中找到如何設定和執行內容中程式碼的相關指示。

主題

- [開始使用](#)
- [動作](#)
- [案例](#)
- [無伺服器範例](#)

開始使用

您好 Amazon SNS

下列程式碼範例說明如何開始使用 Amazon SNS。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
using Amazon.SimpleNotificationService;
using Amazon.SimpleNotificationService.Model;

namespace SNSActions;

public static class HelloSNS
{
    static async Task Main(string[] args)
    {
        var snsClient = new AmazonSimpleNotificationServiceClient();

        Console.WriteLine($"Hello Amazon SNS! Following are some of your topics:");
        Console.WriteLine();

        // You can use await and any of the async methods to get a response.
        // Let's get a list of topics.
        var response = await snsClient.ListTopicsAsync(
            new ListTopicsRequest());

        foreach (var topic in response.Topics)
        {
            Console.WriteLine($"{topic.TopicArn}");
            Console.WriteLine();
        }
    }
}
```


- 如需 API 詳細資訊，請參閱 適用於 .NET 的 AWS SDK API 參考中的 [ListTopics](#)。

動作

CheckIfPhoneNumberIsOptedOut

以下程式碼範例顯示如何使用 CheckIfPhoneNumberIsOptedOut。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
using System;
using System.Threading.Tasks;
using Amazon.SimpleNotificationService;
using Amazon.SimpleNotificationService.Model;

/// <summary>
/// This example shows how to use the Amazon Simple Notification Service
/// (Amazon SNS) to check whether a phone number has been opted out.
/// </summary>
public class IsPhoneNumOptedOut
{
    public static async Task Main()
    {
        string phoneNumber = "+15551112222";

        IAmazonSimpleNotificationService client = new
AmazonSimpleNotificationServiceClient();

        await CheckIfOptedOutAsync(client, phoneNumber);
    }

    /// <summary>
    /// Checks to see if the supplied phone number has been opted out.
    /// </summary>
    /// <param name="client">The initialized Amazon SNS Client object used
```

```

    /// to check if the phone number has been opted out.</param>
    /// <param name="phoneNumber">A string representing the phone number
    /// to check.</param>
    public static async Task
    CheckIfOptedOutAsync(IAmazonSimpleNotificationService client, string phoneNumber)
    {
        var request = new CheckIfPhoneNumberIsOptedOutRequest
        {
            PhoneNumber = phoneNumber,
        };

        try
        {
            var response = await
client.CheckIfPhoneNumberIsOptedOutAsync(request);

            if (response.HttpStatusCode == System.Net.HttpStatusCode.OK)
            {
                string optOutStatus = response.IsOptedOut ? "opted out" : "not
opted out.";
                Console.WriteLine($"The phone number: {phoneNumber} is
{optOutStatus}");
            }
        }
        catch (AuthorizationException ex)
        {
            Console.WriteLine($"{ex.Message}");
        }
    }
}

```

- 如需 API 詳細資訊，請參閱 適用於 .NET 的 AWS SDK API 參考中的 [CheckIfPhoneNumberIsOptedOut](#)。

CreateTopic

以下程式碼範例顯示如何使用 CreateTopic。

適用於 .NET 的 SDK

 Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

建立具有特定名稱的主題。

```
using System;
using System.Threading.Tasks;
using Amazon.SimpleNotificationService;
using Amazon.SimpleNotificationService.Model;

/// <summary>
/// This example shows how to use Amazon Simple Notification Service
/// (Amazon SNS) to add a new Amazon SNS topic.
/// </summary>
public class CreateSNSTopic
{
    public static async Task Main()
    {
        string topicName = "ExampleSNSTopic";

        IAmazonSimpleNotificationService client = new
AmazonSimpleNotificationServiceClient();

        var topicArn = await CreateSNSTopicAsync(client, topicName);
        Console.WriteLine($"New topic ARN: {topicArn}");
    }

    /// <summary>
    /// Creates a new SNS topic using the supplied topic name.
    /// </summary>
    /// <param name="client">The initialized SNS client object used to
    /// create the new topic.</param>
    /// <param name="topicName">A string representing the topic name.</param>
    /// <returns>The Amazon Resource Name (ARN) of the created topic.</returns>
    public static async Task<string>
CreateSNSTopicAsync(IAmazonSimpleNotificationService client, string topicName)
    {
        var request = new CreateTopicRequest
```

```

        {
            Name = topicName,
        };

        var response = await client.CreateTopicAsync(request);

        return response.TopicArn;
    }
}

```

建立具有名稱、特定 FIFO 和重複資料刪除屬性的新主題。

```

/// <summary>
/// Create a new topic with a name and specific FIFO and de-duplication
attributes.
/// </summary>
/// <param name="topicName">The name for the topic.</param>
/// <param name="useFifoTopic">True to use a FIFO topic.</param>
/// <param name="useContentBasedDeduplication">True to use content-based de-
duplication.</param>
/// <returns>The ARN of the new topic.</returns>
public async Task<string> CreateTopicWithName(string topicName, bool
useFifoTopic, bool useContentBasedDeduplication)
{
    var createTopicRequest = new CreateTopicRequest()
    {
        Name = topicName,
    };

    if (useFifoTopic)
    {
        // Update the name if it is not correct for a FIFO topic.
        if (!topicName.EndsWith(".fifo"))
        {
            createTopicRequest.Name = topicName + ".fifo";
        }

        // Add the attributes from the method parameters.
        createTopicRequest.Attributes = new Dictionary<string, string>
        {
            { "FifoTopic", "true" }
        }
    }
}

```

```

        };
        if (useContentBasedDeduplication)
        {
            createTopicRequest.Attributes.Add("ContentBasedDeduplication",
"true");
        }
    }

    var createResponse = await
_amazonSNSClient.CreateTopicAsync(createTopicRequest);
    return createResponse.TopicArn;
}

```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [CreateTopic](#)。

DeleteTopic

以下程式碼範例顯示如何使用 DeleteTopic。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

藉由主題 ARN 刪除該主題。

```

/// <summary>
/// Delete a topic by its topic ARN.
/// </summary>
/// <param name="topicArn">The ARN of the topic.</param>
/// <returns>True if successful.</returns>
public async Task<bool> DeleteTopicByArn(string topicArn)
{
    var deleteResponse = await _amazonSNSClient.DeleteTopicAsync(
        new DeleteTopicRequest()
        {
            TopicArn = topicArn
        }
    );
}

```

```
});  
return deleteResponse.HttpStatusCode == HttpStatusCode.OK;  
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [DeleteTopic](#)。

GetTopicAttributes

以下程式碼範例顯示如何使用 GetTopicAttributes。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
using System;  
using System.Collections.Generic;  
using System.Threading.Tasks;  
using Amazon.SimpleNotificationService;  
  
/// <summary>  
/// This example shows how to retrieve the attributes of an Amazon Simple  
/// Notification Service (Amazon SNS) topic.  
/// </summary>  
public class GetTopicAttributes  
{  
    public static async Task Main()  
    {  
        string topicArn = "arn:aws:sns:us-west-2:000000000000:ExampleSNSTopic";  
        IAmazonSimpleNotificationService client = new  
AmazonSimpleNotificationServiceClient();  
  
        var attributes = await GetTopicAttributesAsync(client, topicArn);  
        DisplayTopicAttributes(attributes);  
    }  
  
    /// <summary>
```

```

    /// Given the ARN of the Amazon SNS topic, this method retrieves the topic
    /// attributes.
    /// </summary>
    /// <param name="client">The initialized Amazon SNS client object used
    /// to retrieve the attributes for the Amazon SNS topic.</param>
    /// <param name="topicArn">The ARN of the topic for which to retrieve
    /// the attributes.</param>
    /// <returns>A Dictionary of topic attributes.</returns>
    public static async Task<Dictionary<string, string>>
GetTopicAttributesAsync(
    IAmazonSimpleNotificationService client,
    string topicArn)
    {
        var response = await client.GetTopicAttributesAsync(topicArn);

        return response.Attributes;
    }

    /// <summary>
    /// This method displays the attributes for an Amazon SNS topic.
    /// </summary>
    /// <param name="topicAttributes">A Dictionary containing the
    /// attributes for an Amazon SNS topic.</param>
    public static void DisplayTopicAttributes(Dictionary<string, string>
topicAttributes)
    {
        foreach (KeyValuePair<string, string> entry in topicAttributes)
        {
            Console.WriteLine($"{entry.Key}: {entry.Value}\n");
        }
    }
}

```

- 如需 API 詳細資訊，請參閱 適用於 .NET 的 AWS SDK API 參考中的 [GetTopicAttributes](#)。

ListSubscriptions

以下程式碼範例顯示如何使用 ListSubscriptions。

適用於 .NET 的 SDK

 Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
using System;
using System.Collections.Generic;
using System.Threading.Tasks;
using Amazon.SimpleNotificationService;
using Amazon.SimpleNotificationService.Model;

/// <summary>
/// This example will retrieve a list of the existing Amazon Simple
/// Notification Service (Amazon SNS) subscriptions.
/// </summary>
public class ListSubscriptions
{
    public static async Task Main()
    {
        IAmazonSimpleNotificationService client = new
AmazonSimpleNotificationServiceClient();

        Console.WriteLine("Enter a topic ARN to list subscriptions for a
specific topic, " +
                        "or press Enter to list subscriptions for all
topics.");
        var topicArn = Console.ReadLine();
        Console.WriteLine();

        var subscriptions = await GetSubscriptionsListAsync(client, topicArn);

        DisplaySubscriptionList(subscriptions);
    }

    /// <summary>
    /// Gets a list of the existing Amazon SNS subscriptions, optionally by
    specifying a topic ARN.
    /// </summary>
    /// <param name="client">The initialized Amazon SNS client object used
```



```

    /// to obtain the list of subscriptions.</param>
    /// <param name="topicArn">The optional ARN of a specific topic. Defaults to
null.</param>
    /// <returns>A list containing information about each subscription.</
returns>
    public static async Task<List<Subscription>>
GetSubscriptionsListAsync(IAmazonSimpleNotificationService client, string topicArn
= null)
    {
        var results = new List<Subscription>();

        if (!string.IsNullOrEmpty(topicArn))
        {
            var paginateByTopic = client.Paginators.ListSubscriptionsByTopic(
                new ListSubscriptionsByTopicRequest()
                {
                    TopicArn = topicArn,
                });

            // Get the entire list using the paginator.
            await foreach (var subscription in paginateByTopic.Subscriptions)
            {
                results.Add(subscription);
            }
        }
        else
        {
            var paginateAllSubscriptions =
client.Paginators.ListSubscriptions(new ListSubscriptionsRequest());

            // Get the entire list using the paginator.
            await foreach (var subscription in
paginateAllSubscriptions.Subscriptions)
            {
                results.Add(subscription);
            }
        }

        return results;
    }

    /// <summary>
    /// Display a list of Amazon SNS subscription information.
    /// </summary>

```

```

    /// <param name="subscriptionList">A list containing details for existing
    /// Amazon SNS subscriptions.</param>
    public static void DisplaySubscriptionList(List<Subscription>
subscriptionList)
    {
        foreach (var subscription in subscriptionList)
        {
            Console.WriteLine($"Owner: {subscription.Owner}");
            Console.WriteLine($"Subscription ARN:
{subscription.SubscriptionArn}");
            Console.WriteLine($"Topic ARN: {subscription.TopicArn}");
            Console.WriteLine($"Endpoint: {subscription.Endpoint}");
            Console.WriteLine($"Protocol: {subscription.Protocol}");
            Console.WriteLine();
        }
    }
}

```

- 如需 API 詳細資訊，請參閱 適用於 .NET 的 AWS SDK API 參考中的 [ListSubscriptions](#)。

ListTopics

以下程式碼範例顯示如何使用 ListTopics。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```

using System;
using System.Collections.Generic;
using System.Threading.Tasks;
using Amazon.SimpleNotificationService;
using Amazon.SimpleNotificationService.Model;

/// <summary>
/// Lists the Amazon Simple Notification Service (Amazon SNS)

```

```

    /// topics for the current account.
    /// </summary>
    public class ListSNSTopics
    {
        public static async Task Main()
        {
            IAmazonSimpleNotificationService client = new
AmazonSimpleNotificationServiceClient();

            await GetTopicListAsync(client);
        }

        /// <summary>
        /// Retrieves the list of Amazon SNS topics in groups of up to 100
        /// topics.
        /// </summary>
        /// <param name="client">The initialized Amazon SNS client object used
        /// to retrieve the list of topics.</param>
        public static async Task GetTopicListAsync(IAmazonSimpleNotificationService
client)
        {
            // If there are more than 100 Amazon SNS topics, the call to
            // ListTopicsAsync will return a value to pass to the
            // method to retrieve the next 100 (or less) topics.
            string nextToken = string.Empty;

            do
            {
                var response = await client.ListTopicsAsync(nextToken);
                DisplayTopicsList(response.Topics);
                nextToken = response.NextToken;
            }
            while (!string.IsNullOrEmpty(nextToken));
        }

        /// <summary>
        /// Displays the list of Amazon SNS Topic ARNs.
        /// </summary>
        /// <param name="topicList">The list of Topic ARNs.</param>
        public static void DisplayTopicsList(List<Topic> topicList)
        {
            foreach (var topic in topicList)
            {
                Console.WriteLine($"{topic.TopicArn}");
            }
        }
    }

```

```
    }  
  }  
}
```

- 如需 API 詳細資訊，請參閱 適用於 .NET 的 AWS SDK API 參考中的 [ListTopics](#)。

Publish

以下程式碼範例顯示如何使用 Publish。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

發布訊息至主題。

```
using System;  
using System.Threading.Tasks;  
using Amazon.SimpleNotificationService;  
using Amazon.SimpleNotificationService.Model;  
  
/// <summary>  
/// This example publishes a message to an Amazon Simple Notification  
/// Service (Amazon SNS) topic.  
/// </summary>  
public class PublishToSNSTopic  
{  
    public static async Task Main()  
    {  
        string topicArn = "arn:aws:sns:us-east-2:000000000000:ExampleSNSTopic";  
        string messageText = "This is an example message to publish to the  
ExampleSNSTopic.";  
  
        IAmazonSimpleNotificationService client = new  
AmazonSimpleNotificationServiceClient();
```

```

        await PublishToTopicAsync(client, topicArn, messageText);
    }

    /// <summary>
    /// Publishes a message to an Amazon SNS topic.
    /// </summary>
    /// <param name="client">The initialized client object used to publish
    /// to the Amazon SNS topic.</param>
    /// <param name="topicArn">The ARN of the topic.</param>
    /// <param name="messageText">The text of the message.</param>
    public static async Task PublishToTopicAsync(
        IAmazonSimpleNotificationService client,
        string topicArn,
        string messageText)
    {
        var request = new PublishRequest
        {
            TopicArn = topicArn,
            Message = messageText,
        };

        var response = await client.PublishAsync(request);

        Console.WriteLine($"Successfully published message ID:
{response.MessageId}");
    }
}

```

將訊息發佈至具有群組、複寫和屬性選項的主題。

```

    /// <summary>
    /// Publish messages using user settings.
    /// </summary>
    /// <returns>Async task.</returns>
    public static async Task PublishMessages()
    {
        Console.WriteLine("Now we can publish messages.");

        var keepSendingMessages = true;
        string? deduplicationId = null;
        string? toneAttribute = null;
    }

```

```

        while (keepSendingMessages)
        {
            Console.WriteLine();
            var message = GetUserResponse("Enter a message to publish.", "This is a
sample message");

            if (_useFifoTopic)
            {
                Console.WriteLine("Because you are using a FIFO topic, you must set
a message group ID." +
                                "\r\nAll messages within the same group will be
received in the order " +
                                "they were published.");

                Console.WriteLine();
                var messageGroupId = GetUserResponse("Enter a message group ID for
this message:", "1");

                if (!_useContentBasedDeduplication)
                {
                    Console.WriteLine("Because you are not using content-based
deduplication, " +
                                    "you must enter a deduplication ID.");

                    Console.WriteLine("Enter a deduplication ID for this message.");
                    deduplicationId = GetUserResponse("Enter a deduplication ID for
this message.", "1");
                }

                if (GetYesNoResponse("Add an attribute to this message?"))
                {
                    Console.WriteLine("Enter a number for an attribute.");
                    for (int i = 0; i < _tones.Length; i++)
                    {
                        Console.WriteLine($"{i + 1}. {_tones[i]}");
                    }

                    var selection = GetUserResponse("", "1");
                    int.TryParse(selection, out var selectionNumber);

                    if (selectionNumber > 0 && selectionNumber < _tones.Length)
                    {
                        toneAttribute = _tones[selectionNumber - 1];
                    }
                }
            }
        }
    }
}

```

```

    }

    var messageID = await SnsWrapper.PublishToTopicWithAttribute(
        _topicArn, message, "tone", toneAttribute, deduplicationId,
messageGroupId);

    Console.WriteLine($"Message published with id {messageID}.");
}

keepSendingMessages = GetYesNoResponse("Send another message?", false);
}
}

```

將使用者的選擇套用至發佈動作。

```

    /// <summary>
    /// Publish a message to a topic with an attribute and optional deduplication
and group IDs.
    /// </summary>
    /// <param name="topicArn">The ARN of the topic.</param>
    /// <param name="message">The message to publish.</param>
    /// <param name="attributeName">The optional attribute for the message.</param>
    /// <param name="attributeValue">The optional attribute value for the message.</
param>
    /// <param name="deduplicationId">The optional deduplication ID for the
message.</param>
    /// <param name="groupId">The optional group ID for the message.</param>
    /// <returns>The ID of the message published.</returns>
    public async Task<string> PublishToTopicWithAttribute(
        string topicArn,
        string message,
        string? attributeName = null,
        string? attributeValue = null,
        string? deduplicationId = null,
        string? groupId = null)
    {
        var publishRequest = new PublishRequest()
        {
            TopicArn = topicArn,
            Message = message,
            MessageDeduplicationId = deduplicationId,
            MessageGroupId = groupId
        }
    }
}

```

```
};

if (attributeValue != null)
{
    // Add the string attribute if it exists.
    publishRequest.MessageAttributes =
        new Dictionary<string, MessageAttributeValue>
        {
            { attributeName!, new MessageAttributeValue() { StringValue =
attributeValue, DataType = "String"} }
        };
}

var publishResponse = await _amazonSNSClient.PublishAsync(publishRequest);
return publishResponse.MessageId;
}
```

- 如需 API 詳細資訊，請參閱 適用於 .NET 的 AWS SDK API 參考中的 [發佈](#)。

Subscribe

以下程式碼範例顯示如何使用 Subscribe。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

透過電子郵件地址訂閱某個主題。

```
/// <summary>
/// Creates a new subscription to a topic.
/// </summary>
/// <param name="client">The initialized Amazon SNS client object, used
/// to create an Amazon SNS subscription.</param>
/// <param name="topicArn">The ARN of the topic to subscribe to.</param>
```



```
/// <returns>A SubscribeResponse object which includes the subscription
/// ARN for the new subscription.</returns>
public static async Task<SubscribeResponse> TopicSubscribeAsync(
    IAmazonSimpleNotificationService client,
    string topicArn)
{
    SubscribeRequest request = new SubscribeRequest()
    {
        TopicArn = topicArn,
        ReturnSubscriptionArn = true,
        Protocol = "email",
        Endpoint = "recipient@example.com",
    };

    var response = await client.SubscribeAsync(request);

    return response;
}
```

使用篩選條件訂閱主題的佇列。

```
/// <summary>
/// Subscribe a queue to a topic with optional filters.
/// </summary>
/// <param name="topicArn">The ARN of the topic.</param>
/// <param name="useFifoTopic">The optional filtering policy for the
subscription.</param>
/// <param name="queueArn">The ARN of the queue.</param>
/// <returns>The ARN of the new subscription.</returns>
public async Task<string> SubscribeTopicWithFilter(string topicArn, string?
filterPolicy, string queueArn)
{
    var subscribeRequest = new SubscribeRequest()
    {
        TopicArn = topicArn,
        Protocol = "sqs",
        Endpoint = queueArn
    };

    if (!string.IsNullOrEmpty(filterPolicy))
    {

```

```
        subscribeRequest.Attributes = new Dictionary<string, string>
    { { "FilterPolicy", filterPolicy } };
    }

    var subscribeResponse = await
    _amazonSNSClient.SubscribeAsync(subscribeRequest);
    return subscribeResponse.SubscriptionArn;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的[訂閱](#)。

Unsubscribe

以下程式碼範例顯示如何使用 Unsubscribe。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

透過訂閱 ARN 取消訂閱主題。

```
/// <summary>
/// Unsubscribe from a topic by a subscription ARN.
/// </summary>
/// <param name="subscriptionArn">The ARN of the subscription.</param>
/// <returns>True if successful.</returns>
public async Task<bool> UnsubscribeByArn(string subscriptionArn)
{
    var unsubscribeResponse = await _amazonSNSClient.UnsubscribeAsync(
        new UnsubscribeRequest()
        {
            SubscriptionArn = subscriptionArn
        });
    return unsubscribeResponse.HttpStatusCode == HttpStatusCode.OK;
}
```

- 如需 API 詳細資訊，請參閱 適用於 .NET 的 AWS SDK API 參考中的[取消訂閱](#)。

案例

建置 Amazon SNS 應用程式

以下程式碼範例示範如何建立具有訂閱和發布功能，並且可轉譯訊息的應用程式。

適用於 .NET 的 SDK

示範如何使用 Amazon Simple Notification Service .NET API 來建立具有訂閱和發布功能的 Web 應用程式。此外，此範例應用程式也會轉譯訊息。

如需完整的原始碼和如何設定及執行的指示，請參閱 [GitHub](#) 上的完整範例。

此範例中使用的服務

- Amazon SNS
- Amazon Translate

建立無伺服器應用程式來管理相片

下列程式碼範例示範如何建立無伺服器應用程式，讓使用者以標籤管理相片。

適用於 .NET 的 SDK

顯示如何開發照片資產管理應用程式，以便使用 Amazon Rekognition 偵測圖片中的標籤，並將其儲存以供日後擷取。

如需完整的原始碼和如何設定及執行的指示，請參閱 [GitHub](#) 上的完整範例。

如要深入探索此範例的來源，請參閱 [AWS 社群](#) 上的文章。

此範例中使用的服務

- API Gateway
- DynamoDB
- Lambda
- Amazon Rekognition
- Amazon S3

- Amazon SNS

發布簡訊

下列程式碼範例示範如何使用 Amazon SNS 發佈訊息。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
namespace SNSMessageExample
{
    using System;
    using System.Threading.Tasks;
    using Amazon;
    using Amazon.SimpleNotificationService;
    using Amazon.SimpleNotificationService.Model;

    public class SNSMessage
    {
        private AmazonSimpleNotificationServiceClient snsClient;

        /// <summary>
        /// Initializes a new instance of the <see cref="SNSMessage"/> class.
        /// Constructs a new SNSMessage object initializing the Amazon Simple
        /// Notification Service (Amazon SNS) client using the supplied
        /// Region endpoint.
        /// </summary>
        /// <param name="regionEndpoint">The Amazon Region endpoint to use in
        /// sending test messages with this object.</param>
        public SNSMessage(RegionEndpoint regionEndpoint)
        {
            snsClient = new AmazonSimpleNotificationServiceClient(regionEndpoint);
        }

        /// <summary>
        /// Sends the SMS message passed in the text parameter to the phone number
        /// in phoneNum.
    }
}
```

```
/// </summary>
/// <param name="phoneNum">The ten-digit phone number to which the text
/// message will be sent.</param>
/// <param name="text">The text of the message to send.</param>
/// <returns>Async task.</returns>
public async Task SendTextMessageAsync(string phoneNum, string text)
{
    if (string.IsNullOrEmpty(phoneNum) || string.IsNullOrEmpty(text))
    {
        return;
    }

    // Now actually send the message.
    var request = new PublishRequest
    {
        Message = text,
        PhoneNumber = phoneNum,
    };

    try
    {
        var response = await snsClient.PublishAsync(request);
    }
    catch (Exception ex)
    {
        Console.WriteLine($"Error sending message: {ex}");
    }
}
}
```

- 如需 API 詳細資訊，請參閱 適用於 .NET 的 AWS SDK API 參考中的[發佈](#)。

將訊息發佈至佇列

以下程式碼範例顯示做法：

- 建立主題 (FIFO 或非 FIFO)。
- 為主題訂閱多個佇列，並提供套用篩選條件的選擇。
- 發佈訊息至主題。

- 輪詢佇列以獲取收到的訊息。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

在命令提示中執行互動式案例。

```
/// <summary>
/// Console application to run a feature scenario for topics and queues.
/// </summary>
public static class TopicsAndQueues
{
    private static bool _useFifoTopic = false;
    private static bool _useContentBasedDeduplication = false;
    private static string _topicName = null!;
    private static string _topicArn = null!;

    private static readonly int _queueCount = 2;
    private static readonly string[] _queueUrls = new string[_queueCount];
    private static readonly string[] _subscriptionArns = new string[_queueCount];
    private static readonly string[] _tones = { "cheerful", "funny", "serious",
"sincere" };
    public static SNSWrapper SnsWrapper { get; set; } = null!;
    public static SQSWrapper SqsWrapper { get; set; } = null!;
    public static bool UseConsole { get; set; } = true;
    static async Task Main(string[] args)
    {
        // Set up dependency injection for Amazon EventBridge.
        using var host = Host.CreateDefaultBuilder(args)
            .ConfigureLogging(logging =>
                logging.AddFilter("System", LogLevel.Debug)
                    .AddFilter<DebugLoggerProvider>("Microsoft",
LogLevel.Information)
                    .AddFilter<ConsoleLoggerProvider>("Microsoft", LogLevel.Trace))
            .ConfigureServices((_, services) =>
                services.AddAWSService<IAmazonSQS>()
                    .AddAWSService<IAmazonSimpleNotificationService>())
```

```
        .AddTransient<SNSWrapper>()
        .AddTransient<SQSWrapper>()
    )
    .Build();

    ServicesSetup(host);
    PrintDescription();

    await RunScenario();
}

/// <summary>
/// Populate the services for use within the console application.
/// </summary>
/// <param name="host">The services host.</param>
private static void ServicesSetup(IHost host)
{
    SnsWrapper = host.Services.GetRequiredService<SNSWrapper>();
    SqsWrapper = host.Services.GetRequiredService<SQSWrapper>();
}

/// <summary>
/// Run the scenario for working with topics and queues.
/// </summary>
/// <returns>True if successful.</returns>
public static async Task<bool> RunScenario()
{
    try
    {
        await SetupTopic();

        await SetupQueues();

        await PublishMessages();

        foreach (var queueUrl in _queueUrls)
        {
            var messages = await PollForMessages(queueUrl);
            if (messages.Any())
            {
                await DeleteMessages(queueUrl, messages);
            }
        }
    }
}
```

```

        await CleanupResources();

        Console.WriteLine("Messaging with topics and queues scenario is
complete.");
        return true;
    }
    catch (Exception ex)
    {
        Console.WriteLine(new string('-', 80));
        Console.WriteLine($"There was a problem running the scenario:
{ex.Message}");
        await CleanupResources();
        Console.WriteLine(new string('-', 80));
        return false;
    }
}

/// <summary>
/// Print a description for the tasks in the scenario.
/// </summary>
/// <returns>Async task.</returns>
private static void PrintDescription()
{
    Console.WriteLine(new string('-', 80));
    Console.WriteLine($"Welcome to messaging with topics and queues.");

    Console.WriteLine(new string('-', 80));
    Console.WriteLine($"In this scenario, you will create an SNS topic and
subscribe {_queueCount} SQS queues to the topic." +
        $"\r\nYou can select from several options for configuring
the topic and the subscriptions for the 2 queues." +
        $"\r\nYou can then post to the topic and see the results
in the queues.\r\n");

    Console.WriteLine(new string('-', 80));
}

/// <summary>
/// Set up the SNS topic to be used with the queues.
/// </summary>
/// <returns>Async task.</returns>
private static async Task<string> SetupTopic()
{
    Console.WriteLine(new string('-', 80));

```



```

        Console.WriteLine($"SNS topics can be configured as FIFO (First-In-First-
Out)." +
            $"\r\nFIFO topics deliver messages in order and support
deduplication and message filtering." +
            $"\r\nYou can then post to the topic and see the results
in the queues.\r\n");

        _useFifoTopic = GetYesNoResponse("Would you like to work with FIFO
topics?");

        if (_useFifoTopic)
        {
            Console.WriteLine(new string('-', 80));
            _topicName = GetUserResponse("Enter a name for your SNS topic: ",
"example-topic");
            Console.WriteLine(
                "Because you have selected a FIFO topic, '.fifo' must be appended to
the topic name.\r\n");

            Console.WriteLine(new string('-', 80));
            Console.WriteLine($"Because you have chosen a FIFO topic, deduplication
is supported." +
                $"\r\nDeduplication IDs are either set in the message
or automatically generated " +
                $"\r\nfrom content using a hash function.\r\n" +
                $"\r\nIf a message is successfully published to an SNS
FIFO topic, any message " +
                $"\r\npublished and determined to have the same
deduplication ID, " +
                $"\r\nwithin the five-minute deduplication interval,
is accepted but not delivered.\r\n" +
                $"\r\nFor more information about deduplication, " +
                $"\r\nsee https://docs.aws.amazon.com/sns/latest/dg/
fifo-message-dedup.html.");

            _useContentBasedDeduplication = GetYesNoResponse("Use content-based
deduplication instead of entering a deduplication ID?");
            Console.WriteLine(new string('-', 80));
        }

        _topicArn = await SnsWrapper.CreateTopicWithName(_topicName, _useFifoTopic,
_useContentBasedDeduplication);

        Console.WriteLine($"Your new topic with the name {_topicName}" +

```

```

        $"\\r\\nand Amazon Resource Name (ARN) {_topicArn}" +
        $"\\r\\nhas been created.\\r\\n");

    Console.WriteLine(new string('-', 80));
    return _topicArn;
}

/// <summary>
/// Set up the queues.
/// </summary>
/// <returns>Async task.</returns>
private static async Task SetupQueues()
{
    Console.WriteLine(new string('-', 80));
    Console.WriteLine($"Now you will create {_queueCount} Amazon Simple Queue
Service (Amazon SQS) queues to subscribe to the topic.");

    // Repeat this section for each queue.
    for (int i = 0; i < _queueCount; i++)
    {
        var queueName = GetUserResponse("Enter a name for an Amazon SQS queue:
", $"example-queue-{i}");
        if (_useFifoTopic)
        {
            // Only explain this once.
            if (i == 0)
            {
                Console.WriteLine(
                    "Because you have selected a FIFO topic, '.fifo' must be
appended to the queue name.");
            }

            var queueUrl = await SqsWrapper.CreateQueueWithName(queueName,
            _useFifoTopic);

            _queueUrls[i] = queueUrl;

            Console.WriteLine($"Your new queue with the name {queueName}" +
                $"\\r\\nand queue URL {queueUrl}" +
                $"\\r\\nhas been created.\\r\\n");

            if (i == 0)
            {
                Console.WriteLine(

```

```

        $"The queue URL is used to retrieve the queue ARN,\r\n" +
        $"which is used to create a subscription.");
        Console.WriteLine(new string('-', 80));
    }

    var queueArn = await SqsWrapper.GetQueueArnByUrl(queueUrl);

    if (i == 0)
    {
        Console.WriteLine(
            $"An AWS Identity and Access Management (IAM) policy must be
attached to an SQS queue, enabling it to receive\r\n" +
            $"messages from an SNS topic");
    }

    await SqsWrapper.SetQueuePolicyForTopic(queueArn, _topicArn,
queueUrl);

    await SetupFilters(i, queueArn, queueName);
}

Console.WriteLine(new string('-', 80));
}

/// <summary>
/// Set up filters with user options for a queue.
/// </summary>
/// <param name="queueCount">The number of this queue.</param>
/// <param name="queueArn">The ARN of the queue.</param>
/// <param name="queueName">The name of the queue.</param>
/// <returns>Async Task.</returns>
public static async Task SetupFilters(int queueCount, string queueArn, string
queueName)
{
    if (_useFifoTopic)
    {
        Console.WriteLine(new string('-', 80));
        // Only explain this once.
        if (queueCount == 0)
        {
            Console.WriteLine(
                "Subscriptions to a FIFO topic can have filters." +

```

```

        "If you add a filter to this subscription, then only the
filtered messages " +
        "will be received in the queue.");

        Console.WriteLine(
            "For information about message filtering, " +
            "see https://docs.aws.amazon.com/sns/latest/dg/sns-message-
filtering.html");

        Console.WriteLine(
            "For this example, you can filter messages by a " +
            "TONE attribute.");
    }

    var useFilter = GetYesNoResponse($"Filter messages for {queueName}'s
subscription to the topic?");

    string? filterPolicy = null;
    if (useFilter)
    {
        filterPolicy = CreateFilterPolicy();
    }
    var subscriptionArn = await
SnsWrapper.SubscribeTopicWithFilter(_topicArn, filterPolicy,
    queueArn);
    _subscriptionArns[queueCount] = subscriptionArn;

    Console.WriteLine(
        $"The queue {queueName} has been subscribed to the topic
{_topicName} " +
        $"with the subscription ARN {subscriptionArn}");
    Console.WriteLine(new string('-', 80));
}
}

/// <summary>
/// Use user input to create a filter policy for a subscription.
/// </summary>
/// <returns>The serialized filter policy.</returns>
public static string CreateFilterPolicy()
{
    Console.WriteLine(new string('-', 80));
    Console.WriteLine(
        $"You can filter messages by one or more of the following" +

```

```

        $"TONE attributes.");

        List<string> filterSelections = new List<string>();

        var selectionNumber = 0;
        do
        {
            Console.WriteLine(
                $"Enter a number to add a TONE filter, or enter 0 to stop adding
filters.");
            for (int i = 0; i < _tones.Length; i++)
            {
                Console.WriteLine($"\\t{i + 1}. {_tones[i]}");
            }

            var selection = GetUserResponse("", filterSelections.Any() ? "0" : "1");
            int.TryParse(selection, out selectionNumber);
            if (selectionNumber > 0 && !
filterSelections.Contains(_tones[selectionNumber - 1]))
            {
                filterSelections.Add(_tones[selectionNumber - 1]);
            }
        } while (selectionNumber != 0);

        var filters = new Dictionary<string, List<string>>
        {
            { "tone", filterSelections }
        };
        string filterPolicy = JsonSerializer.Serialize(filters);
        return filterPolicy;
    }

    /// <summary>
    /// Publish messages using user settings.
    /// </summary>
    /// <returns>Async task.</returns>
    public static async Task PublishMessages()
    {
        Console.WriteLine("Now we can publish messages.");

        var keepSendingMessages = true;
        string? deduplicationId = null;
        string? toneAttribute = null;
        while (keepSendingMessages)

```

```

    {
        Console.WriteLine();
        var message = GetUserResponse("Enter a message to publish.", "This is a
sample message");

        if (_useFifoTopic)
        {
            Console.WriteLine("Because you are using a FIFO topic, you must set
a message group ID." +
                               "\r\nAll messages within the same group will be
received in the order " +
                               "they were published.");

            Console.WriteLine();
            var messageGroupId = GetUserResponse("Enter a message group ID for
this message:", "1");

            if (!_useContentBasedDeduplication)
            {
                Console.WriteLine("Because you are not using content-based
deduplication, " +
                                   "you must enter a deduplication ID.");

                Console.WriteLine("Enter a deduplication ID for this message.");
                deduplicationId = GetUserResponse("Enter a deduplication ID for
this message.", "1");
            }

            if (GetYesNoResponse("Add an attribute to this message?"))
            {
                Console.WriteLine("Enter a number for an attribute.");
                for (int i = 0; i < _tones.Length; i++)
                {
                    Console.WriteLine($"{i + 1}. {_tones[i]}");
                }

                var selection = GetUserResponse("", "1");
                int.TryParse(selection, out var selectionNumber);

                if (selectionNumber > 0 && selectionNumber < _tones.Length)
                {
                    toneAttribute = _tones[selectionNumber - 1];
                }
            }
        }
    }

```

```

        var messageID = await SnsWrapper.PublishToTopicWithAttribute(
            _topicArn, message, "tone", toneAttribute, deduplicationId,
messageGroupId);

        Console.WriteLine($"Message published with id {messageID}.");
    }

    keepSendingMessages = GetYesNoResponse("Send another message?", false);
}
}

/// <summary>
/// Poll for the published messages to see the results of the user's choices.
/// </summary>
/// <returns>Async task.</returns>
public static async Task<List<Message>> PollForMessages(string queueUrl)
{
    Console.WriteLine(new string('-', 80));
    Console.WriteLine($"Now the SQS queue at {queueUrl} will be polled to
retrieve the messages." +
        "\r\nPress any key to continue.");
    if (UseConsole)
    {
        Console.ReadLine();
    }

    var moreMessages = true;
    var messages = new List<Message>();
    while (moreMessages)
    {
        var newMessages = await SqsWrapper.ReceiveMessagesByUrl(queueUrl, 10);

        moreMessages = newMessages.Any();
        if (moreMessages)
        {
            messages.AddRange(newMessages);
        }
    }

    Console.WriteLine($"{messages.Count} message(s) were received by the queue
at {queueUrl}.");

    foreach (var message in messages)

```

```

        {
            Console.WriteLine("\tMessage:" +
                              $"{"\n\t{message.Body}");
        }

        Console.WriteLine(new string('-', 80));
        return messages;
    }

    /// <summary>
    /// Delete the message using handles in a batch.
    /// </summary>
    /// <returns>Async task.</returns>
    public static async Task DeleteMessages(string queueUrl, List<Message> messages)
    {
        Console.WriteLine(new string('-', 80));
        Console.WriteLine("Now we can delete the messages in this queue in a
batch.");
        await SqsWrapper.DeleteMessageBatchByUrl(queueUrl, messages);
        Console.WriteLine(new string('-', 80));
    }

    /// <summary>
    /// Clean up the resources from the scenario.
    /// </summary>
    /// <returns>Async task.</returns>
    private static async Task CleanupResources()
    {
        Console.WriteLine(new string('-', 80));
        Console.WriteLine($"Clean up resources.");

        try
        {
            foreach (var queueUrl in _queueUrls)
            {
                if (!string.IsNullOrEmpty(queueUrl))
                {
                    var deleteQueue =
                        GetYesNoResponse($"Delete queue with url {queueUrl}?");
                    if (deleteQueue)
                    {
                        await SqsWrapper.DeleteQueueByUrl(queueUrl);
                    }
                }
            }
        }
    }

```



```

    }

    foreach (var subscriptionArn in _subscriptionArns)
    {
        if (!string.IsNullOrEmpty(subscriptionArn))
        {
            await SnsWrapper.UnsubscribeByArn(subscriptionArn);
        }
    }

    var deleteTopic = GetYesNoResponse($"Delete topic {_topicName}?");
    if (deleteTopic)
    {
        await SnsWrapper.DeleteTopicByArn(_topicArn);
    }
}
catch (Exception ex)
{
    Console.WriteLine($"Unable to clean up resources. Here's why:
{ex.Message}.");
}

Console.WriteLine(new string('-', 80));
}

/// <summary>
/// Helper method to get a yes or no response from the user.
/// </summary>
/// <param name="question">The question string to print on the console.</param>
/// <param name="defaultAnswer">Optional default answer to use.</param>
/// <returns>True if the user responds with a yes.</returns>
private static bool GetYesNoResponse(string question, bool defaultAnswer = true)
{
    if (UseConsole)
    {
        Console.WriteLine(question);
        var ynResponse = Console.ReadLine();
        var response = ynResponse != null &&
            ynResponse.Equals("y",
                StringComparison.InvariantCultureIgnoreCase);

        return response;
    }
    // If not using the console, use the default.
    return defaultAnswer;
}

```

```

    }

    /// <summary>
    /// Helper method to get a string response from the user through the console.
    /// </summary>
    /// <param name="question">The question string to print on the console.</param>
    /// <param name="defaultAnswer">Optional default answer to use.</param>
    /// <returns>True if the user responds with a yes.</returns>
    private static string GetUserResponse(string question, string defaultAnswer)
    {
        if (UseConsole)
        {
            var response = "";
            while (string.IsNullOrEmpty(response))
            {
                Console.WriteLine(question);
                response = Console.ReadLine();
            }
            return response;
        }
        // If not using the console, use the default.
        return defaultAnswer;
    }
}

```

建立包裝 Amazon SQS 操作的類別。

```

/// <summary>
/// Wrapper for Amazon Simple Queue Service (SQS) operations.
/// </summary>
public class SQSWrapper
{
    private readonly IAmazonSQS _amazonSQSClient;

    /// <summary>
    /// Constructor for the Amazon SQS wrapper.
    /// </summary>
    /// <param name="amazonSQS">The injected Amazon SQS client.</param>
    public SQSWrapper(IAmazonSQS amazonSQS)
    {
        _amazonSQSClient = amazonSQS;
    }
}

```

```
}

/// <summary>
/// Create a queue with a specific name.
/// </summary>
/// <param name="queueName">The name for the queue.</param>
/// <param name="useFifoQueue">True to use a FIFO queue.</param>
/// <returns>The url for the queue.</returns>
public async Task<string> CreateQueueWithName(string queueName, bool
useFifoQueue)
{
    int maxMessage = 256 * 1024;
    var queueAttributes = new Dictionary<string, string>
    {
        {
            QueueAttributeName.MaximumMessageSize,
            maxMessage.ToString()
        }
    };

    var createQueueRequest = new CreateQueueRequest()
    {
        QueueName = queueName,
        Attributes = queueAttributes
    };

    if (useFifoQueue)
    {
        // Update the name if it is not correct for a FIFO queue.
        if (!queueName.EndsWith(".fifo"))
        {
            createQueueRequest.QueueName = queueName + ".fifo";
        }

        // Add an attribute for a FIFO queue.
        createQueueRequest.Attributes.Add(
            QueueAttributeName.FifoQueue, "true");
    }

    var createResponse = await _amazonSQSClient.CreateQueueAsync(
        new CreateQueueRequest()
        {
            QueueName = queueName
        });
}
```

```

        return createResponse.QueueUrl;
    }

    /// <summary>
    /// Get the ARN for a queue from its URL.
    /// </summary>
    /// <param name="queueUrl">The URL of the queue.</param>
    /// <returns>The ARN of the queue.</returns>
    public async Task<string> GetQueueArnByUrl(string queueUrl)
    {
        var getAttributesRequest = new GetQueueAttributesRequest()
        {
            QueueUrl = queueUrl,
            AttributeNames = new List<string>() { QueueAttributeName.QueueArn }
        };

        var getAttributesResponse = await _amazonSQSClient.GetQueueAttributesAsync(
            getAttributesRequest);

        return getAttributesResponse.QueueARN;
    }

    /// <summary>
    /// Set the policy attribute of a queue for a topic.
    /// </summary>
    /// <param name="queueArn">The ARN of the queue.</param>
    /// <param name="topicArn">The ARN of the topic.</param>
    /// <param name="queueUrl">The url for the queue.</param>
    /// <returns>True if successful.</returns>
    public async Task<bool> SetQueuePolicyForTopic(string queueArn, string topicArn,
        string queueUrl)
    {
        var queuePolicy = "{" +
            "\"Version\": \"2012-10-17\", " +
            "\"Statement\": [{" +
                "\"Effect\": \"Allow\", " +
                "\"Principal\": { " +
                    "\"Service\": " +
                        "\"sns.amazonaws.com\"" +
                    "}, " +
                "\"Action\": \"sqs:SendMessage\", " +
                "\"Resource\": \"{queueArn}\", " +
                "\"Condition\": { " +
                    "\"ArnEquals\": { "

```

```

        $"\"aws:SourceArn\": \"{topicArn}\""
    +
        "}" +
        "}" +
        "]]" +
        "}}";
    var attributesResponse = await _amazonSQSClient.SetQueueAttributesAsync(
        new SetQueueAttributesRequest()
        {
            QueueUrl = queueUrl,
            Attributes = new Dictionary<string, string>() { { "Policy",
queuePolicy } }
        });
    return attributesResponse.HttpStatusCode == HttpStatusCode.OK;
}

/// <summary>
/// Receive messages from a queue by its URL.
/// </summary>
/// <param name="queueUrl">The url of the queue.</param>
/// <returns>The list of messages.</returns>
public async Task<List<Message>> ReceiveMessagesByUrl(string queueUrl, int
maxMessages)
{
    // Setting WaitTimeSeconds to non-zero enables long polling.
    // For information about long polling, see
    // https://docs.aws.amazon.com/AWSSimpleQueueService/latest/
SQSDeveloperGuide/sqs-short-and-long-polling.html
    var messageResponse = await _amazonSQSClient.ReceiveMessageAsync(
        new ReceiveMessageRequest()
        {
            QueueUrl = queueUrl,
            MaxNumberOfMessages = maxMessages,
            WaitTimeSeconds = 1
        });
    return messageResponse.Messages;
}

/// <summary>
/// Delete a batch of messages from a queue by its url.
/// </summary>
/// <param name="queueUrl">The url of the queue.</param>
/// <returns>True if successful.</returns>

```

```

    public async Task<bool> DeleteMessageBatchByUrl(string queueUrl, List<Message>
messages)
    {
        var deleteRequest = new DeleteMessageBatchRequest()
        {
            QueueUrl = queueUrl,
            Entries = new List<DeleteMessageBatchRequestEntry>()
        };
        foreach (var message in messages)
        {
            deleteRequest.Entries.Add(new DeleteMessageBatchRequestEntry()
            {
                ReceiptHandle = message.ReceiptHandle,
                Id = message.MessageId
            });
        }

        var deleteResponse = await
        _amazonSQSClient.DeleteMessageBatchAsync(deleteRequest);

        return deleteResponse.Failed.Any();
    }

    /// <summary>
    /// Delete a queue by its URL.
    /// </summary>
    /// <param name="queueUrl">The url of the queue.</param>
    /// <returns>True if successful.</returns>
    public async Task<bool> DeleteQueueByUrl(string queueUrl)
    {
        var deleteResponse = await _amazonSQSClient.DeleteQueueAsync(
            new DeleteQueueRequest()
            {
                QueueUrl = queueUrl
            });
        return deleteResponse.HttpStatusCode == HttpStatusCode.OK;
    }
}

```

建立包裝 Amazon SNS 操作的類別。

```

/// <summary>
/// Wrapper for Amazon Simple Notification Service (SNS) operations.
/// </summary>
public class SNSWrapper
{
    private readonly IAmazonSimpleNotificationService _amazonSNSClient;

    /// <summary>
    /// Constructor for the Amazon SNS wrapper.
    /// </summary>
    /// <param name="amazonSNS">The injected Amazon SNS client.</param>
    public SNSWrapper(IAmazonSimpleNotificationService amazonSNS)
    {
        _amazonSNSClient = amazonSNS;
    }

    /// <summary>
    /// Create a new topic with a name and specific FIFO and de-duplication
    attributes.
    /// </summary>
    /// <param name="topicName">The name for the topic.</param>
    /// <param name="useFifoTopic">True to use a FIFO topic.</param>
    /// <param name="useContentBasedDeduplication">True to use content-based de-
    duplication.</param>
    /// <returns>The ARN of the new topic.</returns>
    public async Task<string> CreateTopicWithName(string topicName, bool
    useFifoTopic, bool useContentBasedDeduplication)
    {
        var createTopicRequest = new CreateTopicRequest()
        {
            Name = topicName,
        };

        if (useFifoTopic)
        {
            // Update the name if it is not correct for a FIFO topic.
            if (!topicName.EndsWith(".fifo"))
            {
                createTopicRequest.Name = topicName + ".fifo";
            }

            // Add the attributes from the method parameters.
            createTopicRequest.Attributes = new Dictionary<string, string>
            {

```

```

        { "FifoTopic", "true" }
    };
    if (useContentBasedDeduplication)
    {
        createTopicRequest.Attributes.Add("ContentBasedDeduplication",
"true");
    }
}

var createResponse = await
_amazonSNSClient.CreateTopicAsync(createTopicRequest);
return createResponse.TopicArn;
}

/// <summary>
/// Subscribe a queue to a topic with optional filters.
/// </summary>
/// <param name="topicArn">The ARN of the topic.</param>
/// <param name="useFifoTopic">The optional filtering policy for the
subscription.</param>
/// <param name="queueArn">The ARN of the queue.</param>
/// <returns>The ARN of the new subscription.</returns>
public async Task<string> SubscribeTopicWithFilter(string topicArn, string?
filterPolicy, string queueArn)
{
    var subscribeRequest = new SubscribeRequest()
    {
        TopicArn = topicArn,
        Protocol = "sqs",
        Endpoint = queueArn
    };

    if (!string.IsNullOrEmpty(filterPolicy))
    {
        subscribeRequest.Attributes = new Dictionary<string, string>
{ { "FilterPolicy", filterPolicy } };
    }

    var subscribeResponse = await
_amazonSNSClient.SubscribeAsync(subscribeRequest);
    return subscribeResponse.SubscriptionArn;
}

/// <summary>

```



```

    /// Publish a message to a topic with an attribute and optional deduplication
    and group IDs.
    /// </summary>
    /// <param name="topicArn">The ARN of the topic.</param>
    /// <param name="message">The message to publish.</param>
    /// <param name="attributeName">The optional attribute for the message.</param>
    /// <param name="attributeValue">The optional attribute value for the message.</
param>
    /// <param name="deduplicationId">The optional deduplication ID for the
message.</param>
    /// <param name="groupId">The optional group ID for the message.</param>
    /// <returns>The ID of the message published.</returns>
    public async Task<string> PublishToTopicWithAttribute(
        string topicArn,
        string message,
        string? attributeName = null,
        string? attributeValue = null,
        string? deduplicationId = null,
        string? groupId = null)
    {
        var publishRequest = new PublishRequest()
        {
            TopicArn = topicArn,
            Message = message,
            MessageDeduplicationId = deduplicationId,
            MessageGroupId = groupId
        };

        if (attributeValue != null)
        {
            // Add the string attribute if it exists.
            publishRequest.MessageAttributes =
                new Dictionary<string, MessageAttributeValue>
                {
                    { attributeName!, new MessageAttributeValue() { StringValue =
attributeValue, DataType = "String" } }
                };
        }

        var publishResponse = await _amazonSNSClient.PublishAsync(publishRequest);
        return publishResponse.MessageId;
    }

```

```
/// <summary>
/// Unsubscribe from a topic by a subscription ARN.
/// </summary>
/// <param name="subscriptionArn">The ARN of the subscription.</param>
/// <returns>True if successful.</returns>
public async Task<bool> UnsubscribeByArn(string subscriptionArn)
{
    var unsubscribeResponse = await _amazonSNSClient.UnsubscribeAsync(
        new UnsubscribeRequest()
        {
            SubscriptionArn = subscriptionArn
        });
    return unsubscribeResponse.HttpStatusCode == HttpStatusCode.OK;
}

/// <summary>
/// Delete a topic by its topic ARN.
/// </summary>
/// <param name="topicArn">The ARN of the topic.</param>
/// <returns>True if successful.</returns>
public async Task<bool> DeleteTopicByArn(string topicArn)
{
    var deleteResponse = await _amazonSNSClient.DeleteTopicAsync(
        new DeleteTopicRequest()
        {
            TopicArn = topicArn
        });
    return deleteResponse.HttpStatusCode == HttpStatusCode.OK;
}
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的下列主題。
 - [CreateQueue](#)
 - [CreateTopic](#)
 - [DeleteMessageBatch](#)
 - [DeleteQueue](#)
 - [DeleteTopic](#)
 - [GetQueueAttributes](#)
 - [發布](#)

- [ReceiveMessage](#)
- [SetQueueAttributes](#)
- [Subscribe](#)
- [Unsubscribe](#)

無伺服器範例

使用 Amazon SNS 觸發條件調用 Lambda 函數

下列程式碼範例示範如何實作 Lambda 函式，該函式會透過接收 SNS 主題的訊息來接收所觸發的事件。函數會從事件參數擷取訊息，並記錄每一則訊息的內容。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在[無伺服器範例](#)儲存庫中設定和執行。

使用 .NET 搭配 Lambda 來使用 SNS 事件。

```
// Copyright Amazon.com, Inc. or its affiliates. All Rights Reserved.
// SPDX-License-Identifier: Apache-2.0
using Amazon.Lambda.Core;
using Amazon.Lambda.SNSEvents;

// Assembly attribute to enable the Lambda function's JSON input to be converted
// into a .NET class.
[assembly: LambdaSerializer(typeof(Amazon.Lambda.Serialization.SystemTextJson.DefaultLambdaJsonSerializer))]

namespace SnsIntegration;

public class Function
{
    public async Task FunctionHandler(SNSEvent evnt, ILambdaContext context)
    {
        foreach (var record in evnt.Records)
```

```
        {
            await ProcessRecordAsync(record, context);
        }
        context.Logger.LogInformation("done");
    }

    private async Task ProcessRecordAsync(SNSEvent.SNSRecord record, ILambdaContext
context)
    {
        try
        {
            context.Logger.LogInformation($"Processed record {record.Sns.Message}");

            // TODO: Do interesting work based on the new message
            await Task.CompletedTask;
        }
        catch (Exception e)
        {
            //You can use Dead Letter Queue to handle failures. By configuring a
Lambda DLQ.
            context.Logger.LogError($"An error occurred");
            throw;
        }
    }
}
```

使用的 Amazon SQS 範例 適用於 .NET 的 SDK

下列程式碼範例示範如何使用 適用於 .NET 的 AWS SDK 搭配 Amazon SQS 執行動作和實作常見案例。

Actions 是大型程式的程式碼摘錄，必須在內容中執行。雖然動作會告訴您如何呼叫個別服務函數，但您可以在其相關情境中查看內容中的動作。

案例是向您展示如何呼叫服務中的多個函數或與其他 AWS 服務組合來完成特定任務的程式碼範例。

每個範例均包含完整原始碼的連結，您可在連結中找到如何設定和執行內容中程式碼的相關指示。

主題

- [開始使用](#)
- [動作](#)

- [案例](#)
- [無伺服器範例](#)

開始使用

Hello Amazon SQS

下列程式碼範例說明如何開始使用 Amazon SQS。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
using Amazon.SQS;
using Amazon.SQS.Model;

namespace SQSActions;

public static class HelloSQS
{
    static async Task Main(string[] args)
    {
        var sqsClient = new AmazonSQSClient();

        Console.WriteLine($"Hello Amazon SQS! Following are some of your queues:");
        Console.WriteLine();

        // You can use await and any of the async methods to get a response.
        // Let's get the first five queues.
        var response = await sqsClient.ListQueuesAsync(
            new ListQueuesRequest()
            {
                MaxResults = 5
            });

        foreach (var queue in response.QueueUrls)
```

```
        {  
            Console.WriteLine($"{queue} Queue Url: {queue}");  
            Console.WriteLine();  
        }  
    }  
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [ListQueues](#)。

動作

CreateQueue

以下程式碼範例顯示如何使用 CreateQueue。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

建立具有特定名稱的主題。

```
/// <summary>  
/// Create a queue with a specific name.  
/// </summary>  
/// <param name="queueName">The name for the queue.</param>  
/// <param name="useFifoQueue">True to use a FIFO queue.</param>  
/// <returns>The url for the queue.</returns>  
public async Task<string> CreateQueueWithName(string queueName, bool  
useFifoQueue)  
{  
    int maxMessage = 256 * 1024;  
    var queueAttributes = new Dictionary<string, string>  
    {  
        {  
            QueueAttributeName.MaximumMessageSize,  
            maxMessage.ToString()  
        }  
    }  
}
```

```

    }
};

var createQueueRequest = new CreateQueueRequest()
{
    QueueName = queueName,
    Attributes = queueAttributes
};

if (useFifoQueue)
{
    // Update the name if it is not correct for a FIFO queue.
    if (!queueName.EndsWith(".fifo"))
    {
        createQueueRequest.QueueName = queueName + ".fifo";
    }

    // Add an attribute for a FIFO queue.
    createQueueRequest.Attributes.Add(
        QueueAttributeName.FifoQueue, "true");
}

var createResponse = await _amazonSQSClient.CreateQueueAsync(
    new CreateQueueRequest()
    {
        QueueName = queueName
    });
return createResponse.QueueUrl;
}

```

建立 Amazon SQS 佇列並傳送訊息至該佇列。

```

using System;
using System.Collections.Generic;
using System.Threading.Tasks;
using Amazon;
using Amazon.SQS;
using Amazon.SQS.Model;

public class CreateSendExample
{
    // Specify your AWS Region (an example Region is shown).

```

```

        private static readonly string QueueName = "Example_Queue";
        private static readonly RegionEndpoint ServiceRegion =
RegionEndpoint.USWest2;
        private static IAmazonSQS client;

        public static async Task Main()
        {
            client = new AmazonSQSClient(ServiceRegion);
            var createQueueResponse = await CreateQueue(client, QueueName);

            string queueUrl = createQueueResponse.QueueUrl;

            Dictionary<string, MessageAttributeValue> messageAttributes = new
Dictionary<string, MessageAttributeValue>
            {
                { "Title",    new MessageAttributeValue { DataType = "String",
StringValue = "The Whistler" } },
                { "Author",  new MessageAttributeValue { DataType = "String",
StringValue = "John Grisham" } },
                { "WeeksOn", new MessageAttributeValue { DataType = "Number",
StringValue = "6" } },
            };

            string messageBody = "Information about current NY Times fiction
bestseller for week of 12/11/2016.";

            var sendMsgResponse = await SendMessage(client, queueUrl, messageBody,
messageAttributes);
        }

        /// <summary>
        /// Creates a new Amazon SQS queue using the queue name passed to it
        /// in queueName.
        /// </summary>
        /// <param name="client">An SQS client object used to send the message.</
param>
        /// <param name="queueName">A string representing the name of the queue
        /// to create.</param>
        /// <returns>A CreateQueueResponse that contains information about the
        /// newly created queue.</returns>
        public static async Task<CreateQueueResponse> CreateQueue(IAmazonSQS client,
string queueName)
        {
            var request = new CreateQueueRequest

```



```

        {
            QueueName = queueName,
            Attributes = new Dictionary<string, string>
            {
                { "DelaySeconds", "60" },
                { "MessageRetentionPeriod", "86400" },
            },
        };

        var response = await client.CreateQueueAsync(request);
        Console.WriteLine($"Created a queue with URL : {response.QueueUrl}");

        return response;
    }

    /// <summary>
    /// Sends a message to an SQS queue.
    /// </summary>
    /// <param name="client">An SQS client object used to send the message.</
param>
    /// <param name="queueUrl">The URL of the queue to which to send the
    /// message.</param>
    /// <param name="messageBody">A string representing the body of the
    /// message to be sent to the queue.</param>
    /// <param name="messageAttributes">Attributes for the message to be
    /// sent to the queue.</param>
    /// <returns>A SendMessageResponse object that contains information
    /// about the message that was sent.</returns>
    public static async Task<SendMessageResponse> SendMessage(
        IAmazonSQS client,
        string queueUrl,
        string messageBody,
        Dictionary<string, MessageAttributeValue> messageAttributes)
    {
        var sendMessageRequest = new SendMessageRequest
        {
            DelaySeconds = 10,
            MessageAttributes = messageAttributes,
            MessageBody = messageBody,
            QueueUrl = queueUrl,
        };

        var response = await client.SendMessageAsync(sendMessageRequest);
        Console.WriteLine($"Sent a message with id : {response.MessageId}");
    }

```

```
        return response;
    }
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [CreateQueue](#)。

DeleteMessage

以下程式碼範例顯示如何使用 DeleteMessage。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

從 Amazon SQS 佇列接收訊息，然後刪除訊息。

```
public static async Task Main()
{
    // If the AWS Region you want to use is different from
    // the AWS Region defined for the default user, supply
    // the specify your AWS Region to the client constructor.
    var client = new AmazonSQSClient();
    string queueName = "Example_Queue";

    var queueUrl = await GetQueueUrl(client, queueName);
    Console.WriteLine($"The SQS queue's URL is {queueUrl}");

    var response = await ReceiveAndDeleteMessage(client, queueUrl);

    Console.WriteLine($"Message: {response.Messages[0]}");
}

///
```

```

    /// </summary>
    /// <param name="client">The Amazon SQS client used to retrieve the
    /// queue URL.</param>
    /// <param name="queueName">A string representing name of the queue
    /// for which to retrieve the URL.</param>
    /// <returns>The URL of the queue.</returns>
    public static async Task<string> GetQueueUrl(IAmazonSQS client, string
queueName)
    {
        var request = new GetQueueUrlRequest
        {
            QueueName = queueName,
        };

        GetQueueUrlResponse response = await client.GetQueueUrlAsync(request);
        return response.QueueUrl;
    }

    /// <summary>
    /// Retrieves the message from the queue at the URL passed in the
    /// queueUrl parameters using the client.
    /// </summary>
    /// <param name="client">The SQS client used to retrieve a message.</param>
    /// <param name="queueUrl">The URL of the queue from which to retrieve
    /// a message.</param>
    /// <returns>The response from the call to ReceiveMessageAsync.</returns>
    public static async Task<ReceiveMessageResponse>
ReceiveAndDeleteMessage(IAmazonSQS client, string queueUrl)
    {
        // Receive a single message from the queue.
        var receiveMessageRequest = new ReceiveMessageRequest
        {
            AttributeNames = { "SentTimestamp" },
            MaxNumberOfMessages = 1,
            MessageAttributeNames = { "All" },
            QueueUrl = queueUrl,
            VisibilityTimeout = 0,
            WaitTimeSeconds = 0,
        };

        var receiveMessageResponse = await
client.ReceiveMessageAsync(receiveMessageRequest);

        // Delete the received message from the queue.

```

```

        var deleteMessageRequest = new DeleteMessageRequest
        {
            QueueUrl = queueUrl,
            ReceiptHandle = receiveMessageResponse.Messages[0].ReceiptHandle,
        };

        await client.DeleteMessageAsync(deleteMessageRequest);

        return receiveMessageResponse;
    }
}

```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [DeleteMessage](#)。

DeleteMessageBatch

以下程式碼範例顯示如何使用 DeleteMessageBatch。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```

/// <summary>
/// Delete a batch of messages from a queue by its url.
/// </summary>
/// <param name="queueUrl">The url of the queue.</param>
/// <returns>True if successful.</returns>
public async Task<bool> DeleteMessageBatchByUrl(string queueUrl, List<Message>
messages)
{
    var deleteRequest = new DeleteMessageBatchRequest()
    {
        QueueUrl = queueUrl,
        Entries = new List<DeleteMessageBatchRequestEntry>()
    };
    foreach (var message in messages)

```

```

        {
            deleteRequest.Entries.Add(new DeleteMessageBatchRequestEntry()
            {
                ReceiptHandle = message.ReceiptHandle,
                Id = message.MessageId
            });
        }

        var deleteResponse = await
            _amazonSQSClient.DeleteMessageBatchAsync(deleteRequest);

        return deleteResponse.Failed.Any();
    }

```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [DeleteMessageBatch](#)。

DeleteQueue

以下程式碼範例顯示如何使用 DeleteQueue。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

藉由使用佇列的 URL 刪除佇列。

```

/// <summary>
/// Delete a queue by its URL.
/// </summary>
/// <param name="queueUrl">The url of the queue.</param>
/// <returns>True if successful.</returns>
public async Task<bool> DeleteQueueByUrl(string queueUrl)
{
    var deleteResponse = await _amazonSQSClient.DeleteQueueAsync(
        new DeleteQueueRequest()
        {

```

```
        QueueUrl = queueUrl
    });
    return deleteResponse.HttpStatusCode == HttpStatusCode.OK;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [DeleteQueue](#)。

GetQueueAttributes

以下程式碼範例顯示如何使用 GetQueueAttributes。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Get the ARN for a queue from its URL.
/// </summary>
/// <param name="queueUrl">The URL of the queue.</param>
/// <returns>The ARN of the queue.</returns>
public async Task<string> GetQueueArnByUrl(string queueUrl)
{
    var getAttributesRequest = new GetQueueAttributesRequest()
    {
        QueueUrl = queueUrl,
        AttributeNames = new List<string>() { QueueAttributeName.QueueArn }
    };

    var getAttributesResponse = await _amazonSQSClient.GetQueueAttributesAsync(
        getAttributesRequest);

    return getAttributesResponse.QueueARN;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [GetQueueAttributes](#)。

GetQueueUrl

以下程式碼範例顯示如何使用 GetQueueUrl。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
using System;
using System.Threading.Tasks;
using Amazon.SQS;
using Amazon.SQS.Model;

public class GetQueueUrl
{
    /// <summary>
    /// Initializes the Amazon SQS client object and then calls the
    /// GetQueueUrlAsync method to retrieve the URL of an Amazon SQS
    /// queue.
    /// </summary>
    public static async Task Main()
    {
        // If the Amazon SQS message queue is not in the same AWS Region as your
        // default user, you need to provide the AWS Region as a parameter to
the
        // client constructor.
        var client = new AmazonSQSClient();

        string queueName = "New-Example-Queue";

        try
        {
            var response = await client.GetQueueUrlAsync(queueName);

            if (response.HttpStatusCode == System.Net.HttpStatusCode.OK)
            {
                Console.WriteLine($"The URL for {queueName} is:
{response.QueueUrl}");
            }
        }
    }
}
```

```

    }
    catch (QueueDoesNotExistException ex)
    {
        Console.WriteLine(ex.Message);
        Console.WriteLine($"The queue {queueName} was not found.");
    }
}
}

```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [GetQueueUrl](#)。

ReceiveMessage

以下程式碼範例顯示如何使用 ReceiveMessage。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

藉由使用佇列的 URL 接收來自佇列的訊息。

```

/// <summary>
/// Receive messages from a queue by its URL.
/// </summary>
/// <param name="queueUrl">The url of the queue.</param>
/// <returns>The list of messages.</returns>
public async Task<List<Message>> ReceiveMessagesByUrl(string queueUrl, int
maxMessages)
{
    // Setting WaitTimeSeconds to non-zero enables long polling.
    // For information about long polling, see
    // https://docs.aws.amazon.com/AWSSimpleQueueService/latest/
SQSDeveloperGuide/sqs-short-and-long-polling.html
    var messageResponse = await _amazonSQSClient.ReceiveMessageAsync(
        new ReceiveMessageRequest()
    {

```



```

        QueueUrl = queueUrl,
        MaxNumberOfMessages = maxMessages,
        WaitTimeSeconds = 1
    });
    return messageResponse.Messages;
}

```

從 Amazon SQS 佇列接收訊息，然後刪除訊息。

```

public static async Task Main()
{
    // If the AWS Region you want to use is different from
    // the AWS Region defined for the default user, supply
    // the specify your AWS Region to the client constructor.
    var client = new AmazonSQSClient();
    string queueName = "Example_Queue";

    var queueUrl = await GetQueueUrl(client, queueName);
    Console.WriteLine($"The SQS queue's URL is {queueUrl}");

    var response = await ReceiveAndDeleteMessage(client, queueUrl);

    Console.WriteLine($"Message: {response.Messages[0]}");
}

/// <summary>
/// Retrieve the queue URL for the queue named in the queueName
/// property using the client object.
/// </summary>
/// <param name="client">The Amazon SQS client used to retrieve the
/// queue URL.</param>
/// <param name="queueName">A string representing name of the queue
/// for which to retrieve the URL.</param>
/// <returns>The URL of the queue.</returns>
public static async Task<string> GetQueueUrl(IAmazonSQS client, string
queueName)
{
    var request = new GetQueueUrlRequest
    {
        QueueName = queueName,
    };
}

```

```

        GetQueueUrlResponse response = await client.GetQueueUrlAsync(request);
        return response.QueueUrl;
    }

    /// <summary>
    /// Retrieves the message from the quque at the URL passed in the
    /// queueURL parameters using the client.
    /// </summary>
    /// <param name="client">The SQS client used to retrieve a message.</param>
    /// <param name="queueUrl">The URL of the queue from which to retrieve
    /// a message.</param>
    /// <returns>The response from the call to ReceiveMessageAsync.</returns>
    public static async Task<ReceiveMessageResponse>
ReceiveAndDeleteMessage(IAmazonSQS client, string queueUrl)
    {
        // Receive a single message from the queue.
        var receiveMessageRequest = new ReceiveMessageRequest
        {
            AttributeNames = { "SentTimestamp" },
            MaxNumberOfMessages = 1,
            MessageAttributeNames = { "All" },
            QueueUrl = queueUrl,
            VisibilityTimeout = 0,
            WaitTimeSeconds = 0,
        };

        var receiveMessageResponse = await
client.ReceiveMessageAsync(receiveMessageRequest);

        // Delete the received message from the queue.
        var deleteMessageRequest = new DeleteMessageRequest
        {
            QueueUrl = queueUrl,
            ReceiptHandle = receiveMessageResponse.Messages[0].ReceiptHandle,
        };

        await client.DeleteMessageAsync(deleteMessageRequest);

        return receiveMessageResponse;
    }
}

```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [ReceiveMessage](#)。

SendMessage

以下程式碼範例顯示如何使用 SendMessage。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

建立 Amazon SQS 佇列並傳送訊息至該佇列。

```
using System;
using System.Collections.Generic;
using System.Threading.Tasks;
using Amazon;
using Amazon.SQS;
using Amazon.SQS.Model;

public class CreateSendExample
{
    // Specify your AWS Region (an example Region is shown).
    private static readonly string QueueName = "Example_Queue";
    private static readonly RegionEndpoint ServiceRegion =
RegionEndpoint.USWest2;
    private static IAmazonSQS client;

    public static async Task Main()
    {
        client = new AmazonSQSClient(ServiceRegion);
        var createQueueResponse = await CreateQueue(client, QueueName);

        string queueUrl = createQueueResponse.QueueUrl;

        Dictionary<string, MessageAttributeValue> messageAttributes = new
Dictionary<string, MessageAttributeValue>
        {
```

```

        { "Title",    new MessageAttributeValue { DataType = "String",
StringValue = "The Whistler" } },
        { "Author",  new MessageAttributeValue { DataType = "String",
StringValue = "John Grisham" } },
        { "WeeksOn", new MessageAttributeValue { DataType = "Number",
StringValue = "6" } },
    };

    string messageBody = "Information about current NY Times fiction
bestseller for week of 12/11/2016.";

    var sendMsgResponse = await SendMessage(client, queueUrl, messageBody,
messageAttributes);
    }

    /// <summary>
    /// Creates a new Amazon SQS queue using the queue name passed to it
    /// in queueName.
    /// </summary>
    /// <param name="client">An SQS client object used to send the message.</
param>
    /// <param name="queueName">A string representing the name of the queue
    /// to create.</param>
    /// <returns>A CreateQueueResponse that contains information about the
    /// newly created queue.</returns>
    public static async Task<CreateQueueResponse> CreateQueue(IAmazonSQS client,
string queueName)
    {
        var request = new CreateQueueRequest
        {
            QueueName = queueName,
            Attributes = new Dictionary<string, string>
            {
                { "DelaySeconds", "60" },
                { "MessageRetentionPeriod", "86400" },
            },
        };

        var response = await client.CreateQueueAsync(request);
        Console.WriteLine($"Created a queue with URL : {response.QueueUrl}");

        return response;
    }

```

```

    /// <summary>
    /// Sends a message to an SQS queue.
    /// </summary>
    /// <param name="client">An SQS client object used to send the message.</
param>
    /// <param name="queueUrl">The URL of the queue to which to send the
    /// message.</param>
    /// <param name="messageBody">A string representing the body of the
    /// message to be sent to the queue.</param>
    /// <param name="messageAttributes">Attributes for the message to be
    /// sent to the queue.</param>
    /// <returns>A SendMessageResponse object that contains information
    /// about the message that was sent.</returns>
    public static async Task<SendMessageResponse> SendMessage(
        IAmazonSQS client,
        string queueUrl,
        string messageBody,
        Dictionary<string, MessageAttributeValue> messageAttributes)
    {
        var sendMessageRequest = new SendMessageRequest
        {
            DelaySeconds = 10,
            MessageAttributes = messageAttributes,
            MessageBody = messageBody,
            QueueUrl = queueUrl,
        };

        var response = await client.SendMessageAsync(sendMessageRequest);
        Console.WriteLine($"Sent a message with id : {response.MessageId}");

        return response;
    }
}

```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [SendMessage](#)。

SetQueueAttributes

以下程式碼範例顯示如何使用 SetQueueAttributes。

適用於 .NET 的 SDK

 Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

設定主題佇列的政策屬性。

```

/// <summary>
/// Set the policy attribute of a queue for a topic.
/// </summary>
/// <param name="queueArn">The ARN of the queue.</param>
/// <param name="topicArn">The ARN of the topic.</param>
/// <param name="queueUrl">The url for the queue.</param>
/// <returns>True if successful.</returns>
public async Task<bool> SetQueuePolicyForTopic(string queueArn, string topicArn,
string queueUrl)
{
    var queuePolicy = "{" +
        "\"Version\": \"2012-10-17\", " +
        "\"Statement\": [{" +
            "\"Effect\": \"Allow\", " +
            "\"Principal\": { " +
                "\"Service\": " +
                    "\"sns.amazonaws.com\" " +
                "}, " +
            "\"Action\": \"sqs:SendMessage\", " +
            "\"Resource\": \"{queueArn}\", " +
            "\"Condition\": { " +
                "\"ArnEquals\": { " +
                    "\"aws:SourceArn\": \"{topicArn}\" " +
                " " +
            "}" +
        "}" +
    "}] " +
    "};

    var attributesResponse = await _amazonSQSClient.SetQueueAttributesAsync(
        new SetQueueAttributesRequest()
        {
            QueueUrl = queueUrl,

```

```
        Attributes = new Dictionary<string, string>() { { "Policy",  
queuePolicy } }  
    });  
    return attributesResponse.HttpStatusCode == HttpStatusCode.OK;  
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [SetQueueAttributes](#)。

案例

將訊息發佈至佇列

以下程式碼範例顯示做法：

- 建立主題 (FIFO 或非 FIFO)。
- 為主題訂閱多個佇列，並提供套用篩選條件的選擇。
- 發佈訊息至主題。
- 輪詢佇列以獲取收到的訊息。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

在命令提示中執行互動式案例。

```
/// <summary>  
/// Console application to run a feature scenario for topics and queues.  
/// </summary>  
public static class TopicsAndQueues  
{  
    private static bool _useFifoTopic = false;  
    private static bool _useContentBasedDeduplication = false;  
    private static string _topicName = null!;  
    private static string _topicArn = null!;
```

```

private static readonly int _queueCount = 2;
private static readonly string[] _queueUrls = new string[_queueCount];
private static readonly string[] _subscriptionArns = new string[_queueCount];
private static readonly string[] _tones = { "cheerful", "funny", "serious",
"sincere" };
public static SNSWrapper SnsWrapper { get; set; } = null!;
public static SQSWrapper SqsWrapper { get; set; } = null!;
public static bool UseConsole { get; set; } = true;
static async Task Main(string[] args)
{
    // Set up dependency injection for Amazon EventBridge.
    using var host = Host.CreateDefaultBuilder(args)
        .ConfigureLogging(logging =>
            logging.AddFilter("System", LogLevel.Debug)
                .AddFilter<DebugLoggerProvider>("Microsoft",
LogLevel.Information)
                    .AddFilter<ConsoleLoggerProvider>("Microsoft", LogLevel.Trace))
        .ConfigureServices((_, services) =>
            services.AddAWSService<IAmazonSQS>()
                .AddAWSService<IAmazonSimpleNotificationService>()
                .AddTransient<SNSWrapper>()
                .AddTransient<SQSWrapper>()
            )
        .Build();

    ServicesSetup(host);
    PrintDescription();

    await RunScenario();
}

/// <summary>
/// Populate the services for use within the console application.
/// </summary>
/// <param name="host">The services host.</param>
private static void ServicesSetup(IHost host)
{
    SnsWrapper = host.Services.GetRequiredService<SNSWrapper>();
    SqsWrapper = host.Services.GetRequiredService<SQSWrapper>();
}

/// <summary>
/// Run the scenario for working with topics and queues.

```



```
/// </summary>
/// <returns>True if successful.</returns>
public static async Task<bool> RunScenario()
{
    try
    {
        await SetupTopic();

        await SetupQueues();

        await PublishMessages();

        foreach (var queueUrl in _queueUrls)
        {
            var messages = await PollForMessages(queueUrl);
            if (messages.Any())
            {
                await DeleteMessages(queueUrl, messages);
            }
        }
        await CleanupResources();

        Console.WriteLine("Messaging with topics and queues scenario is
complete.");
        return true;
    }
    catch (Exception ex)
    {
        Console.WriteLine(new string('-', 80));
        Console.WriteLine($"There was a problem running the scenario:
{ex.Message}");
        await CleanupResources();
        Console.WriteLine(new string('-', 80));
        return false;
    }
}

/// <summary>
/// Print a description for the tasks in the scenario.
/// </summary>
/// <returns>Async task.</returns>
private static void PrintDescription()
{
    Console.WriteLine(new string('-', 80));
}
```

```

        Console.WriteLine($"Welcome to messaging with topics and queues.");

        Console.WriteLine(new string('-', 80));
        Console.WriteLine($"In this scenario, you will create an SNS topic and
subscribe {_queueCount} SQS queues to the topic." +
            $"\r\nYou can select from several options for configuring
the topic and the subscriptions for the 2 queues." +
            $"\r\nYou can then post to the topic and see the results
in the queues.\r\n");

        Console.WriteLine(new string('-', 80));
    }

    /// <summary>
    /// Set up the SNS topic to be used with the queues.
    /// </summary>
    /// <returns>Async task.</returns>
    private static async Task<string> SetupTopic()
    {
        Console.WriteLine(new string('-', 80));
        Console.WriteLine($"SNS topics can be configured as FIFO (First-In-First-
Out)." +
            $"\r\nFIFO topics deliver messages in order and support
deduplication and message filtering." +
            $"\r\nYou can then post to the topic and see the results
in the queues.\r\n");

        _useFifoTopic = GetYesNoResponse("Would you like to work with FIFO
topics?");

        if (_useFifoTopic)
        {
            Console.WriteLine(new string('-', 80));
            _topicName = GetUserResponse("Enter a name for your SNS topic: ",
"example-topic");
            Console.WriteLine(
                "Because you have selected a FIFO topic, '.fifo' must be appended to
the topic name.\r\n");

            Console.WriteLine(new string('-', 80));
            Console.WriteLine($"Because you have chosen a FIFO topic, deduplication
is supported." +
                $"\r\nDeduplication IDs are either set in the message
or automatically generated " +

```

```

        $"\\r\\nfrom content using a hash function.\\r\\n" +
        $"\\r\\nIf a message is successfully published to an SNS
FIFO topic, any message " +
        $"\\r\\npublished and determined to have the same
deduplication ID, " +
        $"\\r\\nwithin the five-minute deduplication interval,
is accepted but not delivered.\\r\\n" +
        $"\\r\\nFor more information about deduplication, " +
        $"\\r\\nsee https://docs.aws.amazon.com/sns/latest/dg/
fifo-message-dedup.html.");
    }

    _useContentBasedDeduplication = GetYesNoResponse("Use content-based
deduplication instead of entering a deduplication ID?");
    Console.WriteLine(new string('-', 80));
}

_topicArn = await SnsWrapper.CreateTopicWithName(_topicName, _useFifoTopic,
_useContentBasedDeduplication);

Console.WriteLine($"Your new topic with the name {_topicName}" +
    $"\\r\\nand Amazon Resource Name (ARN) {_topicArn}" +
    $"\\r\\nhas been created.\\r\\n");

Console.WriteLine(new string('-', 80));
return _topicArn;
}

/// <summary>
/// Set up the queues.
/// </summary>
/// <returns>Async task.</returns>
private static async Task SetupQueues()
{
    Console.WriteLine(new string('-', 80));
    Console.WriteLine($"Now you will create {_queueCount} Amazon Simple Queue
Service (Amazon SQS) queues to subscribe to the topic.");

    // Repeat this section for each queue.
    for (int i = 0; i < _queueCount; i++)
    {
        var queueName = GetUserResponse("Enter a name for an Amazon SQS queue:
", $"example-queue-{i}");
        if (_useFifoTopic)
        {

```

```

        // Only explain this once.
        if (i == 0)
        {
            Console.WriteLine(
                "Because you have selected a FIFO topic, '.fifo' must be
                appended to the queue name.");
        }

        var queueUrl = await SqsWrapper.CreateQueueWithName(queueName,
            _useFifoTopic);

        _queueUrls[i] = queueUrl;

        Console.WriteLine($"Your new queue with the name {queueName}" +
            $"{r\}nand queue URL {queueUrl}" +
            $"{r\}nhas been created.{r\}n");

        if (i == 0)
        {
            Console.WriteLine(
                $"The queue URL is used to retrieve the queue ARN,{r\}n" +
                $"which is used to create a subscription.");
            Console.WriteLine(new string('-', 80));
        }

        var queueArn = await SqsWrapper.GetQueueArnByUrl(queueUrl);

        if (i == 0)
        {
            Console.WriteLine(
                $"An AWS Identity and Access Management (IAM) policy must be
                attached to an SQS queue, enabling it to receive{r\}n" +
                $"messages from an SNS topic");
        }

        await SqsWrapper.SetQueuePolicyForTopic(queueArn, _topicArn,
            queueUrl);

        await SetupFilters(i, queueArn, queueName);
    }
}

Console.WriteLine(new string('-', 80));
}

```

```

    /// <summary>
    /// Set up filters with user options for a queue.
    /// </summary>
    /// <param name="queueCount">The number of this queue.</param>
    /// <param name="queueArn">The ARN of the queue.</param>
    /// <param name="queueName">The name of the queue.</param>
    /// <returns>Async Task.</returns>
    public static async Task SetupFilters(int queueCount, string queueArn, string
queueName)
    {
        if (_useFifoTopic)
        {
            Console.WriteLine(new string('-', 80));
            // Only explain this once.
            if (queueCount == 0)
            {
                Console.WriteLine(
                    "Subscriptions to a FIFO topic can have filters." +
                    "If you add a filter to this subscription, then only the
filtered messages " +
                    "will be received in the queue.");

                Console.WriteLine(
                    "For information about message filtering, " +
                    "see https://docs.aws.amazon.com/sns/latest/dg/sns-message-
filtering.html");

                Console.WriteLine(
                    "For this example, you can filter messages by a" +
                    "TONE attribute.");
            }

            var useFilter = GetYesNoResponse($"Filter messages for {queueName}'s
subscription to the topic?");

            string? filterPolicy = null;
            if (useFilter)
            {
                filterPolicy = CreateFilterPolicy();
            }
            var subscriptionArn = await
SnsWrapper.SubscribeTopicWithFilter(_topicArn, filterPolicy,
queueArn);

```

```

        _subscriptionArns[queueCount] = subscriptionArn;

        Console.WriteLine(
            $"The queue {queueName} has been subscribed to the topic
{_topicName} " +
            $"with the subscription ARN {subscriptionArn}");
        Console.WriteLine(new string('-', 80));
    }
}

/// <summary>
/// Use user input to create a filter policy for a subscription.
/// </summary>
/// <returns>The serialized filter policy.</returns>
public static string CreateFilterPolicy()
{
    Console.WriteLine(new string('-', 80));
    Console.WriteLine(
        $"You can filter messages by one or more of the following" +
        $"TONE attributes.");

    List<string> filterSelections = new List<string>();

    var selectionNumber = 0;
    do
    {
        Console.WriteLine(
            $"Enter a number to add a TONE filter, or enter 0 to stop adding
filters.");
        for (int i = 0; i < _tones.Length; i++)
        {
            Console.WriteLine($"\\t{i + 1}. {_tones[i]}");
        }

        var selection = GetUserResponse("", filterSelections.Any() ? "0" : "1");
        int.TryParse(selection, out selectionNumber);
        if (selectionNumber > 0 && !
filterSelections.Contains(_tones[selectionNumber - 1]))
        {
            filterSelections.Add(_tones[selectionNumber - 1]);
        }
    } while (selectionNumber != 0);

    var filters = new Dictionary<string, List<string>>

```

```

        {
            { "tone", filterSelections }
        };
        string filterPolicy = JsonSerializer.Serialize(filters);
        return filterPolicy;
    }

    /// <summary>
    /// Publish messages using user settings.
    /// </summary>
    /// <returns>Async task.</returns>
    public static async Task PublishMessages()
    {
        Console.WriteLine("Now we can publish messages.");

        var keepSendingMessages = true;
        string? deduplicationId = null;
        string? toneAttribute = null;
        while (keepSendingMessages)
        {
            Console.WriteLine();
            var message = GetUserResponse("Enter a message to publish.", "This is a sample message");

            if (_useFifoTopic)
            {
                Console.WriteLine("Because you are using a FIFO topic, you must set a message group ID." +
                                   "\r\nAll messages within the same group will be received in the order " +
                                   "they were published.");

                Console.WriteLine();
                var messageId = GetUserResponse("Enter a message group ID for this message:", "1");

                if (!_useContentBasedDeduplication)
                {
                    Console.WriteLine("Because you are not using content-based deduplication, " +
                                       "you must enter a deduplication ID.");

                    Console.WriteLine("Enter a deduplication ID for this message.");
                }
            }
        }
    }

```

```

        deduplicationId = GetUserResponse("Enter a deduplication ID for
this message.", "1");
    }

    if (GetYesNoResponse("Add an attribute to this message?"))
    {
        Console.WriteLine("Enter a number for an attribute.");
        for (int i = 0; i < _tones.Length; i++)
        {
            Console.WriteLine($"{i + 1}. {_tones[i]}");
        }

        var selection = GetUserResponse("", "1");
        int.TryParse(selection, out var selectionNumber);

        if (selectionNumber > 0 && selectionNumber < _tones.Length)
        {
            toneAttribute = _tones[selectionNumber - 1];
        }
    }

    var messageId = await SnsWrapper.PublishToTopicWithAttribute(
        _topicArn, message, "tone", toneAttribute, deduplicationId,
messageGroupId);

    Console.WriteLine($"Message published with id {messageID}.");
}

keepSendingMessages = GetYesNoResponse("Send another message?", false);
}
}

/// <summary>
/// Poll for the published messages to see the results of the user's choices.
/// </summary>
/// <returns>Async task.</returns>
public static async Task<List<Message>> PollForMessages(string queueUrl)
{
    Console.WriteLine(new string('-', 80));
    Console.WriteLine($"Now the SQS queue at {queueUrl} will be polled to
retrieve the messages." +
        "\r\nPress any key to continue.");
    if (UseConsole)
    {

```



```

        Console.ReadLine();
    }

    var moreMessages = true;
    var messages = new List<Message>();
    while (moreMessages)
    {
        var newMessages = await SqsWrapper.ReceiveMessagesByUrl(queueUrl, 10);

        moreMessages = newMessages.Any();
        if (moreMessages)
        {
            messages.AddRange(newMessages);
        }
    }

    Console.WriteLine($"{messages.Count} message(s) were received by the queue
at {queueUrl}.");

    foreach (var message in messages)
    {
        Console.WriteLine("\tMessage:" +
            $"{"\n\t{message.Body}"}");
    }

    Console.WriteLine(new string('-', 80));
    return messages;
}

/// <summary>
/// Delete the message using handles in a batch.
/// </summary>
/// <returns>Async task.</returns>
public static async Task DeleteMessages(string queueUrl, List<Message> messages)
{
    Console.WriteLine(new string('-', 80));
    Console.WriteLine("Now we can delete the messages in this queue in a
batch.");
    await SqsWrapper.DeleteMessageBatchByUrl(queueUrl, messages);
    Console.WriteLine(new string('-', 80));
}

/// <summary>
/// Clean up the resources from the scenario.

```

```
/// </summary>
/// <returns>Async task.</returns>
private static async Task CleanupResources()
{
    Console.WriteLine(new string('-', 80));
    Console.WriteLine($"Clean up resources.");

    try
    {
        foreach (var queueUrl in _queueUrls)
        {
            if (!string.IsNullOrEmpty(queueUrl))
            {
                var deleteQueue =
                    GetYesNoResponse($"Delete queue with url {queueUrl}?");
                if (deleteQueue)
                {
                    await SqsWrapper.DeleteQueueByUrl(queueUrl);
                }
            }
        }

        foreach (var subscriptionArn in _subscriptionArns)
        {
            if (!string.IsNullOrEmpty(subscriptionArn))
            {
                await SnsWrapper.UnsubscribeByArn(subscriptionArn);
            }
        }

        var deleteTopic = GetYesNoResponse($"Delete topic {_topicName}?");
        if (deleteTopic)
        {
            await SnsWrapper.DeleteTopicByArn(_topicArn);
        }
    }
    catch (Exception ex)
    {
        Console.WriteLine($"Unable to clean up resources. Here's why:
{ex.Message}.");
    }

    Console.WriteLine(new string('-', 80));
}
```

```

    /// <summary>
    /// Helper method to get a yes or no response from the user.
    /// </summary>
    /// <param name="question">The question string to print on the console.</param>
    /// <param name="defaultAnswer">Optional default answer to use.</param>
    /// <returns>True if the user responds with a yes.</returns>
    private static bool GetYesNoResponse(string question, bool defaultAnswer = true)
    {
        if (UseConsole)
        {
            Console.WriteLine(question);
            var ynResponse = Console.ReadLine();
            var response = ynResponse != null &&
                ynResponse.Equals("y",
                    StringComparison.InvariantCultureIgnoreCase);

            return response;
        }
        // If not using the console, use the default.
        return defaultAnswer;
    }

    /// <summary>
    /// Helper method to get a string response from the user through the console.
    /// </summary>
    /// <param name="question">The question string to print on the console.</param>
    /// <param name="defaultAnswer">Optional default answer to use.</param>
    /// <returns>True if the user responds with a yes.</returns>
    private static string GetUserResponse(string question, string defaultAnswer)
    {
        if (UseConsole)
        {
            var response = "";
            while (string.IsNullOrEmpty(response))
            {
                Console.WriteLine(question);
                response = Console.ReadLine();
            }
            return response;
        }
        // If not using the console, use the default.
        return defaultAnswer;
    }
}

```

建立包裝 Amazon SQS 操作的類別。

```
/// <summary>
/// Wrapper for Amazon Simple Queue Service (SQS) operations.
/// </summary>
public class SQSWrapper
{
    private readonly IAmazonSQS _amazonSQSClient;

    /// <summary>
    /// Constructor for the Amazon SQS wrapper.
    /// </summary>
    /// <param name="amazonSQS">The injected Amazon SQS client.</param>
    public SQSWrapper(IAmazonSQS amazonSQS)
    {
        _amazonSQSClient = amazonSQS;
    }

    /// <summary>
    /// Create a queue with a specific name.
    /// </summary>
    /// <param name="queueName">The name for the queue.</param>
    /// <param name="useFifoQueue">True to use a FIFO queue.</param>
    /// <returns>The url for the queue.</returns>
    public async Task<string> CreateQueueWithName(string queueName, bool
useFifoQueue)
    {
        int maxMessage = 256 * 1024;
        var queueAttributes = new Dictionary<string, string>
        {
            {
                QueueAttributeName.MaximumMessageSize,
                maxMessage.ToString()
            }
        };

        var createQueueRequest = new CreateQueueRequest()
        {
            QueueName = queueName,
            Attributes = queueAttributes
        }
    }
}
```

```

    };

    if (useFifoQueue)
    {
        // Update the name if it is not correct for a FIFO queue.
        if (!queueName.EndsWith(".fifo"))
        {
            createQueueRequest.QueueName = queueName + ".fifo";
        }

        // Add an attribute for a FIFO queue.
        createQueueRequest.Attributes.Add(
            QueueAttributeName.FifoQueue, "true");
    }

    var createResponse = await _amazonSQSClient.CreateQueueAsync(
        new CreateQueueRequest()
        {
            QueueName = queueName
        });
    return createResponse.QueueUrl;
}

/// <summary>
/// Get the ARN for a queue from its URL.
/// </summary>
/// <param name="queueUrl">The URL of the queue.</param>
/// <returns>The ARN of the queue.</returns>
public async Task<string> GetQueueArnByUrl(string queueUrl)
{
    var getAttributesRequest = new GetQueueAttributesRequest()
    {
        QueueUrl = queueUrl,
        AttributeNames = new List<string>() { QueueAttributeName.QueueArn }
    };

    var getAttributesResponse = await _amazonSQSClient.GetQueueAttributesAsync(
        getAttributesRequest);

    return getAttributesResponse.QueueARN;
}

/// <summary>
/// Set the policy attribute of a queue for a topic.

```

```

    /// </summary>
    /// <param name="queueArn">The ARN of the queue.</param>
    /// <param name="topicArn">The ARN of the topic.</param>
    /// <param name="queueUrl">The url for the queue.</param>
    /// <returns>True if successful.</returns>
    public async Task<bool> SetQueuePolicyForTopic(string queueArn, string topicArn,
string queueUrl)
    {
        var queuePolicy = "{" +
            "\"Version\": \"2012-10-17\"," +
            "\"Statement\": [{" +
                "\"Effect\": \"Allow\"," +
                "\"Principal\": {" +
                    "\"Service\": " +
                        "\"sns.amazonaws.com\"" +
                    "}," +
                "\"Action\": \"sqs:SendMessage\"," +
                "\"Resource\": \"{queueArn}\"," +
                "\"Condition\": {" +
                    "\"ArnEquals\": {" +
                        "\"aws:SourceArn\": \"{topicArn}\""
+
                    "}" +
                "}" +
            "}]}" +
            "};

        var attributesResponse = await _amazonSQSClient.SetQueueAttributesAsync(
            new SetQueueAttributesRequest()
            {
                QueueUrl = queueUrl,
                Attributes = new Dictionary<string, string>() { { "Policy",
queuePolicy } }
            });
        return attributesResponse.HttpStatusCode == HttpStatusCode.OK;
    }

    /// <summary>
    /// Receive messages from a queue by its URL.
    /// </summary>
    /// <param name="queueUrl">The url of the queue.</param>
    /// <returns>The list of messages.</returns>
    public async Task<List<Message>> ReceiveMessagesByUrl(string queueUrl, int
maxMessages)
    {

```

```

        // Setting WaitTimeSeconds to non-zero enables long polling.
        // For information about long polling, see
        // https://docs.aws.amazon.com/AWSSimpleQueueService/latest/
SQSDeveloperGuide/sqs-short-and-long-polling.html
        var messageResponse = await _amazonSQSClient.ReceiveMessageAsync(
            new ReceiveMessageRequest()
            {
                QueueUrl = queueUrl,
                MaxNumberOfMessages = maxMessages,
                WaitTimeSeconds = 1
            });
        return messageResponse.Messages;
    }

    /// <summary>
    /// Delete a batch of messages from a queue by its url.
    /// </summary>
    /// <param name="queueUrl">The url of the queue.</param>
    /// <returns>True if successful.</returns>
    public async Task<bool> DeleteMessageBatchByUrl(string queueUrl, List<Message>
messages)
    {
        var deleteRequest = new DeleteMessageBatchRequest()
        {
            QueueUrl = queueUrl,
            Entries = new List<DeleteMessageBatchRequestEntry>()
        };
        foreach (var message in messages)
        {
            deleteRequest.Entries.Add(new DeleteMessageBatchRequestEntry()
            {
                ReceiptHandle = message.ReceiptHandle,
                Id = message.MessageId
            });
        }

        var deleteResponse = await
_amazonSQSClient.DeleteMessageBatchAsync(deleteRequest);

        return deleteResponse.Failed.Any();
    }

    /// <summary>
    /// Delete a queue by its URL.

```

```

    /// </summary>
    /// <param name="queueUrl">The url of the queue.</param>
    /// <returns>True if successful.</returns>
    public async Task<bool> DeleteQueueByUrl(string queueUrl)
    {
        var deleteResponse = await _amazonSQSClient.DeleteQueueAsync(
            new DeleteQueueRequest()
            {
                QueueUrl = queueUrl
            });
        return deleteResponse.HttpStatusCode == HttpStatusCode.OK;
    }
}

```

建立包裝 Amazon SNS 操作的類別。

```

    /// <summary>
    /// Wrapper for Amazon Simple Notification Service (SNS) operations.
    /// </summary>
    public class SNSWrapper
    {
        private readonly IAmazonSimpleNotificationService _amazonSNSClient;

        /// <summary>
        /// Constructor for the Amazon SNS wrapper.
        /// </summary>
        /// <param name="amazonSQS">The injected Amazon SNS client.</param>
        public SNSWrapper(IAmazonSimpleNotificationService amazonSNS)
        {
            _amazonSNSClient = amazonSNS;
        }

        /// <summary>
        /// Create a new topic with a name and specific FIFO and de-duplication
        attributes.
        /// </summary>
        /// <param name="topicName">The name for the topic.</param>
        /// <param name="useFifoTopic">True to use a FIFO topic.</param>
        /// <param name="useContentBasedDeduplication">True to use content-based de-
        duplication.</param>
        /// <returns>The ARN of the new topic.</returns>
    }

```



```

    public async Task<string> CreateTopicWithName(string topicName, bool
useFifoTopic, bool useContentBasedDeduplication)
    {
        var createTopicRequest = new CreateTopicRequest()
        {
            Name = topicName,
        };

        if (useFifoTopic)
        {
            // Update the name if it is not correct for a FIFO topic.
            if (!topicName.EndsWith(".fifo"))
            {
                createTopicRequest.Name = topicName + ".fifo";
            }

            // Add the attributes from the method parameters.
            createTopicRequest.Attributes = new Dictionary<string, string>
            {
                { "FifoTopic", "true" }
            };
            if (useContentBasedDeduplication)
            {
                createTopicRequest.Attributes.Add("ContentBasedDeduplication",
"true");
            }
        }

        var createResponse = await
_amazonSNSClient.CreateTopicAsync(createTopicRequest);
        return createResponse.TopicArn;
    }

    /// <summary>
    /// Subscribe a queue to a topic with optional filters.
    /// </summary>
    /// <param name="topicArn">The ARN of the topic.</param>
    /// <param name="useFifoTopic">The optional filtering policy for the
subscription.</param>
    /// <param name="queueArn">The ARN of the queue.</param>
    /// <returns>The ARN of the new subscription.</returns>
    public async Task<string> SubscribeTopicWithFilter(string topicArn, string?
filterPolicy, string queueArn)
    {

```

```

        var subscribeRequest = new SubscribeRequest()
        {
            TopicArn = topicArn,
            Protocol = "sqs",
            Endpoint = queueArn
        };

        if (!string.IsNullOrEmpty(filterPolicy))
        {
            subscribeRequest.Attributes = new Dictionary<string, string>
            { { "FilterPolicy", filterPolicy } };
        }

        var subscribeResponse = await
        _amazonSNSClient.SubscribeAsync(subscribeRequest);
        return subscribeResponse.SubscriptionArn;
    }

    /// <summary>
    /// Publish a message to a topic with an attribute and optional deduplication
    and group IDs.
    /// </summary>
    /// <param name="topicArn">The ARN of the topic.</param>
    /// <param name="message">The message to publish.</param>
    /// <param name="attributeName">The optional attribute for the message.</param>
    /// <param name="attributeValue">The optional attribute value for the message.</
param>
    /// <param name="deduplicationId">The optional deduplication ID for the
message.</param>
    /// <param name="groupId">The optional group ID for the message.</param>
    /// <returns>The ID of the message published.</returns>
    public async Task<string> PublishToTopicWithAttribute(
        string topicArn,
        string message,
        string? attributeName = null,
        string? attributeValue = null,
        string? deduplicationId = null,
        string? groupId = null)
    {
        var publishRequest = new PublishRequest()
        {
            TopicArn = topicArn,
            Message = message,
            MessageDeduplicationId = deduplicationId,

```

```

        MessageGroupId = groupId
    };

    if (attributeValue != null)
    {
        // Add the string attribute if it exists.
        publishRequest.MessageAttributes =
            new Dictionary<string, MessageAttributeValue>
            {
                { attributeName!, new MessageAttributeValue() { StringValue =
attributeValue, DataType = "String" } }
            };
    }

    var publishResponse = await _amazonSNSClient.PublishAsync(publishRequest);
    return publishResponse.MessageId;
}

/// <summary>
/// Unsubscribe from a topic by a subscription ARN.
/// </summary>
/// <param name="subscriptionArn">The ARN of the subscription.</param>
/// <returns>True if successful.</returns>
public async Task<bool> UnsubscribeByArn(string subscriptionArn)
{
    var unsubscribeResponse = await _amazonSNSClient.UnsubscribeAsync(
        new UnsubscribeRequest()
        {
            SubscriptionArn = subscriptionArn
        });
    return unsubscribeResponse.HttpStatusCode == HttpStatusCode.OK;
}

/// <summary>
/// Delete a topic by its topic ARN.
/// </summary>
/// <param name="topicArn">The ARN of the topic.</param>
/// <returns>True if successful.</returns>
public async Task<bool> DeleteTopicByArn(string topicArn)
{
    var deleteResponse = await _amazonSNSClient.DeleteTopicAsync(
        new DeleteTopicRequest()
        {

```

```
        TopicArn = topicArn
    });
    return deleteResponse.HttpStatusCode == HttpStatusCode.OK;
}
}
```

• 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的下列主題。

- [CreateQueue](#)
- [CreateTopic](#)
- [DeleteMessageBatch](#)
- [DeleteQueue](#)
- [DeleteTopic](#)
- [GetQueueAttributes](#)
- [發布](#)
- [ReceiveMessage](#)
- [SetQueueAttributes](#)
- [Subscribe](#)
- [Unsubscribe](#)

使用適用於 .NET AWS 的訊息處理架構搭配 Amazon SQS

下列程式碼範例示範如何使用適用於 .NET 的訊息處理架構，建立發佈和接收 Amazon SQS AWS 訊息的應用程式。

適用於 .NET 的 SDK

提供適用於 .NET AWS 的訊息處理架構教學課程。本教學課程會建立 Web 應用程式，允許使用者發佈 Amazon SQS 訊息，並會建立接收訊息的命令列應用程式。

如需有關如何設定和執行的完整原始程式碼和指示，請參閱《適用於 .NET 的 AWS SDK 開發人員指南》中的[完整教學](#)課程和 [GitHub](#) 上的範例。

此範例中使用的服務

- Amazon SQS

無伺服器範例

使用 Amazon SQS 觸發條件調用 Lambda 函數

下列程式碼範例示範如何實作 Lambda 函式，該函式會透過接收 SQS 佇列的訊息來接收所觸發的事件。函數會從事件參數擷取訊息，並記錄每一則訊息的內容。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在[無伺服器範例](#)儲存庫中設定和執行。

使用 .NET 搭配 Lambda 來使用 SQS 事件。

```
// Copyright Amazon.com, Inc. or its affiliates. All Rights Reserved.
// SPDX-License-Identifier: Apache-2.0
using Amazon.Lambda.Core;
using Amazon.Lambda.SQSEvents;

// Assembly attribute to enable the Lambda function's JSON input to be converted
// into a .NET class.
[assembly:
    LambdaSerializer(typeof(Amazon.Lambda.Serialization.SystemTextJson.DefaultLambdaJsonSerializer))]

namespace SqsIntegrationSampleCode
{
    public async Task FunctionHandler(SQSEvent evnt, ILambdaContext context)
    {
        foreach (var message in evnt.Records)
        {
            await ProcessMessageAsync(message, context);
        }

        context.Logger.LogInformation("done");
    }

    private async Task ProcessMessageAsync(SQSEvent.SQSMessage message,
        ILambdaContext context)
```

```
{
    try
    {
        context.Logger.LogInformation($"Processed message {message.Body}");

        // TODO: Do interesting work based on the new message
        await Task.CompletedTask;
    }
    catch (Exception e)
    {
        //You can use Dead Letter Queue to handle failures. By configuring a
        Lambda DLQ.
        context.Logger.LogError($"An error occurred");
        throw;
    }
}
```

使用 Amazon SQS 觸發條件報告 Lambda 函數的批次項目失敗

下列程式碼範例示範如何為接收從 SQS 佇列接收事件的 Lambda 函式，實作部分批次回應。此函數會在回應中報告批次項目失敗，指示 Lambda 稍後重試這些訊息。

適用於 .NET 的 SDK

 Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在[無伺服器範例](#)儲存庫中設定和執行。

使用 .NET 搭配 Lambda 報告 SQS 批次項目失敗。

```
// Copyright Amazon.com, Inc. or its affiliates. All Rights Reserved.
// SPDX-License-Identifier: Apache-2.0
using Amazon.Lambda.Core;
using Amazon.Lambda.SQSEvents;

// Assembly attribute to enable the Lambda function's JSON input to be converted
into a .NET class.
```

```
[assembly:
    LambdaSerializer(typeof(Amazon.Lambda.Serialization.SystemTextJson.DefaultLambdaJsonSerializer))]
namespace sqsSample;

public class Function
{
    public async Task<SQSBatchResponse> FunctionHandler(SQSEvent evnt,
        ILambdaContext context)
    {
        List<SQSBatchResponse.BatchItemFailure> batchItemFailures = new
        List<SQSBatchResponse.BatchItemFailure>();
        foreach(var message in evnt.Records)
        {
            try
            {
                //process your message
                await ProcessMessageAsync(message, context);
            }
            catch (System.Exception)
            {
                //Add failed message identifier to the batchItemFailures list
                batchItemFailures.Add(new
                SQSBatchResponse.BatchItemFailure{ItemIdentifier=message.MessageId});
            }
        }
        return new SQSBatchResponse(batchItemFailures);
    }

    private async Task ProcessMessageAsync(SQSEvent.SQSMessage message,
        ILambdaContext context)
    {
        if (String.IsNullOrEmpty(message.Body))
        {
            throw new Exception("No Body in SQS Message.");
        }
        context.Logger.LogInformation($"Processed message {message.Body}");
        // TODO: Do interesting work based on the new message
        await Task.CompletedTask;
    }
}
```

使用的 Step Functions 範例 適用於 .NET 的 SDK

下列程式碼範例示範如何使用 適用於 .NET 的 AWS SDK 搭配 Step Functions 來執行動作和實作常見案例。

基本概念是程式碼範例，這些範例說明如何在服務內執行基本操作。

Actions 是大型程式的程式碼摘錄，必須在內容中執行。雖然動作會告訴您如何呼叫個別服務函數，但您可以在其相關情境中查看內容中的動作。

每個範例均包含完整原始碼的連結，您可在連結中找到如何設定和執行內容中程式碼的相關指示。

主題

- [開始使用](#)
- [基本概念](#)
- [動作](#)

開始使用

Hello Step Functions

下列程式碼範例示範如何開始使用 Step Functions。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
namespace StepFunctionsActions;

using Amazon.StepFunctions;
using Amazon.StepFunctions.Model;

public class HelloStepFunctions
{
```



```
static async Task Main()
{
    var stepFunctionsClient = new AmazonStepFunctionsClient();

    Console.Clear();
    Console.WriteLine("Welcome to AWS Step Functions");
    Console.WriteLine("Let's list up to 10 of your state machines:");
    var stateMachineListRequest = new ListStateMachinesRequest { MaxResults =
10 };

    // Get information for up to 10 Step Functions state machines.
    var response = await
stepFunctionsClient.ListStateMachinesAsync(stateMachineListRequest);

    if (response.StateMachines.Count > 0)
    {
        response.StateMachines.ForEach(stateMachine =>
        {
            Console.WriteLine($"State Machine Name: {stateMachine.Name}\tAmazon
Resource Name (ARN): {stateMachine.StateMachineArn}");
        });
    }
    else
    {
        Console.WriteLine("\tNo state machines were found.");
    }
}
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [ListStateMachines](#)。

基本概念

了解基本概念

以下程式碼範例顯示做法：

- 建立活動。
- 從 Amazon States Language 定義建立狀態機器，其中包含先前建立的活動步驟。
- 執行狀態機器，並使用使用者輸入回應活動。

- 在執行完成後取得最終狀態和輸出，然後清除資源。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

在命令提示中執行互動式案例。

```
global using System.Text.Json;
global using Amazon.StepFunctions;
global using Microsoft.Extensions.Configuration;
global using Microsoft.Extensions.DependencyInjection;
global using Microsoft.Extensions.Hosting;
global using Microsoft.Extensions.Logging;
global using Microsoft.Extensions.Logging.Console;
global using Microsoft.Extensions.Logging.Debug;
global using StepFunctionsActions;
global using LogLevel = Microsoft.Extensions.Logging.LogLevel;

using Amazon.IdentityManagement;
using Amazon.IdentityManagement.Model;
using Amazon.StepFunctions.Model;

namespace StepFunctionsBasics;

public class StepFunctionsBasics
{
    private static ILogger _logger = null!;
    private static IConfigurationRoot _configuration = null!;
    private static IAmazonIdentityManagementService _iamService = null!;

    static async Task Main(string[] args)
    {
        // Set up dependency injection for AWS Step Functions.
        using var host = Host.CreateDefaultBuilder(args)
            .ConfigureLogging(logging =>
```

```

        logging.AddFilter("System", LogLevel.Debug)
            .AddFilter<DebugLoggerProvider>("Microsoft",
LogLevel.Information)
            .AddFilter<ConsoleLoggerProvider>("Microsoft", LogLevel.Trace))
        .ConfigureServices((_, services) =>
            services.AddAWSService<IAmazonStepFunctions>()
                .AddAWSService<IAmazonIdentityManagementService>()
                .AddTransient<StepFunctionsWrapper>()
        )
        .Build();

_logger = LoggerFactory.Create(builder => { builder.AddConsole(); })
    .CreateLogger<StepFunctionsBasics>();

// Load configuration settings.
_configuration = new ConfigurationBuilder()
    .SetBasePath(Directory.GetCurrentDirectory())
    .AddJsonFile("settings.json") // Load test settings from .json file.
    .AddJsonFile("settings.local.json",
        true) // Optionally load local settings.
    .Build();

var activityName = _configuration["ActivityName"];
var stateMachineName = _configuration["StateMachineName"];

var roleName = _configuration["RoleName"];
var repoBaseDir = _configuration["RepoBaseDir"];
var jsonFilePath = _configuration["JsonFilePath"];
var jsonFileName = _configuration["JsonFileName"];

var uiMethods = new UiMethods();
var stepFunctionsWrapper =
host.Services.GetRequiredService<StepFunctionsWrapper>();

_iamService =
host.Services.GetRequiredService<IAmazonIdentityManagementService>();

// Load definition for the state machine from a JSON file.
var stateDefinitionJson = File.ReadAllText($"{repoBaseDir}{jsonFilePath}
{jsonFileName}");

Console.Clear();
uiMethods.DisplayOverview();
uiMethods.PressEnter();

```

```
uiMethods.DisplayTitle("Create activity");
Console.WriteLine("Let's start by creating an activity.");
string activityArn;
string stateMachineArn;

// Check to see if the activity already exists.
var activityList = await stepFunctionsWrapper.ListActivitiesAsync();
var existingActivity = activityList.FirstOrDefault(activity => activity.Name
== activityName);
if (existingActivity is not null)
{
    activityArn = existingActivity.ActivityArn;
    Console.WriteLine($"Activity, {activityName}, already exists.");
}
else
{
    activityArn = await stepFunctionsWrapper.CreateActivity(activityName);
}

// Swap the placeholder in the JSON file with the Amazon Resource Name (ARN)
// of the recently created activity.
var stateDefinition =
stateDefinitionJson.Replace($"{{DOC_EXAMPLE_ACTIVITY_ARN}}", activityArn);

uiMethods.DisplayTitle("Create state machine");
Console.WriteLine("Now we'll create a state machine.");

// Find or create an IAM role that can be assumed by Step Functions.
var role = await GetOrCreateStateMachineRole(roleName);

// See if the state machine already exists.
var stateMachineList = await stepFunctionsWrapper.ListStateMachinesAsync();
var existingStateMachine =
    stateMachineList.FirstOrDefault(stateMachine => stateMachine.Name ==
stateMachineName);
if (existingStateMachine is not null)
{
    Console.WriteLine($"State machine, {stateMachineName}, already
exists.");
    stateMachineArn = existingStateMachine.StateMachineArn;
}
else
{
```

```
        // Create the state machine.
        stateMachineArn =
            await stepFunctionsWrapper.CreateStateMachine(stateMachineName,
stateDefinition, role.Arn);
        uiMethods.PressEnter();
    }

    Console.WriteLine("The state machine has been created.");
    var describeStateMachineResponse = await
stepFunctionsWrapper.DescribeStateMachineAsync(stateMachineArn);

Console.WriteLine($"{describeStateMachineResponse.Name}\t{describeStateMachineResponse.Stat
    Console.WriteLine($"Current status: {describeStateMachineResponse.Status}");
    Console.WriteLine($"Amazon Resource Name (ARN) of the role assumed by the
state machine: {describeStateMachineResponse.RoleArn}");

    var userName = string.Empty;
    Console.Write("Before we start the state machine, tell me what should
ChatSFN call you? ");
    userName = Console.ReadLine();

    // Keep asking until the user enters a string value.
    while (string.IsNullOrEmpty(userName))
    {
        Console.Write("Enter your name: ");
        userName = Console.ReadLine();
    }

    var executionJson = @"{"name": "" + userName + @""}";

    // Start the state machine execution.
    Console.WriteLine("Now we'll start execution of the state machine.");
    var executionArn = await
stepFunctionsWrapper.StartExecutionAsync(executionJson, stateMachineArn);
    Console.WriteLine("State machine started.");

    Console.WriteLine($"Thank you, {userName}. Now let's get started...");
    uiMethods.PressEnter();

    uiMethods.DisplayTitle("ChatSFN");

    var isDone = false;
    var response = new GetActivityTaskResponse();
```

```

var taskToken = string.Empty;
var userChoice = string.Empty;

while (!isDone)
{
    response = await stepFunctionsWrapper.GetActivityTaskAsync(activityArn,
"MvpWorker");
    taskToken = response.TaskToken;

    // Parse the returned JSON string.
    var taskJsonResponse = JsonDocument.Parse(response.Input);
    var taskJsonObject = taskJsonResponse.RootElement;
    var message = taskJsonObject.GetProperty("message").GetString();
    var actions =
taskJsonObject.GetProperty("actions").EnumerateArray().Select(x =>
x.ToString()).ToList();
    Console.WriteLine($"\\n{message}\\n");

    // Prompt the user for another choice.
    Console.WriteLine("ChatSFN: What would you like me to do?");
    actions.ForEach(action => Console.WriteLine($"\\t{action}"));
    Console.Write($"\\n{userName}, tell me your choice: ");
    userChoice = Console.ReadLine();
    if (userChoice?.ToLower() == "done")
    {
        isDone = true;
    }

    Console.WriteLine($"You have selected: {userChoice}");
    var jsonResponse = @"{""action"": "" + userChoice + @""""}";

    await stepFunctionsWrapper.SendTaskSuccessAsync(taskToken,
jsonResponse);
}

await stepFunctionsWrapper.StopExecution(executionArn);
Console.WriteLine("Now we will wait for the execution to stop.");
DescribeExecutionResponse executionResponse;
do
{
    executionResponse = await
stepFunctionsWrapper.DescribeExecutionAsync(executionArn);
} while (executionResponse.Status == ExecutionStatus.RUNNING);

```

```

        Console.WriteLine("State machine stopped.");
        uiMethods.PressEnter();

        uiMethods.DisplayTitle("State machine executions");
        Console.WriteLine("Now let's take a look at the execution values for the
state machine.");

        // List the executions.
        var executions = await
stepFunctionsWrapper.ListExecutionsAsync(stateMachineArn);

        uiMethods.DisplayTitle("Step function execution values");
        executions.ForEach(execution =>
        {
            Console.WriteLine($"{execution.Name}\t{execution.StartDate} to
{execution.StopDate}");
        });

        uiMethods.PressEnter();

        // Now delete the state machine and the activity.
        uiMethods.DisplayTitle("Clean up resources");
        Console.WriteLine("Deleting the state machine...");

        await stepFunctionsWrapper.DeleteStateMachine(stateMachineArn);
        Console.WriteLine("State machine deleted.");

        Console.WriteLine("Deleting the activity...");
        await stepFunctionsWrapper.DeleteActivity(activityArn);
        Console.WriteLine("Activity deleted.");

        Console.WriteLine("The Amazon Step Functions scenario is now complete.");
    }

    static async Task<Role> GetOrCreateStateMachineRole(string roleName)
    {
        // Define the policy document for the role.
        var stateMachineRolePolicy = @"{
            ""Version"": ""2012-10-17"",
            ""Statement"": [{
                ""Sid"": "",
                ""Effect"": ""Allow"",
                ""Principal"": {
                    ""Service"": ""states.amazonaws.com""},

```

```

        ""Action"": ""sts:AssumeRole""}}]";

    var role = new Role();
    var roleExists = false;

    try
    {
        var getRoleResponse = await _iamService.GetRoleAsync(new GetRoleRequest
        { RoleName = roleName });
        roleExists = true;
        role = getRoleResponse.Role;
    }
    catch (NoSuchEntityException)
    {
        // The role doesn't exist. Create it.
        Console.WriteLine($"Role, {roleName} doesn't exist. Creating it...");
    }

    if (!roleExists)
    {
        var request = new CreateRoleRequest
        {
            RoleName = roleName,
            AssumeRolePolicyDocument = stateMachineRolePolicy,
        };

        var createRoleResponse = await _iamService.CreateRoleAsync(request);
        role = createRoleResponse.Role;
    }

    return role;
}

namespace StepFunctionsBasics;

/// <summary>
/// Some useful methods to make screen display easier.
/// </summary>
public class UiMethods
{
    private readonly string _sepBar = new('-', Console.WindowWidth);

```



```

/// <summary>
/// Show information about the scenario.
/// </summary>
public void DisplayOverview()
{
    Console.Clear();
    DisplayTitle("Welcome to the AWS Step Functions Demo");

    Console.WriteLine("This example application will do the following:");
    Console.WriteLine("\t 1. Create an activity.");
    Console.WriteLine("\t 2. Create a state machine.");
    Console.WriteLine("\t 3. Start an execution.");
    Console.WriteLine("\t 4. Run the worker, then stop it.");
    Console.WriteLine("\t 5. List executions.");
    Console.WriteLine("\t 6. Clean up the resources created for the example.");
}

/// <summary>
/// Display a message and wait until the user presses enter.
/// </summary>
public void PressEnter()
{
    Console.Write("\nPress <Enter> to continue.");
    _ = Console.ReadLine();
}

/// <summary>
/// Pad a string with spaces to center it on the console display.
/// </summary>
/// <param name="strToCenter"></param>
/// <returns></returns>
private string CenterString(string strToCenter)
{
    var padAmount = (Console.WindowWidth - strToCenter.Length) / 2;
    var leftPad = new string(' ', padAmount);
    return $"{leftPad}{strToCenter}";
}

/// <summary>
/// Display a line of hyphens, the centered text of the title, and another
/// line of hyphens.
/// </summary>
/// <param name="strTitle">The string to be displayed.</param>
public void DisplayTitle(string strTitle)

```

```
{
    Console.WriteLine(_sepBar);
    Console.WriteLine(CenterString(strTitle));
    Console.WriteLine(_sepBar);
}
}
```

定義包裝狀態機器和活動動作的類別。

```
namespace StepFunctionsActions;

using Amazon.StepFunctions;
using Amazon.StepFunctions.Model;

/// <summary>
/// Wrapper that performs AWS Step Functions actions.
/// </summary>
public class StepFunctionsWrapper
{
    private readonly IAmazonStepFunctions _amazonStepFunctions;

    /// <summary>
    /// The constructor for the StepFunctionsWrapper. Initializes the
    /// client object passed to it.
    /// </summary>
    /// <param name="amazonStepFunctions">An initialized Step Functions client
    object.</param>
    public StepFunctionsWrapper(IAmazonStepFunctions amazonStepFunctions)
    {
        _amazonStepFunctions = amazonStepFunctions;
    }

    /// <summary>
    /// Create a Step Functions activity using the supplied name.
    /// </summary>
    /// <param name="activityName">The name for the new Step Functions activity.</
    param>
    /// <returns>The Amazon Resource Name (ARN) for the new activity.</returns>
    public async Task<string> CreateActivity(string activityName)
    {
```

```

        var response = await _amazonStepFunctions.CreateActivityAsync(new
CreateActivityRequest { Name = activityName });
        return response.ActivityArn;
    }

    /// <summary>
    /// Create a Step Functions state machine.
    /// </summary>
    /// <param name="stateMachineName">Name for the new Step Functions state
    /// machine.</param>
    /// <param name="definition">A JSON string that defines the Step Functions
    /// state machine.</param>
    /// <param name="roleArn">The Amazon Resource Name (ARN) of the role.</param>
    /// <returns></returns>
    public async Task<string> CreateStateMachine(string stateMachineName, string
definition, string roleArn)
    {
        var request = new CreateStateMachineRequest
        {
            Name = stateMachineName,
            Definition = definition,
            RoleArn = roleArn
        };

        var response =
            await _amazonStepFunctions.CreateStateMachineAsync(request);
        return response.StateMachineArn;
    }

    /// <summary>
    /// Delete a Step Machine activity.
    /// </summary>
    /// <param name="activityArn">The Amazon Resource Name (ARN) of
    /// the activity.</param>
    /// <returns>A Boolean value indicating the success of the action.</returns>
    public async Task<bool> DeleteActivity(string activityArn)
    {
        var response = await _amazonStepFunctions.DeleteActivityAsync(new
DeleteActivityRequest { ActivityArn = activityArn });
        return response.HttpStatusCode == System.Net.HttpStatusCode.OK;
    }

```

```
/// <summary>
/// Delete a Step Functions state machine.
/// </summary>
/// <param name="stateMachineArn">The Amazon Resource Name (ARN) of the
/// state machine.</param>
/// <returns>A Boolean value indicating the success of the action.</returns>
public async Task<bool> DeleteStateMachine(string stateMachineArn)
{
    var response = await _amazonStepFunctions.DeleteStateMachineAsync(new
DeleteStateMachineRequest
    { StateMachineArn = stateMachineArn });
    return response.HttpStatusCode == System.Net.HttpStatusCode.OK;
}

/// <summary>
/// Retrieve information about the specified Step Functions execution.
/// </summary>
/// <param name="executionArn">The Amazon Resource Name (ARN) of the
/// Step Functions execution.</param>
/// <returns>The API response returned by the API.</returns>
public async Task<DescribeExecutionResponse> DescribeExecutionAsync(string
executionArn)
{
    var response = await _amazonStepFunctions.DescribeExecutionAsync(new
DescribeExecutionRequest { ExecutionArn = executionArn });
    return response;
}

/// <summary>
/// Retrieve information about the specified Step Functions state machine.
/// </summary>
/// <param name="StateMachineArn">The Amazon Resource Name (ARN) of the
/// Step Functions state machine to retrieve.</param>
/// <returns>Information about the specified Step Functions state machine.</
returns>
public async Task<DescribeStateMachineResponse> DescribeStateMachineAsync(string
StateMachineArn)
{
    var response = await _amazonStepFunctions.DescribeStateMachineAsync(new
DescribeStateMachineRequest { StateMachineArn = StateMachineArn });
    return response;
}
```

```
}

/// <summary>
/// Retrieve a task with the specified Step Functions activity
/// with the specified Amazon Resource Name (ARN).
/// </summary>
/// <param name="activityArn">The Amazon Resource Name (ARN) of
/// the Step Functions activity.</param>
/// <param name="workerName">The name of the Step Functions worker.</param>
/// <returns>The response from the Step Functions activity.</returns>
public async Task<GetActivityTaskResponse> GetActivityTaskAsync(string
activityArn, string workerName)
{
    var response = await _amazonStepFunctions.GetActivityTaskAsync(new
GetActivityTaskRequest
    { ActivityArn = activityArn, WorkerName = workerName });
    return response;
}

/// <summary>
/// List the Step Functions activities for the current account.
/// </summary>
/// <returns>A list of ActivityListItem.</returns>
public async Task<List<ActivityListItem>> ListActivitiesAsync()
{
    var request = new ListActivitiesRequest();
    var activities = new List<ActivityListItem>();

    do
    {
        var response = await _amazonStepFunctions.ListActivitiesAsync(request);

        if (response.NextToken is not null)
        {
            request.NextToken = response.NextToken;
        }

        activities.AddRange(response.Activities);
    }
    while (request.NextToken is not null);

    return activities;
}
```

```

    }

    /// <summary>
    /// Retrieve information about executions of a Step Functions
    /// state machine.
    /// </summary>
    /// <param name="stateMachineArn">The Amazon Resource Name (ARN) of the
    /// Step Functions state machine.</param>
    /// <returns>A list of ExecutionListItem objects.</returns>
    public async Task<List<ExecutionListItem>> ListExecutionsAsync(string
stateMachineArn)
    {
        var executions = new List<ExecutionListItem>();
        ListExecutionsResponse response;
        var request = new ListExecutionsRequest { StateMachineArn =
stateMachineArn };

        do
        {
            response = await _amazonStepFunctions.ListExecutionsAsync(request);
            executions.AddRange(response.Executions);
            if (response.NextToken is not null)
            {
                request.NextToken = response.NextToken;
            }
        } while (response.NextToken is not null);

        return executions;
    }

    /// <summary>
    /// Retrieve a list of Step Functions state machines.
    /// </summary>
    /// <returns>A list of StateMachineListItem objects.</returns>
    public async Task<List<StateMachineListItem>> ListStateMachinesAsync()
    {
        var stateMachines = new List<StateMachineListItem>();
        var listStateMachinesPaginator =
            _amazonStepFunctions.Paginators.ListStateMachines(new
ListStateMachinesRequest());

        await foreach (var response in listStateMachinesPaginator.Responses)

```

```

        {
            stateMachines.AddRange(response.StateMachines);
        }

        return stateMachines;
    }

    /// <summary>
    /// Indicate that the Step Functions task, indicated by the
    /// task token, has completed successfully.
    /// </summary>
    /// <param name="taskToken">Identifies the task.</param>
    /// <param name="taskResponse">The response received from executing the task.</
param>
    /// <returns>A Boolean value indicating the success of the action.</returns>
    public async Task<bool> SendTaskSuccessAsync(string taskToken, string
taskResponse)
    {
        var response = await _amazonStepFunctions.SendTaskSuccessAsync(new
SendTaskSuccessRequest
        { TaskToken = taskToken, Output = taskResponse });

        return response.HttpStatusCode == System.Net.HttpStatusCode.OK;
    }

    /// <summary>
    /// Start execution of an AWS Step Functions state machine.
    /// </summary>
    /// <param name="executionName">The name to use for the execution.</param>
    /// <param name="executionJson">The JSON string to pass for execution.</param>
    /// <param name="stateMachineArn">The Amazon Resource Name (ARN) of the
    /// Step Functions state machine.</param>
    /// <returns>The Amazon Resource Name (ARN) of the AWS Step Functions
    /// execution.</returns>
    public async Task<string> StartExecutionAsync(string executionJson, string
stateMachineArn)
    {
        var executionRequest = new StartExecutionRequest
        {
            Input = executionJson,
            StateMachineArn = stateMachineArn
        };
    }

```

```
        var response = await
        _amazonStepFunctions.StartExecutionAsync(executionRequest);
        return response.ExecutionArn;
    }

    /// <summary>
    /// Stop execution of a Step Functions workflow.
    /// </summary>
    /// <param name="executionArn">The Amazon Resource Name (ARN) of
    /// the Step Functions execution to stop.</param>
    /// <returns>A Boolean value indicating the success of the action.</returns>
    public async Task<bool> StopExecution(string executionArn)
    {
        var response =
            await _amazonStepFunctions.StopExecutionAsync(new StopExecutionRequest
            { ExecutionArn = executionArn });
        return response.HttpStatusCode == System.Net.HttpStatusCode.OK;
    }
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的下列主題。

- [CreateActivity](#)
- [CreateStateMachine](#)
- [DeleteActivity](#)
- [DeleteStateMachine](#)
- [DescribeExecution](#)
- [DescribeStateMachine](#)
- [GetActivityTask](#)
- [ListActivities](#)
- [ListStateMachines](#)
- [SendTaskSuccess](#)
- [StartExecution](#)

- [StopExecution](#)

動作

CreateActivity

以下程式碼範例顯示如何使用 CreateActivity。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Create a Step Functions activity using the supplied name.
/// </summary>
/// <param name="activityName">The name for the new Step Functions activity.</
param>
/// <returns>The Amazon Resource Name (ARN) for the new activity.</returns>
public async Task<string> CreateActivity(string activityName)
{
    var response = await _amazonStepFunctions.CreateActivityAsync(new
CreateActivityRequest { Name = activityName });
    return response.ActivityArn;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [CreateActivity](#)。

CreateStateMachine

以下程式碼範例顯示如何使用 CreateStateMachine。

適用於 .NET 的 SDK

 Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Create a Step Functions state machine.
/// </summary>
/// <param name="stateMachineName">Name for the new Step Functions state
/// machine.</param>
/// <param name="definition">A JSON string that defines the Step Functions
/// state machine.</param>
/// <param name="roleArn">The Amazon Resource Name (ARN) of the role.</param>
/// <returns></returns>
public async Task<string> CreateStateMachine(string stateMachineName, string
definition, string roleArn)
{
    var request = new CreateStateMachineRequest
    {
        Name = stateMachineName,
        Definition = definition,
        RoleArn = roleArn
    };

    var response =
        await _amazonStepFunctions.CreateStateMachineAsync(request);
    return response.StateMachineArn;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [CreateStateMachine](#)。

DeleteActivity

以下程式碼範例顯示如何使用 DeleteActivity。

適用於 .NET 的 SDK

 Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Delete a Step Machine activity.
/// </summary>
/// <param name="activityArn">The Amazon Resource Name (ARN) of
/// the activity.</param>
/// <returns>A Boolean value indicating the success of the action.</returns>
public async Task<bool> DeleteActivity(string activityArn)
{
    var response = await _amazonStepFunctions.DeleteActivityAsync(new
DeleteActivityRequest { ActivityArn = activityArn });
    return response.HttpStatusCode == System.Net.HttpStatusCode.OK;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [DeleteActivity](#)。

DeleteStateMachine

以下程式碼範例顯示如何使用 DeleteStateMachine。

適用於 .NET 的 SDK

 Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Delete a Step Functions state machine.
```

```
/// </summary>
/// <param name="stateMachineArn">The Amazon Resource Name (ARN) of the
/// state machine.</param>
/// <returns>A Boolean value indicating the success of the action.</returns>
public async Task<bool> DeleteStateMachine(string stateMachineArn)
{
    var response = await _amazonStepFunctions.DeleteStateMachineAsync(new
DeleteStateMachineRequest
    { StateMachineArn = stateMachineArn });
    return response.HttpStatusCode == System.Net.HttpStatusCode.OK;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [DeleteStateMachine](#)。

DescribeExecution

以下程式碼範例顯示如何使用 DescribeExecution。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Retrieve information about the specified Step Functions execution.
/// </summary>
/// <param name="executionArn">The Amazon Resource Name (ARN) of the
/// Step Functions execution.</param>
/// <returns>The API response returned by the API.</returns>
public async Task<DescribeExecutionResponse> DescribeExecutionAsync(string
executionArn)
{
    var response = await _amazonStepFunctions.DescribeExecutionAsync(new
DescribeExecutionRequest { ExecutionArn = executionArn });
    return response;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [DescribeExecution](#)。

DescribeStateMachine

以下程式碼範例顯示如何使用 DescribeStateMachine。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Retrieve information about the specified Step Functions state machine.
/// </summary>
/// <param name="StateMachineArn">The Amazon Resource Name (ARN) of the
/// Step Functions state machine to retrieve.</param>
/// <returns>Information about the specified Step Functions state machine.</
returns>
public async Task<DescribeStateMachineResponse> DescribeStateMachineAsync(string
StateMachineArn)
{
    var response = await _amazonStepFunctions.DescribeStateMachineAsync(new
DescribeStateMachineRequest { StateMachineArn = StateMachineArn });
    return response;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK 命令參考》中的 [DescribeStateMachine](#)。

GetActivityTask

以下程式碼範例顯示如何使用 GetActivityTask。

適用於 .NET 的 SDK

 Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Retrieve a task with the specified Step Functions activity
/// with the specified Amazon Resource Name (ARN).
/// </summary>
/// <param name="activityArn">The Amazon Resource Name (ARN) of
/// the Step Functions activity.</param>
/// <param name="workerName">The name of the Step Functions worker.</param>
/// <returns>The response from the Step Functions activity.</returns>
public async Task<GetActivityTaskResponse> GetActivityTaskAsync(string
activityArn, string workerName)
{
    var response = await _amazonStepFunctions.GetActivityTaskAsync(new
GetActivityTaskRequest
    { ActivityArn = activityArn, WorkerName = workerName });
    return response;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [GetActivityTask](#)。

ListActivities

以下程式碼範例顯示如何使用 ListActivities。

適用於 .NET 的 SDK

 Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// List the Step Functions activities for the current account.
/// </summary>
/// <returns>A list of ActivityListItem.</returns>
public async Task<List<ActivityListItem>> ListActivitiesAsync()
{
    var request = new ListActivitiesRequest();
    var activities = new List<ActivityListItem>();

    do
    {
        var response = await _amazonStepFunctions.ListActivitiesAsync(request);

        if (response.NextToken is not null)
        {
            request.NextToken = response.NextToken;
        }

        activities.AddRange(response.Activities);
    }
    while (request.NextToken is not null);

    return activities;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [ListActivities](#)。

ListExecutions

以下程式碼範例顯示如何使用 ListExecutions。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Retrieve information about executions of a Step Functions
/// state machine.
/// </summary>
/// <param name="stateMachineArn">The Amazon Resource Name (ARN) of the
/// Step Functions state machine.</param>
/// <returns>A list of ExecutionListItem objects.</returns>
public async Task<List<ExecutionListItem>> ListExecutionsAsync(string
stateMachineArn)
{
    var executions = new List<ExecutionListItem>();
    ListExecutionsResponse response;
    var request = new ListExecutionsRequest { StateMachineArn =
stateMachineArn };

    do
    {
        response = await _amazonStepFunctions.ListExecutionsAsync(request);
        executions.AddRange(response.Executions);
        if (response.NextToken is not null)
        {
            request.NextToken = response.NextToken;
        }
    } while (response.NextToken is not null);

    return executions;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [ListExecutions](#)。

ListStateMachines

以下程式碼範例顯示如何使用 ListStateMachines。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Retrieve a list of Step Functions state machines.
/// </summary>
/// <returns>A list of StateMachineListItem objects.</returns>
public async Task<List<StateMachineListItem>> ListStateMachinesAsync()
{
    var stateMachines = new List<StateMachineListItem>();
    var listStateMachinesPaginator =
        _amazonStepFunctions.Paginators.ListStateMachines(new
ListStateMachinesRequest());

    await foreach (var response in listStateMachinesPaginator.Responses)
    {
        stateMachines.AddRange(response.StateMachines);
    }

    return stateMachines;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [ListStateMachines](#)。

SendTaskSuccess

以下程式碼範例顯示如何使用 SendTaskSuccess。

適用於 .NET 的 SDK

 Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Indicate that the Step Functions task, indicated by the
/// task token, has completed successfully.
/// </summary>
/// <param name="taskToken">Identifies the task.</param>
/// <param name="taskResponse">The response received from executing the task.</
param>
/// <returns>A Boolean value indicating the success of the action.</returns>
public async Task<bool> SendTaskSuccessAsync(string taskToken, string
taskResponse)
{
    var response = await _amazonStepFunctions.SendTaskSuccessAsync(new
SendTaskSuccessRequest
    { TaskToken = taskToken, Output = taskResponse });

    return response.HttpStatusCode == System.Net.HttpStatusCode.OK;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [SendTaskSuccess](#)。

StartExecution

以下程式碼範例顯示如何使用 StartExecution。

適用於 .NET 的 SDK

 Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Start execution of an AWS Step Functions state machine.
/// </summary>
/// <param name="executionName">The name to use for the execution.</param>
/// <param name="executionJson">The JSON string to pass for execution.</param>
/// <param name="stateMachineArn">The Amazon Resource Name (ARN) of the
/// Step Functions state machine.</param>
/// <returns>The Amazon Resource Name (ARN) of the AWS Step Functions
/// execution.</returns>
public async Task<string> StartExecutionAsync(string executionJson, string
stateMachineArn)
{
    var executionRequest = new StartExecutionRequest
    {
        Input = executionJson,
        StateMachineArn = stateMachineArn
    };

    var response = await
_amazonStepFunctions.StartExecutionAsync(executionRequest);
    return response.ExecutionArn;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [StartExecution](#)。

AWS STS 使用的範例 適用於 .NET 的 SDK

下列程式碼範例示範如何使用 適用於 .NET 的 AWS SDK 搭配 來執行動作和實作常見案例 AWS STS。

Actions 是大型程式的程式碼摘錄，必須在內容中執行。雖然動作會告訴您如何呼叫個別服務函數，但您可以在其相關情境中查看內容中的動作。

每個範例均包含完整原始碼的連結，您可在連結中找到如何設定和執行內容中程式碼的相關指示。

主題

- [動作](#)

動作

AssumeRole

以下程式碼範例顯示如何使用 AssumeRole。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
using System;
using System.Threading.Tasks;
using Amazon;
using Amazon.SecurityToken;
using Amazon.SecurityToken.Model;

namespace AssumeRoleExample
{
    class AssumeRole
    {
        /// <summary>
        /// This example shows how to use the AWS Security Token
        /// Service (AWS STS) to assume an IAM role.
        ///
        /// NOTE: It is important that the role that will be assumed has a
        /// trust relationship with the account that will assume the role.
        ///
        /// Before you run the example, you need to create the role you want to
        /// assume and have it trust the IAM account that will assume that role.
        ///
        /// See https://docs.aws.amazon.com/IAM/latest/UserGuide/
        id_roles_create.html
        /// for help in working with roles.
        /// </summary>

        // A region property may be used if the profile or credentials loaded do not
        // specify a region,
        // or to use a specific region.
```

```

private static readonly RegionEndpoint REGION = RegionEndpoint.USWest2;

static async Task Main()
{
    // Create the SecurityToken client and then display the identity of the
    // default user.
    var roleArnToAssume = "arn:aws:iam::123456789012:role/testAssumeRole";

    var client = new
Amazon.SecurityToken.AmazonSecurityTokenServiceClient(REGION);

    // Get and display the information about the identity of the default
user.
    var callerIdRequest = new GetCallerIdentityRequest();
    var caller = await client.GetCallerIdentityAsync(callerIdRequest);
    Console.WriteLine($"Original Caller: {caller.Arn}");

    // Create the request to use with the AssumeRoleAsync call.
    var assumeRoleReq = new AssumeRoleRequest()
    {
        DurationSeconds = 1600,
        RoleSessionName = "Session1",
        RoleArn = roleArnToAssume
    };

    var assumeRoleRes = await client.AssumeRoleAsync(assumeRoleReq);

    // Now create a new client based on the credentials of the caller
assuming the role.
    var client2 = new AmazonSecurityTokenServiceClient(credentials:
assumeRoleRes.Credentials, REGION);

    // Get and display information about the caller that has assumed the
defined role.
    var caller2 = await client2.GetCallerIdentityAsync(callerIdRequest);
    Console.WriteLine($"AssumedRole Caller: {caller2.Arn}");
}
}
}

```

- 如需 API 詳細資訊，請參閱 適用於 .NET 的 AWS SDK API Reference 中的 [AssumeRole](#)。

支援 使用的範例 適用於 .NET 的 SDK

下列程式碼範例示範如何使用 適用於 .NET 的 AWS SDK 搭配 來執行動作和實作常見案例 支援。

基本概念是程式碼範例，這些範例說明如何在服務內執行基本操作。

Actions 是大型程式的程式碼摘錄，必須在內容中執行。雖然動作會告訴您如何呼叫個別服務函數，但您可以在其相關情境中查看內容中的動作。

每個範例均包含完整原始碼的連結，您可在連結中找到如何設定和執行內容中程式碼的相關指示。

主題

- [開始使用](#)
- [基本概念](#)
- [動作](#)

開始使用

您好 支援

下列程式碼範例示範如何開始使用 支援。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
using Amazon.AWSSupport;
using Microsoft.Extensions.DependencyInjection;
using Microsoft.Extensions.Hosting;

public static class HelloSupport
{
    static async Task Main(string[] args)
    {
```

```
// Use the AWS .NET Core Setup package to set up dependency injection for
the AWS Support service.
// Use your AWS profile name, or leave it blank to use the default profile.
// You must have one of the following AWS Support plans: Business,
Enterprise On-Ramp, or Enterprise. Otherwise, an exception will be thrown.
using var host = Host.CreateDefaultBuilder(args)
    .ConfigureServices((_, services) =>
        services.AddAWSService<IAmazonAWSSupport>()
    ).Build();

// Now the client is available for injection.
var supportClient = host.Services.GetRequiredService<IAmazonAWSSupport>();

// You can use await and any of the async methods to get a response.
var response = await supportClient.DescribeServicesAsync();
Console.WriteLine($"\\tHello AWS Support! There are {response.Services.Count}
services available.");
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [DescribeServices](#)。

基本概念

了解基本概念

以下程式碼範例顯示做法：

- 取得並顯示案例可用的服務和嚴重性層級。
- 根據選取的服務、類別和嚴重性層級建立支援案例。
- 取得並顯示當天開啟的案例清單。
- 將附件集和通訊新增至新案例。
- 描述案例的新附件和通訊。
- 解決案例。
- 取得並顯示當天已解決的案例清單。

適用於 .NET 的 SDK

 Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

在命令提示中執行互動式案例。

```
/// <summary>
/// Hello AWS Support example.
/// </summary>
public static class SupportCaseScenario
{
    /*
        Before running this .NET code example, set up your development environment,
        including your credentials.

        To use the AWS Support API, you must have one of the following AWS Support
        plans: Business, Enterprise On-Ramp, or Enterprise.

        This .NET example performs the following tasks:
        1. Get and display services. Select a service from the list.
        2. Select a category from the selected service.
        3. Get and display severity levels and select a severity level from the list.
        4. Create a support case using the selected service, category, and severity
        level.
        5. Get and display a list of open support cases for the current day.
        6. Create an attachment set with a sample text file to add to the case.
        7. Add a communication with the attachment to the support case.
        8. List the communications of the support case.
        9. Describe the attachment set.
        10. Resolve the support case.
        11. Get a list of resolved cases for the current day.
    */

    private static SupportWrapper _supportWrapper = null!;

    static async Task Main(string[] args)
    {
        // Set up dependency injection for the AWS Support service.
        // Use your AWS profile name, or leave it blank to use the default profile.
```



```

        using var host = Host.CreateDefaultBuilder(args)
            .ConfigureLogging(logging =>
                logging.AddFilter("System", LogLevel.Debug)
                    .AddFilter<DebugLoggerProvider>("Microsoft",
LogLevel.Information)
                    .AddFilter<ConsoleLoggerProvider>("Microsoft", LogLevel.Trace))
            .ConfigureServices((_, services) =>
                services.AddAWSService<IAmazonAWSSupport>(new AWSOptions() { Profile
= "default" })
                    .AddTransient<SupportWrapper>()
            )
            .Build();

var logger = LoggerFactory.Create(builder =>
{
    builder.AddConsole();
}).CreateLogger(typeof(SupportCaseScenario));

_supportWrapper = host.Services.GetRequiredService<SupportWrapper>();

Console.WriteLine(new string('-', 80));
Console.WriteLine("Welcome to the AWS Support case example scenario.");
Console.WriteLine(new string('-', 80));

try
{
    var apiSupported = await _supportWrapper.VerifySubscription();
    if (!apiSupported)
    {
        logger.LogError("You must have a Business, Enterprise On-Ramp, or
Enterprise Support " +
                        "plan to use the AWS Support API. \n\tPlease
upgrade your subscription to run these examples.");
        return;
    }

    var service = await DisplayAndSelectServices();

    var category = DisplayAndSelectCategories(service);

    var severityLevel = await DisplayAndSelectSeverity();

    var caseId = await CreateSupportCase(service, category, severityLevel);

```

```

        await DescribeTodayOpenCases();

        var attachmentSetId = await CreateAttachmentSet();

        await AddCommunicationToCase(attachmentSetId, caseId);

        var attachmentId = await ListCommunicationsForCase(caseId);

        await DescribeCaseAttachment(attachmentId);

        await ResolveCase(caseId);

        await DescribeTodayResolvedCases();

        Console.WriteLine(new string('-', 80));
        Console.WriteLine("AWS Support case example scenario complete.");
        Console.WriteLine(new string('-', 80));
    }
    catch (Exception ex)
    {
        logger.LogError(ex, "There was a problem executing the scenario.");
    }
}

/// <summary>
/// List some available services from AWS Support, and select a service for the
example.
/// </summary>
/// <returns>The selected service.</returns>
private static async Task<Service> DisplayAndSelectServices()
{
    Console.WriteLine(new string('-', 80));
    var services = await _supportWrapper.DescribeServices();
    Console.WriteLine($"AWS Support client returned {services.Count}
services.");

    Console.WriteLine($"1. Displaying first 10 services:");
    for (int i = 0; i < 10 && i < services.Count; i++)
    {
        Console.WriteLine($"  {i + 1}. {services[i].Name}");
    }

    var choiceNumber = 0;
    while (choiceNumber < 1 || choiceNumber > services.Count)

```

```
{
    Console.WriteLine(
        "Select an example support service by entering a number from the
preceding list:");
    var choice = Console.ReadLine();
    Int32.TryParse(choice, out choiceNumber);
}
Console.WriteLine(new string('-', 80));

return services[choiceNumber - 1];
}

/// <summary>
/// List the available categories for a service and select a category for the
example.
/// </summary>
/// <param name="service">Service to use for displaying categories.</param>
/// <returns>The selected category.</returns>
private static Category DisplayAndSelectCategories(Service service)
{
    Console.WriteLine(new string('-', 80));

    Console.WriteLine($"2. Available support categories for Service
\"{service.Name}\":");
    for (int i = 0; i < service.Categories.Count; i++)
    {
        Console.WriteLine($"  {i + 1}. {service.Categories[i].Name}");
    }

    var choiceNumber = 0;
    while (choiceNumber < 1 || choiceNumber > service.Categories.Count)
    {
        Console.WriteLine(
            "Select an example support category by entering a number from the
preceding list:");
        var choice = Console.ReadLine();
        Int32.TryParse(choice, out choiceNumber);
    }

    Console.WriteLine(new string('-', 80));

    return service.Categories[choiceNumber - 1];
}
```

```

    /// <summary>
    /// List available severity levels from AWS Support, and select a level for the
    example.
    /// </summary>
    /// <returns>The selected severity level.</returns>
    private static async Task<SeverityLevel> DisplayAndSelectSeverity()
    {
        Console.WriteLine(new string('-', 80));
        var severityLevels = await _supportWrapper.DescribeSeverityLevels();

        Console.WriteLine($"3. Get and display available severity levels:");
        for (int i = 0; i < 10 && i < severityLevels.Count; i++)
        {
            Console.WriteLine($"  \t{i + 1}. {severityLevels[i].Name}");
        }

        var choiceNumber = 0;
        while (choiceNumber < 1 || choiceNumber > severityLevels.Count)
        {
            Console.WriteLine(
                preceding list:");
            var choice = Console.ReadLine();
            Int32.TryParse(choice, out choiceNumber);
        }
        Console.WriteLine(new string('-', 80));

        return severityLevels[choiceNumber - 1];
    }

    /// <summary>
    /// Create an example support case.
    /// </summary>
    /// <param name="service">Service to use for the new case.</param>
    /// <param name="category">Category to use for the new case.</param>
    /// <param name="severity">Severity to use for the new case.</param>
    /// <returns>The caseId of the new support case.</returns>
    private static async Task<string> CreateSupportCase(Service service,
        Category category, SeverityLevel severity)
    {
        Console.WriteLine(new string('-', 80));
        Console.WriteLine($"4. Create an example support case" +
            $" with the following settings:" +

```

```

        $" \n\tService: {service.Name}, Category: {category.Name}
" +
        $"and Severity Level: {severity.Name}.";
    var caseId = await _supportWrapper.CreateCase(service.Code, category.Code,
severity.Code,
        "Example case for testing, ignore.", "This is my example support
case.");

    Console.WriteLine($" \tNew case created with ID {caseId}");

    Console.WriteLine(new string('-', 80));

    return caseId;
}

/// <summary>
/// List open cases for the current day.
/// </summary>
/// <returns>Async task.</returns>
private static async Task DescribeTodayOpenCases()
{
    Console.WriteLine($"5. List the open support cases for the current day.");
    // Describe the cases. If it is empty, try again and allow time for the new
case to appear.
    List<CaseDetails> currentOpenCases = null!;
    while (currentOpenCases == null || currentOpenCases.Count == 0)
    {
        Thread.Sleep(1000);
        currentOpenCases = await _supportWrapper.DescribeCases(
            new List<string>(),
            null,
            false,
            false,
            DateTime.UtcNow.Date,
            DateTime.UtcNow);
    }

    foreach (var openCase in currentOpenCases)
    {
        Console.WriteLine($" \tCase: {openCase.CaseId} created
{openCase.TimeCreated}");
    }

    Console.WriteLine(new string('-', 80));
}

```

```

    }

    /// <summary>
    /// Create an attachment set for a support case.
    /// </summary>
    /// <returns>The attachment set id.</returns>
    private static async Task<string> CreateAttachmentSet()
    {
        Console.WriteLine(new string('-', 80));
        Console.WriteLine($"6. Create an attachment set for a support case.");
        var fileName = "example_attachment.txt";

        // Create the file if it does not already exist.
        if (!File.Exists(fileName))
        {
            await using StreamWriter sw = File.CreateText(fileName);
            await sw.WriteLineAsync(
                "This is a sample file for attachment to a support case.");
        }

        await using var ms = new MemoryStream(await
File.ReadAllBytesAsync(fileName));

        var attachmentSetId = await _supportWrapper.AddAttachmentToSet(
            ms,
            fileName);

        Console.WriteLine($"\\tNew attachment set created with id: \\n
\\t{attachmentSetId.Substring(0, 65)}...");

        Console.WriteLine(new string('-', 80));

        return attachmentSetId;
    }

    /// <summary>
    /// Add an attachment set and communication to a case.
    /// </summary>
    /// <param name="attachmentSetId">Id of the attachment set.</param>
    /// <param name="caseId">Id of the case to receive the attachment set.</param>
    /// <returns>Async task.</returns>
    private static async Task AddCommunicationToCase(string attachmentSetId, string
caseId)
    {

```

```

        Console.WriteLine(new string('-', 80));
        Console.WriteLine($"7. Add attachment set and communication to {caseId}.");

        await _supportWrapper.AddCommunicationToCase(
            caseId,
            "This is an example communication added to a support case.",
            attachmentSetId);

        Console.WriteLine($"\\tNew attachment set and communication added to
{caseId}");

        Console.WriteLine(new string('-', 80));
    }

    /// <summary>
    /// List the communications for a case.
    /// </summary>
    /// <param name="caseId">Id of the case to describe.</param>
    /// <returns>An attachment id.</returns>
    private static async Task<string> ListCommunicationsForCase(string caseId)
    {
        Console.WriteLine(new string('-', 80));
        Console.WriteLine($"8. List communications for case {caseId}.");

        var communications = await _supportWrapper.DescribeCommunications(caseId);
        var attachmentId = "";
        foreach (var communication in communications)
        {
            Console.WriteLine(
                $"\\tCommunication created on: {communication.TimeCreated} has
{communication.AttachmentSet.Count} attachments.");
            if (communication.AttachmentSet.Any())
            {
                attachmentId = communication.AttachmentSet.First().AttachmentId;
            }
        }

        Console.WriteLine(new string('-', 80));
        return attachmentId;
    }

    /// <summary>
    /// Describe an attachment by id.
    /// </summary>

```

```

/// <param name="attachmentId">Id of the attachment to describe.</param>
/// <returns>Async task.</returns>
private static async Task DescribeCaseAttachment(string attachmentId)
{
    Console.WriteLine(new string('-', 80));
    Console.WriteLine($"9. Describe the attachment set.");

    var attachment = await _supportWrapper.DescribeAttachment(attachmentId);
    var data = Encoding.ASCII.GetString(attachment.Data.ToArray());
    Console.WriteLine($"\\tAttachment includes {attachment.FileName} with data:
\\n\\t{data}");

    Console.WriteLine(new string('-', 80));
}

/// <summary>
/// Resolve the support case.
/// </summary>
/// <param name="caseId">Id of the case to resolve.</param>
/// <returns>Async task.</returns>
private static async Task ResolveCase(string caseId)
{
    Console.WriteLine(new string('-', 80));
    Console.WriteLine($"10. Resolve case {caseId}.");

    var status = await _supportWrapper.ResolveCase(caseId);
    Console.WriteLine($"\\tCase {caseId} has final status {status}");

    Console.WriteLine(new string('-', 80));
}

/// <summary>
/// List resolved cases for the current day.
/// </summary>
/// <returns>Async Task.</returns>
private static async Task DescribeTodayResolvedCases()
{
    Console.WriteLine(new string('-', 80));
    Console.WriteLine($"11. List the resolved support cases for the current
day.");
    var currentCases = await _supportWrapper.DescribeCases(
        new List<string>(),
        null,
        false,

```



```

        true,
        DateTime.UtcNow.Date,
        DateTime.UtcNow);

    foreach (var currentCase in currentCases)
    {
        if (currentCase.Status == "resolved")
        {
            Console.WriteLine(
                $"\\tCase: {currentCase.CaseId}: status {currentCase.Status}");
        }
    }

    Console.WriteLine(new string('-', 80));
}
}

```

案例用於 支援 動作的包裝函式方法。

```

/// <summary>
/// Wrapper methods to use AWS Support for working with support cases.
/// </summary>
public class SupportWrapper
{
    private readonly IAmazonAWSSupport _amazonSupport;
    public SupportWrapper(IAmazonAWSSupport amazonSupport)
    {
        _amazonSupport = amazonSupport;
    }

    /// <summary>
    /// Get the descriptions of AWS services.
    /// </summary>
    /// <param name="name">Optional language for services.
    /// Currently Chinese ("zh"), English ("en"), Japanese ("ja") and Korean ("ko")
    are supported.</param>
    /// <returns>The list of AWS service descriptions.</returns>
    public async Task<List<Service>> DescribeServices(string language = "en")
    {
        var response = await _amazonSupport.DescribeServicesAsync(

```

```

        new DescribeServicesRequest()
        {
            Language = language
        });
    return response.Services;
}

/// <summary>
/// Get the descriptions of support severity levels.
/// </summary>
/// <param name="name">Optional language for severity levels.
/// Currently Chinese ("zh"), English ("en"), Japanese ("ja") and Korean ("ko")
are supported.</param>
/// <returns>The list of support severity levels.</returns>
public async Task<List<SeverityLevel>> DescribeSeverityLevels(string language =
"en")
{
    var response = await _amazonSupport.DescribeSeverityLevelsAsync(
        new DescribeSeverityLevelsRequest()
        {
            Language = language
        });
    return response.SeverityLevels;
}

/// <summary>
/// Create a new support case.
/// </summary>
/// <param name="serviceCode">Service code for the new case.</param>
/// <param name="categoryCode">Category for the new case.</param>
/// <param name="severityCode">Severity code for the new case.</param>
/// <param name="subject">Subject of the new case.</param>
/// <param name="body">Body text of the new case.</param>
/// <param name="language">Optional language support for your case.
/// Currently Chinese ("zh"), English ("en"), Japanese ("ja") and Korean ("ko")
are supported.</param>
/// <param name="attachmentSetId">Optional Id for an attachment set for the new
case.</param>
/// <param name="issueType">Optional issue type for the new case. Options are
"customer-service" or "technical".</param>

```

```

    /// <returns>The caseId of the new support case.</returns>
    public async Task<string> CreateCase(string serviceCode, string categoryCode,
    string severityCode, string subject,
        string body, string language = "en", string? attachmentSetId = null, string
    issueType = "customer-service")
    {
        var response = await _amazonSupport.CreateCaseAsync(
            new CreateCaseRequest()
            {
                ServiceCode = serviceCode,
                CategoryCode = categoryCode,
                SeverityCode = severityCode,
                Subject = subject,
                Language = language,
                AttachmentSetId = attachmentSetId,
                IssueType = issueType,
                CommunicationBody = body
            });
        return response.CaseId;
    }

    /// <summary>
    /// Add an attachment to a set, or create a new attachment set if one does not
    exist.
    /// </summary>
    /// <param name="data">The data for the attachment.</param>
    /// <param name="fileName">The file name for the attachment.</param>
    /// <param name="attachmentSetId">Optional setId for the attachment. Creates a
    new attachment set if empty.</param>
    /// <returns>The setId of the attachment.</returns>
    public async Task<string> AddAttachmentToSet(MemoryStream data, string fileName,
    string? attachmentSetId = null)
    {
        var response = await _amazonSupport.AddAttachmentsToSetAsync(
            new AddAttachmentsToSetRequest
            {
                AttachmentSetId = attachmentSetId,
                Attachments = new List<Attachment>
                {
                    new Attachment
                    {
                        Data = data,

```

```

        FileName = fileName
    }
}

});
return response.AttachmentSetId;
}

/// <summary>
/// Get description of a specific attachment.
/// </summary>
/// <param name="attachmentId">Id of the attachment, usually fetched by
describing the communications of a case.</param>
/// <returns>The attachment object.</returns>
public async Task<Attachment> DescribeAttachment(string attachmentId)
{
    var response = await _amazonSupport.DescribeAttachmentAsync(
        new DescribeAttachmentRequest()
        {
            AttachmentId = attachmentId
        });
    return response.Attachment;
}

/// <summary>
/// Add communication to a case, including optional attachment set ID and CC
email addresses.
/// </summary>
/// <param name="caseId">Id for the support case.</param>
/// <param name="body">Body text of the communication.</param>
/// <param name="attachmentSetId">Optional Id for an attachment set.</param>
/// <param name="ccEmailAddresses">Optional list of CC email addresses.</param>
/// <returns>True if successful.</returns>
public async Task<bool> AddCommunicationToCase(string caseId, string body,
    string? attachmentSetId = null, List<string>? ccEmailAddresses = null)
{
    var response = await _amazonSupport.AddCommunicationToCaseAsync(
        new AddCommunicationToCaseRequest()
        {
            CaseId = caseId,
            CommunicationBody = body,

```

```

        AttachmentSetId = attachmentSetId,
        CcEmailAddresses = ccEmailAddresses
    });
    return response.Result;
}

/// <summary>
/// Describe the communications for a case, optionally with a date filter.
/// </summary>
/// <param name="caseId">The ID of the support case.</param>
/// <param name="afterTime">The optional start date for a filtered search.</
param>
/// <param name="beforeTime">The optional end date for a filtered search.</
param>
/// <returns>The list of communications for the case.</returns>
public async Task<List<Communication>> DescribeCommunications(string caseId,
DateTime? afterTime = null, DateTime? beforeTime = null)
{
    var results = new List<Communication>();
    var paginateCommunications =
_amazonSupport.Paginators.DescribeCommunications(
    new DescribeCommunicationsRequest()
    {
        CaseId = caseId,
        AfterTime = afterTime?.ToString("s"),
        BeforeTime = beforeTime?.ToString("s")
    });
    // Get the entire list using the paginator.
    await foreach (var communications in paginateCommunications.Communications)
    {
        results.Add(communications);
    }
    return results;
}

/// <summary>
/// Get case details for a list of case ids, optionally with date filters.
/// </summary>
/// <param name="caseIds">The list of case IDs.</param>
/// <param name="displayId">Optional display ID.</param>

```

```

    /// <param name="includeCommunication">True to include communication. Defaults
to true.</param>
    /// <param name="includeResolvedCases">True to include resolved cases. Defaults
to false.</param>
    /// <param name="afterTime">The optional start date for a filtered search.</
param>
    /// <param name="beforeTime">The optional end date for a filtered search.</
param>
    /// <param name="language">Optional language support for your case.
    /// Currently Chinese ("zh"), English ("en"), Japanese ("ja") and Korean ("ko")
are supported.</param>
    /// <returns>A list of CaseDetails.</returns>
    public async Task<List<CaseDetails>> DescribeCases(List<string> caseIds, string?
displayId = null, bool includeCommunication = true,
        bool includeResolvedCases = false, DateTime? afterTime = null, DateTime?
beforeTime = null,
        string language = "en")
    {
        var results = new List<CaseDetails>();
        var paginateCases = _amazonSupport.Paginators.DescribeCases(
            new DescribeCasesRequest()
            {
                CaseIdList = caseIds,
                DisplayId = displayId,
                IncludeCommunications = includeCommunication,
                IncludeResolvedCases = includeResolvedCases,
                AfterTime = afterTime?.ToString("s"),
                BeforeTime = beforeTime?.ToString("s"),
                Language = language
            });
        // Get the entire list using the paginator.
        await foreach (var cases in paginateCases.Cases)
        {
            results.Add(cases);
        }
        return results;
    }

    /// <summary>
    /// Resolve a support case by caseId.
    /// </summary>
    /// <param name="caseId">Id for the support case.</param>

```

```
/// <returns>The final status of the case after resolving.</returns>
public async Task<string> ResolveCase(string caseId)
{
    var response = await _amazonSupport.ResolveCaseAsync(
        new ResolveCaseRequest()
        {
            CaseId = caseId
        });
    return response.FinalCaseStatus;
}

/// <summary>
/// Verify the support level for AWS Support API access.
/// </summary>
/// <returns>True if the subscription level supports API access.</returns>
public async Task<bool> VerifySubscription()
{
    try
    {
        var response = await _amazonSupport.DescribeServicesAsync(
            new DescribeServicesRequest()
            {
                Language = "en"
            });
        return response.HttpStatusCode == HttpStatusCode.OK;
    }
    catch (Amazon.AWSSupport.AmazonAWSSupportException ex)
    {
        if (ex.ErrorCode == "SubscriptionRequiredException")
        {
            return false;
        }
        else throw;
    }
}
}
```

- 如需 API 詳細資訊，請參閱 適用於 .NET 的 AWS SDK API Reference (《API 參考》) 中的下列主題。
 - [AddAttachmentsToSet](#)

- [AddCommunicationToCase](#)
- [CreateCase](#)
- [DescribeAttachment](#)
- [DescribeCases](#)
- [DescribeCommunications](#)
- [DescribeServices](#)
- [DescribeSeverityLevels](#)
- [ResolveCase](#)

動作

AddAttachmentsToSet

以下程式碼範例顯示如何使用 AddAttachmentsToSet。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Add an attachment to a set, or create a new attachment set if one does not
exist.
/// </summary>
/// <param name="data">The data for the attachment.</param>
/// <param name="fileName">The file name for the attachment.</param>
/// <param name="attachmentSetId">Optional setId for the attachment. Creates a
new attachment set if empty.</param>
/// <returns>The setId of the attachment.</returns>
public async Task<string> AddAttachmentToSet(MemoryStream data, string fileName,
string? attachmentSetId = null)
{
    var response = await _amazonSupport.AddAttachmentsToSetAsync(
        new AddAttachmentsToSetRequest
```



```

        {
            AttachmentSetId = attachmentSetId,
            Attachments = new List<Attachment>
            {
                new Attachment
                {
                    Data = data,
                    FileName = fileName
                }
            }
        });
        return response.AttachmentSetId;
    }

```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [AddAttachmentsToSet](#)。

AddCommunicationToCase

以下程式碼範例顯示如何使用 AddCommunicationToCase。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```

/// <summary>
/// Add communication to a case, including optional attachment set ID and CC
email addresses.
/// </summary>
/// <param name="caseId">Id for the support case.</param>
/// <param name="body">Body text of the communication.</param>
/// <param name="attachmentSetId">Optional Id for an attachment set.</param>
/// <param name="ccEmailAddresses">Optional list of CC email addresses.</param>
/// <returns>True if successful.</returns>

```

```
public async Task<bool> AddCommunicationToCase(string caseId, string body,
    string? attachmentSetId = null, List<string>? ccEmailAddresses = null)
{
    var response = await _amazonSupport.AddCommunicationToCaseAsync(
        new AddCommunicationToCaseRequest()
        {
            CaseId = caseId,
            CommunicationBody = body,
            AttachmentSetId = attachmentSetId,
            CcEmailAddresses = ccEmailAddresses
        });
    return response.Result;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [AddCommunicationToCase](#)。

CreateCase

以下程式碼範例顯示如何使用 CreateCase。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Create a new support case.
/// </summary>
/// <param name="serviceCode">Service code for the new case.</param>
/// <param name="categoryCode">Category for the new case.</param>
/// <param name="severityCode">Severity code for the new case.</param>
/// <param name="subject">Subject of the new case.</param>
/// <param name="body">Body text of the new case.</param>
/// <param name="language">Optional language support for your case.
```

```

    /// Currently Chinese ("zh"), English ("en"), Japanese ("ja") and Korean ("ko")
    are supported.</param>
    /// <param name="attachmentSetId">Optional Id for an attachment set for the new
    case.</param>
    /// <param name="issueType">Optional issue type for the new case. Options are
    "customer-service" or "technical".</param>
    /// <returns>The caseId of the new support case.</returns>
    public async Task<string> CreateCase(string serviceCode, string categoryCode,
        string severityCode, string subject,
        string body, string language = "en", string? attachmentSetId = null, string
        issueType = "customer-service")
    {
        var response = await _amazonSupport.CreateCaseAsync(
            new CreateCaseRequest()
            {
                ServiceCode = serviceCode,
                CategoryCode = categoryCode,
                SeverityCode = severityCode,
                Subject = subject,
                Language = language,
                AttachmentSetId = attachmentSetId,
                IssueType = issueType,
                CommunicationBody = body
            });
        return response.CaseId;
    }

```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [CreateCase](#)。

DescribeAttachment

以下程式碼範例顯示如何使用 DescribeAttachment。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Get description of a specific attachment.
/// </summary>
/// <param name="attachmentId">Id of the attachment, usually fetched by
describing the communications of a case.</param>
/// <returns>The attachment object.</returns>
public async Task<Attachment> DescribeAttachment(string attachmentId)
{
    var response = await _amazonSupport.DescribeAttachmentAsync(
        new DescribeAttachmentRequest()
        {
            AttachmentId = attachmentId
        });
    return response.Attachment;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [DescribeAttachment](#)。

DescribeCases

以下程式碼範例顯示如何使用 DescribeCases。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Get case details for a list of case ids, optionally with date filters.
/// </summary>
/// <param name="caseIds">The list of case IDs.</param>
/// <param name="displayId">Optional display ID.</param>
/// <param name="includeCommunication">True to include communication. Defaults
to true.</param>
```

```

    /// <param name="includeResolvedCases">True to include resolved cases. Defaults
    to false.</param>
    /// <param name="afterTime">The optional start date for a filtered search.</
param>
    /// <param name="beforeTime">The optional end date for a filtered search.</
param>
    /// <param name="language">Optional language support for your case.
    /// Currently Chinese ("zh"), English ("en"), Japanese ("ja") and Korean ("ko")
    are supported.</param>
    /// <returns>A list of CaseDetails.</returns>
    public async Task<List<CaseDetails>> DescribeCases(List<string> caseIds, string?
displayId = null, bool includeCommunication = true,
        bool includeResolvedCases = false, DateTime? afterTime = null, DateTime?
beforeTime = null,
        string language = "en")
    {
        var results = new List<CaseDetails>();
        var paginateCases = _amazonSupport.Paginators.DescribeCases(
            new DescribeCasesRequest()
            {
                CaseIdList = caseIds,
                DisplayId = displayId,
                IncludeCommunications = includeCommunication,
                IncludeResolvedCases = includeResolvedCases,
                AfterTime = afterTime?.ToString("s"),
                BeforeTime = beforeTime?.ToString("s"),
                Language = language
            });
        // Get the entire list using the paginator.
        await foreach (var cases in paginateCases.Cases)
        {
            results.Add(cases);
        }
        return results;
    }

```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [DescribeCases](#)。

DescribeCommunications

以下程式碼範例顯示如何使用 DescribeCommunications。

適用於 .NET 的 SDK

 Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Describe the communications for a case, optionally with a date filter.
/// </summary>
/// <param name="caseId">The ID of the support case.</param>
/// <param name="afterTime">The optional start date for a filtered search.</
param>
/// <param name="beforeTime">The optional end date for a filtered search.</
param>
/// <returns>The list of communications for the case.</returns>
public async Task<List<Communication>> DescribeCommunications(string caseId,
DateTime? afterTime = null, DateTime? beforeTime = null)
{
    var results = new List<Communication>();
    var paginateCommunications =
        _amazonSupport.Paginators.DescribeCommunications(
            new DescribeCommunicationsRequest()
            {
                CaseId = caseId,
                AfterTime = afterTime?.ToString("s"),
                BeforeTime = beforeTime?.ToString("s")
            });
    // Get the entire list using the paginator.
    await foreach (var communications in paginateCommunications.Communications)
    {
        results.Add(communications);
    }
    return results;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [DescribeCommunications](#)。

DescribeServices

以下程式碼範例顯示如何使用 DescribeServices。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Get the descriptions of AWS services.
/// </summary>
/// <param name="name">Optional language for services.
/// Currently Chinese ("zh"), English ("en"), Japanese ("ja") and Korean ("ko")
are supported.</param>
/// <returns>The list of AWS service descriptions.</returns>
public async Task<List<Service>> DescribeServices(string language = "en")
{
    var response = await _amazonSupport.DescribeServicesAsync(
        new DescribeServicesRequest()
        {
            Language = language
        });
    return response.Services;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [DescribeServices](#)。

DescribeSeverityLevels

以下程式碼範例顯示如何使用 DescribeSeverityLevels。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Get the descriptions of support severity levels.
/// </summary>
/// <param name="name">Optional language for severity levels.
/// Currently Chinese ("zh"), English ("en"), Japanese ("ja") and Korean ("ko")
are supported.</param>
/// <returns>The list of support severity levels.</returns>
public async Task<List<SeverityLevel>> DescribeSeverityLevels(string language =
"en")
{
    var response = await _amazonSupport.DescribeSeverityLevelsAsync(
        new DescribeSeverityLevelsRequest()
        {
            Language = language
        });
    return response.SeverityLevels;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [DescribeSeverityLevels](#)。

ResolveCase

以下程式碼範例顯示如何使用 ResolveCase。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Resolve a support case by caseId.
/// </summary>
/// <param name="caseId">Id for the support case.</param>
/// <returns>The final status of the case after resolving.</returns>
public async Task<string> ResolveCase(string caseId)
{
    var response = await _amazonSupport.ResolveCaseAsync(
        new ResolveCaseRequest()
        {
            CaseId = caseId
        });
    return response.FinalCaseStatus;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [ResolveCase](#)。

使用的 Amazon Textract 範例 適用於 .NET 的 SDK

下列程式碼範例示範如何使用 適用於 .NET 的 AWS SDK 搭配 Amazon Textract 執行動作和實作常見案例。

案例是向您展示如何呼叫服務中的多個函數或與其他 AWS 服務組合來完成特定任務的程式碼範例。

每個範例均包含完整原始碼的連結，您可在連結中找到如何設定和執行內容中程式碼的相關指示。

主題

- [案例](#)

案例

建立應用程式以分析客戶意見回饋

下列程式碼範例會示範如何建立可分析客戶評論卡、從其原始語言進行翻譯、判斷對方情緒，以及透過翻譯後的文字產生音訊檔案的應用程式。

適用於 .NET 的 SDK

此範例應用程式會分析和存儲客戶的意見回饋卡。具體來說，它滿足了紐約市一家虛構飯店的需求。飯店以實體評論卡的形式收到賓客以各種語言撰寫的意見回饋。這些意見回饋透過 Web 用戶端上傳至應用程式。評論卡的影像上傳後，系統會執行下列步驟：

- 文字內容是使用 Amazon Textract 從影像中擷取。
- Amazon Comprehend 會決定擷取文字及其用語的情感。
- 擷取的文字內容會使用 Amazon Translate 翻譯成英文。
- Amazon Polly 會使用擷取的文字內容合成音訊檔案。

完整的應用程式可透過 AWS CDK 部署。如需原始程式碼和部署的說明，請參閱 [GitHub](#) 中的專案。

此範例中使用的服務

- Amazon Comprehend
- Lambda
- Amazon Polly
- Amazon Textract
- Amazon Translate

使用的 Amazon Transcribe 範例 適用於 .NET 的 SDK

下列程式碼範例示範如何使用 適用於 .NET 的 AWS SDK 搭配 Amazon Transcribe 執行動作和實作常見案例。

Actions 是大型程式的程式碼摘錄，必須在內容中執行。雖然動作會告訴您如何呼叫個別服務函數，但您可以在其相關情境中查看內容中的動作。

每個範例均包含完整原始碼的連結，您可在連結中找到如何設定和執行內容中程式碼的相關指示。

主題

- [動作](#)

動作

CreateVocabulary

以下程式碼範例顯示如何使用 CreateVocabulary。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Create a custom vocabulary using a list of phrases. Custom vocabularies
/// improve transcription accuracy for one or more specific words.
/// </summary>
/// <param name="languageCode">The language code of the vocabulary.</param>
/// <param name="phrases">Phrases to use in the vocabulary.</param>
/// <param name="vocabularyName">Name for the vocabulary.</param>
/// <returns>The state of the custom vocabulary.</returns>
public async Task<VocabularyState> CreateCustomVocabulary(LanguageCode
languageCode,
    List<string> phrases, string vocabularyName)
{
    var response = await _amazonTranscribeService.CreateVocabularyAsync(
        new CreateVocabularyRequest
        {
            LanguageCode = languageCode,
            Phrases = phrases,
            VocabularyName = vocabularyName
        });
    return response.VocabularyState;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [CreateVocabulary](#)。

DeleteMedicalTranscriptionJob

以下程式碼範例顯示如何使用 DeleteMedicalTranscriptionJob。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Delete a medical transcription job. Also deletes the transcript associated
with the job.
/// </summary>
/// <param name="jobName">Name of the medical transcription job to delete.</
param>
/// <returns>True if successful.</returns>
public async Task<bool> DeleteMedicalTranscriptionJob(string jobName)
{
    var response = await
        _amazonTranscribeService.DeleteMedicalTranscriptionJobAsync(
            new DeleteMedicalTranscriptionJobRequest()
            {
                MedicalTranscriptionJobName = jobName
            });
    return response.HttpStatusCode == HttpStatusCode.OK;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [DeleteMedicalTranscriptionJob](#)。

DeleteTranscriptionJob

以下程式碼範例顯示如何使用 DeleteTranscriptionJob。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Delete a transcription job. Also deletes the transcript associated with the
job.
/// </summary>
/// <param name="jobName">Name of the transcription job to delete.</param>
/// <returns>True if successful.</returns>
public async Task<bool> DeleteTranscriptionJob(string jobName)
{
    var response = await _amazonTranscribeService.DeleteTranscriptionJobAsync(
        new DeleteTranscriptionJobRequest()
        {
            TranscriptionJobName = jobName
        });
    return response.HttpStatusCode == HttpStatusCode.OK;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [DeleteTranscriptionJob](#)。

DeleteVocabulary

以下程式碼範例顯示如何使用 DeleteVocabulary。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Delete an existing custom vocabulary.
/// </summary>
/// <param name="vocabularyName">Name of the vocabulary to delete.</param>
/// <returns>True if successful.</returns>
public async Task<bool> DeleteCustomVocabulary(string vocabularyName)
{
    var response = await _amazonTranscribeService.DeleteVocabularyAsync(
        new DeleteVocabularyRequest
        {
            VocabularyName = vocabularyName
        });
    return response.HttpStatusCode == HttpStatusCode.OK;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [DeleteVocabulary](#)。

GetTranscriptionJob

以下程式碼範例顯示如何使用 GetTranscriptionJob。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Get details about a transcription job.
/// </summary>
/// <param name="jobName">A unique name for the transcription job.</param>
/// <returns>A TranscriptionJob instance with information on the requested
job.</returns>
public async Task<TranscriptionJob> GetTranscriptionJob(string jobName)
{

```

```
var response = await _amazonTranscribeService.GetTranscriptionJobAsync(  
    new GetTranscriptionJobRequest()  
    {  
        TranscriptionJobName = jobName  
    });  
return response.TranscriptionJob;  
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [GetTranscriptionJob](#)。

GetVocabulary

以下程式碼範例顯示如何使用 GetVocabulary。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>  
/// Get information about a custom vocabulary.  
/// </summary>  
/// <param name="vocabularyName">Name of the vocabulary.</param>  
/// <returns>The state of the custom vocabulary.</returns>  
public async Task<VocabularyState> GetCustomVocabulary(string vocabularyName)  
{  
    var response = await _amazonTranscribeService.GetVocabularyAsync(  
        new GetVocabularyRequest()  
        {  
            VocabularyName = vocabularyName  
        });  
    return response.VocabularyState;  
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [GetVocabulary](#)。

ListMedicalTranscriptionJobs

以下程式碼範例顯示如何使用 ListMedicalTranscriptionJobs。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// List medical transcription jobs, optionally with a name filter.
/// </summary>
/// <param name="jobNameContains">Optional name filter for the medical
transcription jobs.</param>
/// <returns>A list of summaries about medical transcription jobs.</returns>
public async Task<List<MedicalTranscriptionJobSummary>>
ListMedicalTranscriptionJobs(
    string? jobNameContains = null)
{
    var response = await
_amazonTranscribeService.ListMedicalTranscriptionJobsAsync(
    new ListMedicalTranscriptionJobsRequest()
    {
        JobNameContains = jobNameContains
    });
    return response.MedicalTranscriptionJobSummaries;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [ListMedicalTranscriptionJobs](#)。

ListTranscriptionJobs

以下程式碼範例顯示如何使用 ListTranscriptionJobs。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// List transcription jobs, optionally with a name filter.
/// </summary>
/// <param name="jobNameContains">Optional name filter for the transcription
jobs.</param>
/// <returns>A list of transcription job summaries.</returns>
public async Task<List<TranscriptionJobSummary>> ListTranscriptionJobs(string?
jobNameContains = null)
{
    var response = await _amazonTranscribeService.ListTranscriptionJobsAsync(
        new ListTranscriptionJobsRequest()
        {
            JobNameContains = jobNameContains
        });
    return response.TranscriptionJobSummaries;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [ListTranscriptionJobs](#)。

ListVocabularies

以下程式碼範例顯示如何使用 ListVocabularies。

適用於 .NET 的 SDK

 Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// List custom vocabularies for the current account. Optionally specify a name
/// filter and a specific state to filter the vocabularies list.
/// </summary>
/// <param name="nameContains">Optional string the vocabulary name must
contain.</param>
/// <param name="stateEquals">Optional state of the vocabulary.</param>
/// <returns>List of information about the vocabularies.</returns>
public async Task<List<VocabularyInfo>> ListCustomVocabularies(string?
nameContains = null,
    VocabularyState? stateEquals = null)
{
    var response = await _amazonTranscribeService.ListVocabulariesAsync(
        new ListVocabulariesRequest()
        {
            NameContains = nameContains,
            StateEquals = stateEquals
        });
    return response.Vocabularies;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [ListVocabularies](#)。

StartMedicalTranscriptionJob

以下程式碼範例顯示如何使用 StartMedicalTranscriptionJob。

適用於 .NET 的 SDK

 Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Start a medical transcription job for a media file. This method returns
/// as soon as the job is started.
/// </summary>
/// <param name="jobName">A unique name for the medical transcription job.</
param>
/// <param name="mediaFileUri">The URI of the media file, typically an Amazon S3
location.</param>
/// <param name="mediaFormat">The format of the media file.</param>
/// <param name="outputBucketName">Location for the output, typically an Amazon
S3 location.</param>
/// <param name="transcriptionType">Conversation or dictation transcription
type.</param>
/// <returns>A MedicalTransactionJob instance with information on the new job.</
returns>
public async Task<MedicalTranscriptionJob> StartMedicalTranscriptionJob(
    string jobName, string mediaFileUri,
    MediaFormat mediaFormat, string outputBucketName,
    Amazon.TranscribeService.Type transcriptionType)
{
    var response = await
        _amazonTranscribeService.StartMedicalTranscriptionJobAsync(
            new StartMedicalTranscriptionJobRequest()
            {
                MedicalTranscriptionJobName = jobName,
                Media = new Media()
                {
                    MediaFileUri = mediaFileUri
                },
                MediaFormat = mediaFormat,
                LanguageCode =
                    LanguageCode
```

```

        .EnUS, // The value must be en-US for medical
        transcriptions.
            OutputBucketName = outputBucketName,
            OutputKey =
                jobName, // The value is a key used to fetch the output of the
        transcription.
            Specialty = Specialty.PRIMARYCARE, // The value PRIMARYCARE must be
        set.
            Type = transcriptionType
        });
    return response.MedicalTranscriptionJob;
}

```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [StartMedicalTranscriptionJob](#)。

StartTranscriptionJob

以下程式碼範例顯示如何使用 StartTranscriptionJob。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```

    /// <summary>
    /// Start a transcription job for a media file. This method returns
    /// as soon as the job is started.
    /// </summary>
    /// <param name="jobName">A unique name for the transcription job.</param>
    /// <param name="mediaFileUri">The URI of the media file, typically an Amazon S3
    location.</param>
    /// <param name="mediaFormat">The format of the media file.</param>
    /// <param name="languageCode">The language code of the media file, such as en-
    US.</param>

```

```
/// <param name="vocabularyName">Optional name of a custom vocabulary.</param>
/// <returns>A TranscriptionJob instance with information on the new job.</
returns>
    public async Task<TranscriptionJob> StartTranscriptionJob(string jobName, string
mediaFileUri,
    MediaFormat mediaFormat, LanguageCode languageCode, string? vocabularyName)
    {
        var response = await _amazonTranscribeService.StartTranscriptionJobAsync(
            new StartTranscriptionJobRequest()
            {
                TranscriptionJobName = jobName,
                Media = new Media()
                {
                    MediaFileUri = mediaFileUri
                },
                MediaFormat = mediaFormat,
                LanguageCode = languageCode,
                Settings = vocabularyName != null ? new Settings()
                {
                    VocabularyName = vocabularyName
                } : null
            });
        return response.TranscriptionJob;
    }
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [StartTranscriptionJob](#)。

UpdateVocabulary

以下程式碼範例顯示如何使用 UpdateVocabulary。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
/// <summary>
/// Update a custom vocabulary with new values. Update overwrites all existing
information.
/// </summary>
/// <param name="languageCode">The language code of the vocabulary.</param>
/// <param name="phrases">Phrases to use in the vocabulary.</param>
/// <param name="vocabularyName">Name for the vocabulary.</param>
/// <returns>The state of the custom vocabulary.</returns>
public async Task<VocabularyState> UpdateCustomVocabulary(LanguageCode
languageCode,
    List<string> phrases, string vocabularyName)
{
    var response = await _amazonTranscribeService.UpdateVocabularyAsync(
        new UpdateVocabularyRequest()
        {
            LanguageCode = languageCode,
            Phrases = phrases,
            VocabularyName = vocabularyName
        });
    return response.VocabularyState;
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [UpdateVocabulary](#)。

使用的 Amazon Translate 範例 適用於 .NET 的 SDK

下列程式碼範例示範如何使用 適用於 .NET 的 AWS SDK 搭配 Amazon Translate 執行動作和實作常見案例。

Actions 是大型程式的程式碼摘錄，必須在內容中執行。雖然動作會告訴您如何呼叫個別服務函數，但您可以在其相關情境中查看內容中的動作。

案例是向您展示如何呼叫服務中的多個函數或與其他 AWS 服務組合來完成特定任務的程式碼範例。

每個範例均包含完整原始碼的連結，您可在連結中找到如何設定和執行內容中程式碼的相關指示。

主題

- [動作](#)

- [案例](#)

動作

DescribeTextTranslationJob

以下程式碼範例顯示如何使用 DescribeTextTranslationJob。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
using System;
using System.Threading.Tasks;
using Amazon.Translate;
using Amazon.Translate.Model;

/// <summary>
/// The following example shows how to retrieve the details of
/// a text translation job using Amazon Translate.
/// </summary>
public class DescribeTextTranslation
{
    public static async Task Main()
    {
        var client = new AmazonTranslateClient();

        // The Job Id is generated when the text translation job is started
        // with a call to the StartTextTranslationJob method.
        var jobId = "1234567890abcdef01234567890abcde";

        var request = new DescribeTextTranslationJobRequest
        {
            JobId = jobId,
        };

        var jobProperties = await DescribeTranslationJobAsync(client, request);
```

```

        DisplayTranslationJobDetails(jobProperties);
    }

    /// <summary>
    /// Retrieve information about an Amazon Translate text translation job.
    /// </summary>
    /// <param name="client">The initialized Amazon Translate client object.</
param>
    /// <param name="request">The DescribeTextTranslationJobRequest object.</
param>
    /// <returns>The TextTranslationJobProperties object containing
    /// information about the text translation job..</returns>
    public static async Task<TextTranslationJobProperties>
DescribeTranslationJobAsync(
    AmazonTranslateClient client,
    DescribeTextTranslationJobRequest request)
    {
        var response = await client.DescribeTextTranslationJobAsync(request);
        if (response.HttpStatusCode == System.Net.HttpStatusCode.OK)
        {
            return response.TextTranslationJobProperties;
        }
        else
        {
            return null;
        }
    }

    /// <summary>
    /// Displays the properties of the text translation job.
    /// </summary>
    /// <param name="jobProperties">The properties of the text translation
    /// job returned by the call to DescribeTextTranslationJobAsync.</param>
    public static void DisplayTranslationJobDetails(TextTranslationJobProperties
jobProperties)
    {
        if (jobProperties is null)
        {
            Console.WriteLine("No text translation job properties found.");
            return;
        }

        // Display the details of the text translation job.
        Console.WriteLine($"{jobProperties.JobId}: {jobProperties.JobName}");
    }

```



```
}  
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [DescribeTextTranslationJob](#)。

ListTextTranslationJobs

以下程式碼範例顯示如何使用 ListTextTranslationJobs。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
using System;  
using System.Collections.Generic;  
using System.Threading.Tasks;  
using Amazon.Translate;  
using Amazon.Translate.Model;  
  
/// <summary>  
/// List Amazon Translate translation jobs, along with details about each job.  
/// </summary>  
public class ListTranslationJobs  
{  
    public static async Task Main()  
    {  
        var client = new AmazonTranslateClient();  
        var filter = new TextTranslationJobFilter  
        {  
            JobStatus = "COMPLETED",  
        };  
  
        var request = new ListTextTranslationJobsRequest  
        {  

```

```

        MaxResults = 10,
        Filter = filter,
    };

    await ListJobsAsync(client, request);
}

/// <summary>
/// List Amazon Translate text translation jobs.
/// </summary>
/// <param name="client">The initialized Amazon Translate client object.</
param>
/// <param name="request">An Amazon Translate
/// ListTextTranslationJobsRequest object detailing which text
/// translation jobs are of interest.</param>
public static async Task ListJobsAsync(
    AmazonTranslateClient client,
    ListTextTranslationJobsRequest request)
{
    ListTextTranslationJobsResponse response;

    do
    {
        response = await client.ListTextTranslationJobsAsync(request);

        ShowTranslationJobDetails(response.TextTranslationJobPropertiesList);

        request.NextToken = response.NextToken;
    }
    while (response.NextToken is not null);
}

/// <summary>
/// List existing translation job details.
/// </summary>
/// <param name="properties">A list of Amazon Translate text
/// translation jobs.</param>
public static void
ShowTranslationJobDetails(List<TextTranslationJobProperties> properties)
{
    properties.ForEach(prop =>
    {
        Console.WriteLine($"{prop.JobId}: {prop.JobName}");
        Console.WriteLine($"Status: {prop.JobStatus}");
    });
}

```

```
        Console.WriteLine($"Submitted time: {prop.SubmittedTime}");  
    });  
}  
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [ListTextTranslationJobs](#)。

StartTextTranslationJob

以下程式碼範例顯示如何使用 StartTextTranslationJob。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
using System;  
using System.Collections.Generic;  
using System.Threading.Tasks;  
using Amazon.Translate;  
using Amazon.Translate.Model;  
  
/// <summary>  
/// This example shows how to use Amazon Translate to process the files in  
/// an Amazon Simple Storage Service (Amazon S3) bucket. The translated results  
/// will also be stored in an Amazon S3 bucket.  
/// </summary>  
public class BatchTranslate  
{  
    public static async Task Main()  
    {  
        var contentType = "text/plain";  
  
        // Set this variable to an S3 bucket location with a folder."  
        // Input files must be in a folder and not at the bucket root."
```

```

        var s3InputUri = "s3://amzn-s3-demo-bucket1/FOLDER/";
        var s3OutputUri = "s3://amzn-s3-demo-bucket2/";

        // This role must have permissions to read the source bucket and to read
and        // write to the destination bucket where the translated text will be
        stored.
        var dataAccessRoleArn = "arn:aws:iam::0123456789ab:role/
S3TranslateRole";

        var client = new AmazonTranslateClient();

        var inputConfig = new InputDataConfig
        {
            ContentType = contentType,
            S3Uri = s3InputUri,
        };

        var outputConfig = new OutputDataConfig
        {
            S3Uri = s3OutputUri,
        };

        var request = new StartTextTranslationJobRequest
        {
            JobName = "ExampleTranslationJob",
            DataAccessRoleArn = dataAccessRoleArn,
            InputDataConfig = inputConfig,
            OutputDataConfig = outputConfig,
            SourceLanguageCode = "en",
            TargetLanguageCodes = new List<string> { "fr" },
        };

        var response = await StartTextTranslationAsync(client, request);

        if (response.HttpStatusCode == System.Net.HttpStatusCode.OK)
        {
            Console.WriteLine($"{response.JobId}: {response.JobStatus}");
        }
    }

    /// <summary>
    /// Start the Amazon Translate text translation job.
    /// </summary>

```

```
    /// <param name="client">The initialized AmazonTranslateClient object.</  
param>  
    /// <param name="request">The request object that includes details such  
    /// as source and destination bucket names and the IAM Role that will  
    /// be used to access the buckets.</param>  
    /// <returns>The StartTextTranslationResponse object that includes the  
    /// details of the request response.</returns>  
    public static async Task<StartTextTranslationJobResponse>  
StartTextTranslationAsync(AmazonTranslateClient client,  
StartTextTranslationJobRequest request)  
    {  
        var response = await client.StartTextTranslationJobAsync(request);  
        return response;  
    }  
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [StartTextTranslationJob](#)。

StopTextTranslationJob

以下程式碼範例顯示如何使用 StopTextTranslationJob。

適用於 .NET 的 SDK

Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
using System;  
using System.Threading.Tasks;  
using Amazon.Translate;  
using Amazon.Translate.Model;  
  
/// <summary>  
/// Shows how to stop a running Amazon Translation Service text translation  
/// job.
```

```

/// </summary>
public class StopTextTranslationJob
{
    public static async Task Main()
    {
        var client = new AmazonTranslateClient();
        var jobId = "1234567890abcdef01234567890abcde";

        var request = new StopTextTranslationJobRequest
        {
            JobId = jobId,
        };

        await StopTranslationJobAsync(client, request);
    }

    /// <summary>
    /// Sends a request to stop a text translation job.
    /// </summary>
    /// <param name="client">Initialized AmazonTrnslateClient object.</param>
    /// <param name="request">The request object to be passed to the
    /// StopTextJobAsync method.</param>
    public static async Task StopTranslationJobAsync(
        AmazonTranslateClient client,
        StopTextTranslationJobRequest request)
    {
        var response = await client.StopTextTranslationJobAsync(request);
        if (response.HttpStatusCode == System.Net.HttpStatusCode.OK)
        {
            Console.WriteLine($"{response.JobId} as status:
{response.JobStatus}");
        }
    }
}

```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [StopTextTranslationJob](#)。

TranslateText

以下程式碼範例顯示如何使用 TranslateText。

適用於 .NET 的 SDK

 Note

GitHub 上提供更多範例。尋找完整範例，並了解如何在 [AWS 程式碼範例儲存庫](#) 中設定和執行。

```
using System;
using System.IO;
using System.Threading.Tasks;
using Amazon.S3;
using Amazon.S3.Transfer;
using Amazon.Translate;
using Amazon.Translate.Model;

/// <summary>
/// Take text from a file stored a Amazon Simple Storage Service (Amazon S3)
/// object and translate it using the Amazon Transfer Service.
/// </summary>
public class TranslateText
{
    public static async Task Main()
    {
        // If the region you want to use is different from the region
        // defined for the default user, supply it as a parameter to the
        // Amazon Translate client object constructor.
        var client = new AmazonTranslateClient();

        // Set the source language to "auto" to request Amazon Translate to
        // automatically detect te language of the source text.

        // You can get a list of the languages supposed by Amazon Translate
        // in the Amazon Translate Developer's Guide here:
        //      https://docs.aws.amazon.com/translate/latest/dg/what-is.html
        string srcLang = "en"; // English.
        string destLang = "fr"; // French.

        // The Amazon Simple Storage Service (Amazon S3) bucket where the
        // source text file is stored.
        string srcBucket = "amzn-s3-demo-bucket";
        string srcTextFile = "source.txt";
```

```

        var srcText = await GetSourceTextAsync(srcBucket, srcTextFile);
        var destText = await TranslatingTextAsync(client, srcLang, destLang,
srcText);

        ShowText(srcText, destText);
    }

    /// <summary>
    /// Use the Amazon S3 TransferUtility to retrieve the text to translate
    /// from an object in an S3 bucket.
    /// </summary>
    /// <param name="srcBucket">The name of the S3 bucket where the
    /// text is stored.
    /// </param>
    /// <param name="srcTextFile">The key of the S3 object that
    /// contains the text to translate.</param>
    /// <returns>A string representing the source text.</returns>
    public static async Task<string> GetSourceTextAsync(string srcBucket, string
srcTextFile)
    {
        string srcText = string.Empty;

        var s3Client = new AmazonS3Client();
        TransferUtility utility = new TransferUtility(s3Client);

        using var stream = await utility.OpenStreamAsync(srcBucket,
srcTextFile);

        StreamReader file = new System.IO.StreamReader(stream);

        srcText = file.ReadToEnd();
        return srcText;
    }

    /// <summary>
    /// Use the Amazon Translate Service to translate the document from the
    /// source language to the specified destination language.
    /// </summary>
    /// <param name="client">The Amazon Translate Service client used to
    /// perform the translation.</param>
    /// <param name="srcLang">The language of the source text.</param>
    /// <param name="destLang">The destination language for the translated
    /// text.</param>

```



```
/// <param name="text">A string representing the text to ranslate.</param>
/// <returns>The text that has been translated to the destination
/// language.</returns>
public static async Task<string> TranslatingTextAsync(AmazonTranslateClient
client, string srcLang, string destLang, string text)
{
    var request = new TranslateTextRequest
    {
        SourceLanguageCode = srcLang,
        TargetLanguageCode = destLang,
        Text = text,
    };

    var response = await client.TranslateTextAsync(request);

    return response.TranslatedText;
}

/// <summary>
/// Show the original text followed by the translated text.
/// </summary>
/// <param name="srcText">The original text to be translated.</param>
/// <param name="destText">The translated text.</param>
public static void ShowText(string srcText, string destText)
{
    Console.WriteLine("Source text:");
    Console.WriteLine(srcText);
    Console.WriteLine();
    Console.WriteLine("Translated text:");
    Console.WriteLine(destText);
}
}
```

- 如需 API 詳細資訊，請參閱《適用於 .NET 的 AWS SDK API 參考》中的 [TranslateText](#)。

案例

建置 Amazon SNS 應用程式

以下程式碼範例示範如何建立具有訂閱和發布功能，並且可轉譯訊息的應用程式。

適用於 .NET 的 SDK

示範如何使用 Amazon Simple Notification Service .NET API 來建立具有訂閱和發布功能的 Web 應用程式。此外，此範例應用程式也會轉譯訊息。

如需完整的原始碼和如何設定及執行的指示，請參閱 [GitHub](#) 上的完整範例。

此範例中使用的服務

- Amazon SNS
- Amazon Translate

建立應用程式以分析客戶意見回饋

下列程式碼範例會示範如何建立可分析客戶評論卡、從其原始語言進行翻譯、判斷對方情緒，以及透過翻譯後的文字產生音訊檔案的應用程式。

適用於 .NET 的 SDK

此範例應用程式會分析和存儲客戶的意見回饋卡。具體來說，它滿足了紐約市一家虛構飯店的需求。飯店以實體評論卡的形式收到賓客以各種語言撰寫的意見回饋。這些意見回饋透過 Web 用戶端上傳至應用程式。評論卡的影像上傳後，系統會執行下列步驟：

- 文字內容是使用 Amazon Textract 從影像中擷取。
- Amazon Comprehend 會決定擷取文字及其用語的情感。
- 擷取的文字內容會使用 Amazon Translate 翻譯成英文。
- Amazon Polly 會使用擷取的文字內容合成音訊檔案。

完整的應用程式可透過 AWS CDK 部署。如需原始程式碼和部署的說明，請參閱 [GitHub](#) 中的專案。

此範例中使用的服務

- Amazon Comprehend
- Lambda
- Amazon Polly
- Amazon Textract
- Amazon Translate

此 AWS 產品或服務的安全性

雲端安全是 Amazon Web Services (AWS) 最重視的一環。身為 AWS 客戶的您，將能從資料中心和網路架構的建置中獲益，以滿足組織最為敏感的安全要求。安全性是 AWS 與您之間共同責任。[共同責任模型](#) 將此描述為雲端本身的安全和雲端內部的安全。

雲端的安全性 – AWS 負責保護執行 AWS 雲端中提供的所有服務的基礎設施，並為您提供可安全使用的服務。我們的安全責任是最高優先順序 AWS，我們的安全有效性由第三方稽核人員定期測試和驗證，作為[AWS 合規計劃](#)的一部分。

雲端的安全性 – 您的責任取決於您使用 AWS 的服務，以及其他因素，包括資料的敏感度、組織的需求，以及適用的法律和法規。

此 AWS 產品或服務會透過其支援的特定 Amazon Web Services (AWS) 服務，遵循[共同責任模型](#)。如需 AWS 服務安全資訊，請參閱[AWS 服務安全文件頁面](#)，以及[AWS 合規計劃在 AWS 合規工作範圍內的服務](#)。

主題

- [此 AWS 產品或服務中的資料保護](#)
- [身分和存取權管理](#)
- [此 AWS 產品或服務的合規驗證](#)
- [此 AWS 產品或服務的彈性](#)
- [此 AWS 產品或服務的基礎設施安全](#)
- [在中強制執行最低 TLS 版本 適用於 .NET 的 AWS SDK](#)
- [Amazon S3 加密用戶端遷移 \(V1 至 V2\)](#)
- [Amazon S3 加密用戶端遷移 \(V2 到 V4\)](#)

此 AWS 產品或服務中的資料保護

AWS [共同責任模型](#)適用於此 AWS 產品或服務中的資料保護。如此模型所述，AWS 負責保護執行所有的全域基礎設施 AWS 雲端。您負責維護在此基礎設施上託管內容的控制權。您也同時負責所使用 AWS 服務的安全組態和管理任務。如需資料隱私權的詳細資訊，請參閱[資料隱私權常見問答集](#)。如需有關歐洲資料保護的相關資訊，請參閱AWS 安全性部落格上的[AWS 共同責任模型和 GDPR](#) 部落格文章。

基於資料保護目的，我們建議您保護 AWS 帳戶 登入資料，並使用 AWS IAM Identity Center 或 AWS Identity and Access Management (IAM) 設定個別使用者。如此一來，每個使用者都只會獲得授與完成其任務所必須的許可。我們也建議您採用下列方式保護資料：

- 每個帳戶均要使用多重要素驗證 (MFA)。
- 使用 SSL/TLS 與 AWS 資源通訊。我們需要 TLS 1.2 並建議使用 TLS 1.3。
- 使用 設定 API 和使用者活動記錄 AWS CloudTrail。如需有關使用 CloudTrail 追蹤擷取 AWS 活動的資訊，請參閱AWS CloudTrail 《使用者指南》中的[使用 CloudTrail 追蹤](#)。
- 使用 AWS 加密解決方案，以及其中的所有預設安全控制 AWS 服務。
- 使用進階的受管安全服務 (例如 Amazon Macie)，協助探索和保護儲存在 Amazon S3 的敏感資料。
- 如果您在 AWS 透過命令列界面或 API 存取 時需要 FIPS 140-3 驗證的密碼編譯模組，請使用 FIPS 端點。如需有關 FIPS 和 FIPS 端點的更多相關資訊，請參閱[聯邦資訊處理標準 \(FIPS\) 140-3](#)。

我們強烈建議您絕對不要將客戶的電子郵件地址等機密或敏感資訊，放在標籤或自由格式的文字欄位中，例如名稱欄位。這包括當您使用此 AWS 產品或服務，或使用主控台、API AWS CLI或 AWS SDKs的其他 AWS 服務 時。您在標籤或自由格式文字欄位中輸入的任何資料都可能用於計費或診斷日誌。如果您提供外部伺服器的 URL，我們強烈建議請勿在驗證您對該伺服器請求的 URL 中包含憑證資訊。

身分和存取權管理

AWS Identity and Access Management (IAM) 是 AWS 服務，可協助管理員安全地控制對 AWS 資源的存取。IAM 管理員可控制誰可以進行驗證（登入）和授權（具有許可）來使用 AWS 資源。IAM 是您可以免費使用 AWS 服務的。

主題

- [目標對象](#)
- [使用身分驗證](#)
- [使用政策管理存取權](#)
- [AWS 服務 如何使用 IAM](#)
- [對 AWS 身分和存取進行故障診斷](#)

目標對象

您使用 AWS Identity and Access Management (IAM) 的方式會有所不同，取決於您在 中執行的工作 AWS。

服務使用者 – 如果您使用 AWS 服務 執行任務，管理員會為您提供所需的登入資料和許可。當您使用更多 AWS 功能來執行工作時，您可能需要額外的許可。了解存取許可的管理方式可協助您向管理員請求正確的許可。如果您無法存取 中的功能 AWS，請參閱 [對 AWS 身分和存取進行故障診斷](#)或 AWS 服務 您正在使用的 使用者指南。

服務管理員 – 如果您負責公司 AWS 的資源，您可能擁有 的完整存取權 AWS。您的任務是判斷服務使用者應存取哪些 AWS 功能和資源。接著，您必須將請求提交給您的 IAM 管理員，來變更您服務使用者的許可。檢閱此頁面上的資訊，了解 IAM 的基本概念。若要進一步了解貴公司如何使用 IAM AWS，請參閱您正在使用的 使用者指南 AWS 服務。

IAM 管理員：如果您是 IAM 管理員，建議您掌握如何撰寫政策以管理 AWS 存取權的詳細資訊。若要檢視您可以在 IAM 中使用的以 AWS 身分為基礎的政策範例，請參閱 AWS 服務 您正在使用的 使用者指南。

使用身分驗證

身分驗證是您 AWS 使用身分憑證登入 的方式。您必須以 AWS 帳戶根使用者、IAM 使用者或擔任 IAM 角色身分進行身分驗證。

您可以使用身分來源的登入資料，例如 AWS IAM Identity Center (IAM Identity Center)、單一登入身分驗證或 Google/Facebook 登入資料，以聯合身分的形式登入。如需有關登入的詳細資訊，請參閱《AWS 登入 使用者指南》中的 [如何登入您的 AWS 帳戶](#)。

對於程式設計存取，AWS 提供 SDK 和 CLI 以密碼編譯方式簽署請求。如需詳細資訊，請參閱《IAM 使用者指南》中的 [API 請求的AWS 第 4 版簽署程序](#)。

AWS 帳戶 根使用者

當您建立 時 AWS 帳戶，您會從一個名為 AWS 帳戶 theroot 使用者的登入身分開始，該身分具有對所有 AWS 服務 和 資源的完整存取權。強烈建議不要使用根使用者來執行日常任務。有關需要根使用者憑證的任務，請參閱《IAM 使用者指南》中的 [需要根使用者憑證的任務](#)。

聯合身分

最佳實務是要求人類使用者使用聯合身分提供者，以 AWS 服務 使用臨時憑證存取。

聯合身分是您企業目錄、Web 身分提供者的使用者，或使用來自身分來源的 AWS 服務憑證存取 Directory Service。聯合身分會擔任角色，而該角色會提供臨時憑證。

若需集中化管理存取權限，建議使用 AWS IAM Identity Center。如需詳細資訊，請參閱 AWS IAM Identity Center 使用者指南中的[什麼是 IAM Identity Center？](#)。

IAM 使用者和群組

IAM 使用者https://docs.aws.amazon.com/IAM/latest/UserGuide/id_users.html是一種身分具備單人或應用程式的特定許可權。建議以臨時憑證取代具備長期憑證的 IAM 使用者。如需詳細資訊，請參閱《IAM 使用者指南》中的[要求人類使用者使用聯合身分提供者來 AWS 使用臨時憑證存取](#)。

[IAM 群組](#)會指定 IAM 使用者集合，使管理大量使用者的許可權更加輕鬆。如需詳細資訊，請參閱《IAM 使用者指南》中的[IAM 使用者的使用案例](#)。

IAM 角色

IAM 角色https://docs.aws.amazon.com/IAM/latest/UserGuide/id_roles.html的身分具有特定許可權，其可以提供臨時憑證。您可以透過[從使用者切換到 IAM 角色（主控台）](#)或呼叫 AWS CLI 或 AWS API 操作來擔任角色。如需詳細資訊，請參閱《IAM 使用者指南》中的[擔任角色的方法](#)。

IAM 角色適用於聯合身分使用者存取、臨時 IAM 使用者許可、跨帳戶存取權與跨服務存取，以及在 Amazon EC2 執行的應用程式。如需詳細資訊，請參閱《IAM 使用者指南》中的[IAM 中的快帳戶資源存取](#)。

使用政策管理存取權

您可以透過建立政策並將其連接到身分或資源 AWS 來控制 AWS 中的存取。政策定義與身分或資源相關聯的許可。當委託人提出請求時 AWS，會評估這些政策。大多數政策會以 JSON 文件 AWS 的形式存放在中。如需進一步了解 JSON 政策文件，請參閱《IAM 使用者指南》中的[JSON 政策概觀](#)。

管理員會使用政策，透過定義哪些主體可在哪些條件下對哪些資源執行動作，以指定可存取的範圍。

預設情況下，使用者和角色沒有許可。IAM 管理員會建立 IAM 政策並將其新增至角色，供使用者後續擔任。IAM 政策定義動作的許可，無論採用何種方式執行。

身分型政策

身分型政策是附加至身分 (使用者、使用者群組或角色) 的 JSON 許可政策文件。這類政策控制身分可對哪些資源執行哪些動作，以及適用的條件。如需了解如何建立身分型政策，請參閱《IAM 使用者指南》中的[透過客戶管理政策定義自訂 IAM 許可](#)。

身分型政策可分為內嵌政策 (直接內嵌於單一身分) 與受管政策 (可附加至多個身分的獨立政策)。如需了解如何在受管政策及內嵌政策之間做選擇，請參閱《IAM 使用者指南》中的[在受管政策與內嵌政策之間選擇](#)。

資源型政策

資源型政策是附加到資源的 JSON 政策文件。範例包括 IAM 角色信任政策與 Amazon S3 儲存貯體政策。在支援資源型政策的服務中，服務管理員可以使用它們來控制對特定資源的存取權限。您必須在資源型政策中[指定主體](#)。

資源型政策是位於該服務中的內嵌政策。您無法在資源型政策中使用來自 IAM 的 AWS 受管政策。

存取控制清單 (ACL)

存取控制清單 (ACL) 可控制哪些主體 (帳戶成員、使用者或角色) 擁有存取某資源的許可。ACL 類似於資源型政策，但它們不使用 JSON 政策文件格式。

Amazon S3 AWS WAF 和 Amazon VPC 是支援 ACLs 的服務範例。如需進一步了解 ACL，請參閱《Amazon Simple Storage Service 開發人員指南》中的[存取控制清單 \(ACL\) 概觀](#)。

其他政策類型

AWS 支援其他政策類型，可設定更多常見政策類型授予的最大許可：

- 許可界限 — 設定身分型政策可授與 IAM 實體的最大許可。如需詳細資訊，請參閱《IAM 使用者指南》中的[IAM 實體許可界限](#)。
- 服務控制政策 (SCP) — 為 AWS Organizations 中的組織或組織單位指定最大許可。如需詳細資訊，請參閱《AWS Organizations 使用者指南》中的[服務控制政策](#)。
- 資源控制政策 (RCP) — 設定您帳戶中資源可用許可的上限。如需詳細資訊，請參閱《AWS Organizations 使用者指南》中的[資源控制政策 \(RCP\)](#)。
- 工作階段政策 — 在以程式設計方式為角色或聯合身分使用者建立臨時工作階段時，以參數形式傳遞的進階政策。如需詳細資訊，請參閱《IAM 使用者指南》中的[工作階段政策](#)。

多種政策類型

當多種類型的政策適用於請求時，產生的許可會更複雜而無法理解。若要了解如何 AWS 在涉及多種政策類型時決定是否允許請求，請參閱《IAM 使用者指南》中的[政策評估邏輯](#)。

AWS 服務 如何使用 IAM

若要深入了解 如何使用 AWS 服務 大多數 IAM 功能，請參閱《IAM 使用者指南》中的[AWS 使用 IAM 的服務](#)。

若要了解如何 AWS 服務 搭配 IAM 使用特定，請參閱相關服務使用者指南的安全章節。

對 AWS 身分和存取進行故障診斷

使用以下資訊來協助您診斷和修正使用 AWS 和 IAM 時可能遇到的常見問題。

主題

- [我無權在 中執行動作 AWS](#)
- [我未獲得執行 iam:PassRole 的授權](#)
- [我想要允許 以外的人員 AWS 帳戶 存取我的 AWS 資源](#)

我無權在 中執行動作 AWS

如果您收到錯誤，告知您未獲授權執行動作，您的政策必須更新，允許您執行動作。

下列範例錯誤會在mateojackson IAM 使用者嘗試使用主控台檢視一個虛構 *my-example-widget* 資源的詳細資訊，但卻無虛構 `awes:GetWidget` 許可時發生。

```
User: arn:aws:iam::123456789012:user/mateojackson is not authorized to perform:
awes:GetWidget on resource: my-example-widget
```

在此情況下，必須更新 mateojackson 使用者的政策，允許使用 `awes:GetWidget` 動作存取 *my-example-widget* 資源。

如果您需要協助，請聯絡您的 AWS 管理員。您的管理員提供您的簽署憑證。

我未獲得執行 iam:PassRole 的授權

如果您收到錯誤，告知您未獲授權執行 `iam:PassRole` 動作，您的政策必須更新，允許您將角色傳遞給 AWS。

有些 AWS 服務 可讓您將現有角色傳遞給該服務，而不是建立新的服務角色或服務連結角色。如需執行此作業，您必須擁有將角色傳遞至該服務的許可。

名為 marymajor 的 IAM 使用者嘗試使用主控台在 AWS 中執行動作時，發生下列範例錯誤。但是，動作要求服務具備服務角色授予的許可。Mary 沒有將角色傳遞給服務的許可。

```
User: arn:aws:iam::123456789012:user/marymajor is not authorized to perform:
iam:PassRole
```

在這種情況下，Mary 的政策必須更新，允許她執行 iam:PassRole 動作。

如果您需要協助，請聯絡您的 AWS 管理員。您的管理員提供您的簽署憑證。

我想要允許以外的人員 AWS 帳戶 存取我的 AWS 資源

您可以建立一個角色，讓其他帳戶中的使用者或您組織外部的人員存取您的資源。您可以指定要允許哪些信任物件取得該角色。針對支援基於資源的政策或存取控制清單 (ACL) 的服務，您可以使用那些政策來授予人員存取您的資源的許可。

如需進一步了解，請參閱以下內容：

- 若要了解 是否 AWS 支援這些功能，請參閱 [AWS 服務 如何使用 IAM](#)。
- 若要了解如何 AWS 帳戶 在您擁有的 資源之間提供存取權，請參閱《[IAM 使用者指南](#)》中的 [在您擁有 AWS 帳戶 的另一個 IAM 使用者中提供存取權](#)。
- 若要了解如何將資源的存取權提供給第三方 AWS 帳戶，請參閱《IAM 使用者指南》中的 [將存取權提供給第三方 AWS 帳戶 擁有](#)。
- 如需了解如何透過聯合身分提供存取權，請參閱《IAM 使用者指南》中的 [將存取權提供給在外部進行身分驗證的使用者 \(聯合身分\)](#)。
- 如需了解使用角色和資源型政策進行跨帳戶存取之間的差異，請參閱《IAM 使用者指南》中的 [IAM 中的跨帳戶資源存取](#)。

此 AWS 產品或服務的合規驗證

若要了解 AWS 服務 是否在特定合規計劃範圍內，請參閱[AWS 服務 合規計劃範圍內](#)然後選擇您感興趣的合規計劃。如需一般資訊，請參閱[AWS 合規計劃](#)。

您可以使用 下載第三方稽核報告 AWS Artifact。如需詳細資訊，請參閱[下載報告 in AWS Artifact](#)

您使用 時的合規責任 AWS 服務 取決於資料的機密性、您公司的合規目標，以及適用的法律和法規。如需使用 時合規責任的詳細資訊 AWS 服務，請參閱 [AWS 安全文件](#)。

此 AWS 產品或服務會透過其支援的特定 Amazon Web Services (AWS) 服務，遵循[共同責任模型](#)。如需 AWS 服務安全資訊，請參閱[AWS 服務安全文件頁面](#)，以及[AWS 合規計劃在 AWS 合規工作範圍內的服務](#)。

此 AWS 產品或服務的彈性

AWS 全球基礎設施是以 AWS 區域 和可用區域為基礎建置。

AWS 區域 提供多個實體分隔和隔離的可用區域，這些可用區域與低延遲、高輸送量和高備援聯網連接。

透過可用區域，您可以設計與操作的應用程式和資料庫，在可用區域之間自動容錯移轉而不會發生中斷。可用區域的可用性、容錯能力和擴展能力，均較單一或多個資料中心的傳統基礎設施還高。

如需 AWS 區域和可用區域的詳細資訊，請參閱 [AWS 全球基礎設施](#)。

此 AWS 產品或服務會透過其支援的特定 Amazon Web Services (AWS) 服務，遵循[共同責任模型](#)。如需 AWS 服務安全資訊，請參閱[AWS 服務安全文件頁面](#)，以及[AWS 合規計劃在 AWS 合規工作範圍內的服務](#)。

此 AWS 產品或服務的基礎設施安全

此 AWS 產品或服務使用 受管服務，因此受到 全球網路安全的 AWS 保護。如需 AWS 安全服務以及如何 AWS 保護基礎設施的資訊，請參閱[AWS 雲端安全](#)。若要使用基礎設施安全的最佳實務來設計您的 AWS 環境，請參閱安全支柱 AWS Well-Architected Framework 中的[基礎設施保護](#)。

您可以使用 AWS 發佈的 API 呼叫，透過網路存取此 AWS 產品或服務。使用者端必須支援下列專案：

- Transport Layer Security (TLS)。我們需要 TLS 1.2 並建議使用 TLS 1.3。
- 具備完美轉送私密(PFS)的密碼套件，例如 DHE (Ephemeral Diffie-Hellman)或 ECDHE (Elliptic Curve Ephemeral Diffie-Hellman)。現代系統(如 Java 7 和更新版本)大多會支援這些模式。

此外，請求必須使用存取金鑰 ID 和與 IAM 主體相關聯的私密存取金鑰來簽署。或者，您可以透過 [AWS Security Token Service](#) (AWS STS) 來產生暫時安全憑證來簽署請求。

此 AWS 產品或服務會透過其支援的特定 Amazon Web Services (AWS) 服務，遵循[共同責任模型](#)。如需 AWS 服務安全資訊，請參閱[AWS 服務安全文件頁面](#)，以及[AWS 合規計劃在 AWS 合規工作範圍內的服務](#)。

在中強制執行最低 TLS 版本 適用於 .NET 的 AWS SDK

若要在與 AWS 服務通訊時提高安全性，您應該 適用於 .NET 的 AWS SDK 將設定為使用 TLS 1.2 或更新版本。

適用於 .NET 的 AWS SDK 使用基礎 .NET 執行時間來決定要使用的安全通訊協定。根據預設，.NET 的目前版本會使用作業系統支援之最新設定的通訊協定。應用程式可覆寫此開發套件行為，但「不建議」這麼做。

.NET Core

根據預設，.NET Core 會使用作業系統支援之最新設定的通訊協定。適用於 .NET 的 AWS SDK 未提供覆寫此行為的機制。

如果您是使用比 2.1 更舊的 .NET Core 版本，「強烈」建議您升級 .NET Core 版本。

請參閱下列各個作業系統的特定資訊。

Windows

Windows 的現代化分發會[依預設啟用](https://learn.microsoft.com/en-us/windows-server/security/tls/tls-registry-settings#tls-12) TLS 1.2 支援。如果您在 Windows 7 SP1 或 Windows Server 2008 R2 SP1 上執行，則需要確保已在登錄檔中啟用 TLS 1.2 支援，如 <https://learn.microsoft.com/en-us/windows-server/security/tls/tls-registry-settings#tls-12> 所述。如果執行的是較舊的分發，則必須升級作業系統。如需有關 Windows 中 TLS 1.3 支援的資訊，請查看最新的 Microsoft 文件，了解最低必要用戶端或伺服器版本。

macOS

如果執行的是 .NET Core 2.1 或更新版本，會依預設啟用 TLS 1.2。[OS X Mavericks v10.9 或更新版本支援 TLS 1.2](https://learn.microsoft.com/en-us/dotnet/core/install/windows?tabs=net80&pivots=os-macos)。 .NET Core 2.1 版和更新版本需要更新版本的 macOS，如 <https://learn.microsoft.com/en-us/dotnet/core/install/windows?tabs=net80&pivots=os-macos>：// 所述。

如果您使用的是 .NET Core 1.0，.NET Core 會[在 macOS 上使用 OpenSSL](#)，這是必須另外安裝的相依項目。OpenSSL 在 1.0.1 版中新增了對 TLS 1.2 的支援，並在 1.1.1 版中新增了對 TLS 1.3 的支援。

Linux

Linux 上的 .NET Core 需要使用許多 Linux 分發隨附綁定的 OpenSSL，但也可以另外個別安裝。OpenSSL 在 1.0.1 版中新增了對 TLS 1.2 的支援，並在 1.1.1 版中新增了對 TLS 1.3 的支援。如果您是使用 .NET Core 的現代化版本 (2.1 或更新版本)，且已安裝套件管理員，可能已為您安裝 OpenSSL 更現代化的版本。

若要確認，您可以在終端機視窗中執行 `openssl version`，然後驗證版本確實比 1.0.1 更新。

.NET Framework

如果您執行的是 .NET Framework 的現代化版本 (4.7 或更新版本) 以及 Windows 的現代化版本 (至少是適用於用戶端的 Windows 8、適用於伺服器的 Windows Server 2012 或更新版本)，會依預設啟用並使用 TLS 1.2。

如果您使用的是未使用作業系統設定的 .NET Framework 執行期 (.NET Framework 3.5 到 4.5.2)，適用於 .NET 的 AWS SDK 會嘗試將 [TLS 1.1 和 TLS 1.2 的支援新增至](#)支援的通訊協定。如果您使用的是 .NET Framework 3.5，這只有在已安裝適當的熱修補程式時才會成功，如下所示：

- Windows 10 版本 1511 和 Windows Server 2016 – [KB3156421](#)
- Windows 8.1 和 Windows Server 2012 R2 – [KB3154520](#)
- Windows Server 2012 – [KB3154519](#)
- Windows 7 SP1 和 Server 2008 R2 SP1 – [KB3154518](#)

Warning

從 2024 年 8 月 15 日開始，適用於 .NET 的 AWS SDK 將結束對 .NET Framework 3.5 的支援，並將最低 .NET Framework 版本變更為 4.7.2。如需詳細資訊，請參閱部落格文章 [.NET Framework 3.5 和 4.5 目標的重要變更 適用於 .NET 的 AWS SDK](#)。

如果您的應用程式在 Windows 7 SP1 或 Windows Server 2008 R2 SP1 上較新的 .NET Framework 上執行，您需要確保在登錄檔中啟用 TLS 1.2 支援，如 <https://learn.microsoft.com/en-us/windows-server/security/tls/tls-registry-settings#tls-12> 所述。Windows 更新版本會依預設啟用該支援。

如需搭配 .NET Framework 使用 TLS 的詳細最佳實務，請參閱 Microsoft 文章：<https://learn.microsoft.com/en-us/dotnet/framework/network-programming/tls>。

AWS Tools for PowerShell

[AWS Tools for PowerShell](#) 使用適用於 .NET 的 AWS SDK 進行對 AWS 服務的所有呼叫。環境的行為取決於執行的 Windows PowerShell 版本，如下所示。

經由 5.x 的 Windows PowerShell 2.0

經由 5.x 的 Windows PowerShell 2.0 可在 .NET Framework 上執行。您可以使用下列命令，驗證 PowerShell 使用的是哪個 .NET 執行時間 (2.0 或 4.0)。

```
$PSVersionTable.CLRVersion
```

- 若使用 .NET 執行時間 2.0，請按照上述有關 適用於 .NET 的 AWS SDK 和 .NET Framework 3.5 的指示進行。

Warning

從 2024 年 8 月 15 日開始，適用於 .NET 的 AWS SDK 將結束對 .NET Framework 3.5 的支援，並將最低 .NET Framework 版本變更為 4.7.2。如需詳細資訊，請參閱部落格文章 [.NET Framework 3.5 和 4.5 目標的重要變更 適用於 .NET 的 AWS SDK](#)。

- 若使用 .NET 執行時間 4.0，請按照上述有關 適用於 .NET 的 AWS SDK 和 .NET Framework 4+ 的指示進行。

Windows PowerShell 6.0

Windows PowerShell 6.0 和更新版本會在 .NET Core 上執行。您可以執行下列命令，驗證 .NET Core 使用的是哪個版本。

```
[System.Reflection.Assembly]::GetEntryAssembly().GetCustomAttributes([System.Runtime.Versioning.FrameworkName], $true).FrameworkName
```

請遵循先前提供的有關 適用於 .NET 的 AWS SDK 和相關 .NET Core 版本的指示。

Xamarin

如需 Xamarin，請參閱 <https://learn.microsoft.com/en-us/xamarin/cross-platform/app-fundamentals/transport-layer-security>。綜上所述：

適用於 Android

- 需要 Android 5.0 或更新版本。
- Project Properties (專案屬性)、Android Options (Android 選項)：HttpClient 實作必須設為 Android 且 SSL/TLS 實作必須設為 Native TLS 1.2+ (原生 TLS 1.2+)。

適用於 iOS

- 需要 iOS 7 或更新版本。
- Project Properties (專案屬性)、iOS Build (iOS 組建) : HttpClient 實作必須設為 NSURLSession。

適用於 macOS

- 需要 macOS 10.9 或更新版本。
- Project Options (專案選項)、Build (組建)、Mac Build (Mac 組建) : HttpClient 實作必須設為 NSURLSession。

Unity

您必須使用 Unity 2018.2 或更新版本，並使用等同於 .NET 4.x 的指令碼編寫執行時間。您可以在 Project Settings (專案設定)、Configuration (組態)、Player (播放器) 中設定此選項，如 <https://docs.unity3d.com/2019.1/Documentation/Manual/ScriptingRuntimeUpgrade.html> 所述。等同於 .NET 4.x 的指令碼編寫執行時間會對執行 Mono or IL2CPP 的所有 Unity 平台啟用 TLS 1.2 支援。

瀏覽器 (適用於 Blazor WebAssembly)

WebAssembly 會在瀏覽器 (而不是伺服器) 中執行，並使用瀏覽器來處理 HTTP 流量。因此，TLS 支援是取決於瀏覽器支援。

Blazor WebAssembly 在 ASP.NET Core 3.1 預覽版中僅支援支援 WebAssembly 的瀏覽器，如 <https://learn.microsoft.com/en-us/aspnet/core/blazor/supported-platforms> 所述。所有主流瀏覽器在支援 WebAssembly 之前均已支援 TLS 1.2。如果您瀏覽器的情況是像這樣，則在應用程式執行時，該應用程式就能透過 TLS 1.2 進行通訊。

若要取得詳細資訊並進行確認，請參閱瀏覽器的文件。

Amazon S3 加密用戶端遷移 (V1 至 V2)

Note

如果您使用 V2 且想要遷移至 V4，請參閱 [Amazon S3 加密用戶端遷移 \(V2 到 V4\)](#)。

本主題說明如何將應用程式從 Amazon Simple Storage Service (Amazon S3) 加密用戶端的第 1 版 (V1) 遷移到第 2 版 (V2)，並確保在整個遷移過程中的應用程式可用性。

使用 V2 用戶端加密的物件無法使用 V1 用戶端解密。為了簡化遷移至新用戶端，而不必一次重新加密所有物件，已提供「V1-transitional」用戶端。此用戶端可以解密 V1 和 V2-encrypted 物件，但只會以 V1-compatible 格式加密物件。V2 用戶端可以解密 V1 和 V2-encrypted 物件（啟用 V1 物件時），但只會以 V2-compatible 格式加密物件。

遷移概觀

此遷移分三個階段進行。此處會介紹這些階段，稍後會詳細說明。在下一個階段開始之前，所有使用共用物件的用戶端都必須完成每個階段。

1. 將現有用戶端更新為 V1-transitional 用戶端，以讀取新格式。首先，更新您的應用程式以對 V1-transitional 用戶端取代 V1 用戶端取得相依性。V1-transitional 用戶端可讓您現有的程式碼解密由新的 V2 用戶端寫入的物件，以及 V1-compatible 格式寫入的物件。

Note

V1-transitional 用戶端僅供遷移之用。移至 V1 轉換用戶端後，繼續升級至 V2 用戶端。
V1-transitional

2. 將 V1-transitional 用戶端遷移至 V2 用戶端以寫入新格式。接著，使用 V1-transitional 用戶端，並將安全性設定檔設定為 V2AndLegacy。V2 在 V2 用戶端上設定此安全性設定檔可讓這些用戶端解密以 V1-compatible 格式加密的物件。
3. 更新 V2 用戶端以不再讀取 V1 格式。最後，在所有用戶端遷移至 V2 且所有物件都已以 V2-compatible 格式加密或重新加密後，請將 V2 安全設定檔設定為 V2 而非 V2AndLegacy。這可防止解密 V1-compatible 格式的物件。

將現有用戶端更新為 V1-transitional 用戶端以讀取新格式

V2 加密用戶端使用舊版用戶端不支援的加密演算法。遷移的第一步是更新您的 V1 解密用戶端，以便他們可以讀取新格式。

V1-transitional 用戶端可讓您的應用程式解密 V1 和 V2-encrypted 物件。此用戶端是 [Amazon.Extensions.S3.Encryption](#) NuGet 套件的一部分。在每個應用程式上執行下列步驟，以使用 V1-transitional 用戶端。

1. 對 [Amazon.Extensions.S3.Encryption](#) 套件採用新的相依性。如果您的專案直接依賴 AWSSDK.S3 或 AWSSDK.KeyManagementService 套件，您必須更新或移除這些相依性，以便使用此新套件提取其更新版本。

2. 將適當的using陳述式從 Amazon.S3.Encryption變更為 Amazon.Extensions.S3.Encryption，如下所示：

```
// using Amazon.S3.Encryption;  
using Amazon.Extensions.S3.Encryption;
```

3. 重建並重新部署您的應用程式。

V1-transitional 用戶端與 V1 用戶端完全 API 相容，因此不需要其他程式碼變更。

將 V1-transitional用戶端遷移至 V2 用戶端以寫入新格式

V2 用戶端是 [Amazon.Extensions.S3.Encryption](#) NuGet 套件的一部分。它可讓您的應用程式解密 V1 和 V2-encrypted的物件（如果設定為這樣做），但只會以 V2-compatible格式加密物件。

更新現有用戶端以讀取新的加密格式後，您可以繼續將應用程式安全地更新為 V2 加密和解密用戶端。在每個應用程式上執行下列步驟，以使用 V2 用戶端：

1. 將 EncryptionMaterials 變更為 EncryptionMaterialsV2。
 - a. 使用 KMS 時：
 - i. 提供 KMS 金鑰 ID。
 - ii. 宣告您正在使用的加密方法，也就是 KmsType.KmsContext。
 - iii. 提供加密內容給 KMS，以與此資料金鑰建立關聯。您可以傳送空白字典 (Amazon 加密內容仍會合併)，但建議提供額外的內容。
 - b. 使用使用者提供的金鑰包裝方法（對稱或非對稱加密）時：
 - i. 提供包含加密資料的 AES或 RSA執行個體。
 - ii. 宣告要使用的加密演算法，也就是 SymmetricAlgorithmType.AesGcm或 AsymmetricAlgorithmType.RsaOaepSha1。
2. AmazonS3CryptoConfiguration 將 SecurityProfile 屬性設為 AmazonS3CryptoConfigurationV2時，將 變更為 SecurityProfile.V2AndLegacy。
3. 將 AmazonS3EncryptionClient 變更為 AmazonS3EncryptionClientV2。此用戶端會採用先前步驟中新轉換的 AmazonS3CryptoConfigurationV2和 EncryptionMaterialsV2 物件。

範例：KMS 到 KMS+Context

預遷移

```
using System.Security.Cryptography;
using Amazon.S3.Encryption;

var encryptionMaterial = new
    EncryptionMaterials("1234abcd-12ab-34cd-56ef-1234567890ab");
var configuration = new AmazonS3CryptoConfiguration()
{
    StorageMode = CryptoStorageMode.ObjectMetadata
};
var encryptionClient = new AmazonS3EncryptionClient(configuration, encryptionMaterial);
```

遷移後

```
using System.Security.Cryptography;
using Amazon.Extensions.S3.Encryption;
using Amazon.Extensions.S3.Encryption.Primitives;

var encryptionContext = new Dictionary<string, string>();
var encryptionMaterial = new
    EncryptionMaterialsV2("1234abcd-12ab-34cd-56ef-1234567890ab", KmsType.KmsContext,
    encryptionContext);
var configuration = new AmazonS3CryptoConfigurationV2(SecurityProfile.V2AndLegacy)
{
    StorageMode = CryptoStorageMode.ObjectMetadata
};
var encryptionClient = new AmazonS3EncryptionClientV2(configuration,
    encryptionMaterial);
```

範例：對稱演算法 (AES-CBC 到 AES-GCM 金鑰包裝)

StorageMode 可以是 ObjectMetadata 或 InstructionFile。

預遷移

```
using System.Security.Cryptography;
using Amazon.S3.Encryption;

var symmetricAlgorithm = Aes.Create();
var encryptionMaterial = new EncryptionMaterials(symmetricAlgorithm);
```

```
var configuration = new AmazonS3CryptoConfiguration()
{
    StorageMode = CryptoStorageMode.ObjectMetadata
};
var encryptionClient = new AmazonS3EncryptionClient(configuration, encryptionMaterial);
```

遷移後

```
using System.Security.Cryptography;
using Amazon.Extensions.S3.Encryption;
using Amazon.Extensions.S3.Encryption.Primitives;

var symmetricAlgorithm = Aes.Create();
var encryptionMaterial = new EncryptionMaterialsV2(symmetricAlgorithm,
    SymmetricAlgorithmType.AesGcm);
var configuration = new AmazonS3CryptoConfigurationV2(SecurityProfile.V2AndLegacy)
{
    StorageMode = CryptoStorageMode.ObjectMetadata
};
var encryptionClient = new AmazonS3EncryptionClientV2(configuration,
    encryptionMaterial);
```

Note

使用 AES-GCM 解密時，請先將整個物件讀到結尾，再開始使用解密的資料。這是為了驗證物件在加密後尚未修改。

範例：非對稱演算法 (RSA 到 RSA-OAEP-SHA1 金鑰包裝)

StorageMode 可以是 ObjectMetadata 或 InstructionFile。

預遷移

```
using System.Security.Cryptography;
using Amazon.S3.Encryption;

var asymmetricAlgorithm = RSA.Create();
var encryptionMaterial = new EncryptionMaterials(asymmetricAlgorithm);
var configuration = new AmazonS3CryptoConfiguration()
{
    StorageMode = CryptoStorageMode.ObjectMetadata
```

```
};  
var encryptionClient = new AmazonS3EncryptionClient(configuration, encryptionMaterial);
```

遷移後

```
using System.Security.Cryptography;  
using Amazon.Extensions.S3.Encryption;  
using Amazon.Extensions.S3.Encryption.Primitives;  
  
var asymmetricAlgorithm = RSA.Create();  
var encryptionMaterial = new EncryptionMaterialsV2(asymmetricAlgorithm,  
    AsymmetricAlgorithmType.RsaOaepSha1);  
var configuration = new AmazonS3CryptoConfigurationV2(SecurityProfile.V2AndLegacy)  
{  
    StorageMode = CryptoStorageMode.ObjectMetadata  
};  
var encryptionClient = new AmazonS3EncryptionClientV2(configuration,  
    encryptionMaterial);
```

將 V2 用戶端更新為不再讀取 V1 格式

最後，所有物件都將使用 V2 用戶端進行加密或重新加密。此轉換完成後，您可以透過將 `SecurityProfile` 屬性設定為 `來停用 V2 用戶端中的 V1 相容性` `SecurityProfile.V2`，如下列程式碼片段所示。V2

```
//var configuration = new AmazonS3CryptoConfigurationV2(SecurityProfile.V2AndLegacy);  
var configuration = new AmazonS3CryptoConfigurationV2(SecurityProfile.V2);
```

Amazon S3 加密用戶端遷移 (V2 到 V4)

Note

如果您使用 V1 且想要遷移至 V4，您必須先遷移至 V2。請參閱 [Amazon S3 加密用戶端遷移 \(V1 至 V2\)](#)。

本主題說明如何將應用程式從 Amazon Simple Storage Service (Amazon S3) 加密用戶端的第 2 版 (V2) 遷移到第 4 版 (V4)，並確保在整個遷移過程中的應用程式可用性。V4 使用 AES-GCM 與內容加密的金鑰承諾，並引進承諾政策來增強對金鑰替代攻擊的安全性。

V4 用戶端可在 [Amazon.Extensions.S3.Encryption](#) NuGet 套件中使用。

Important

重大變更：使用 `REQUIRE_ENCRYPT_REQUIRE_DECRYPT` 政策設定的 V4 用戶端無法解密使用 V1 或 V2 用戶端加密的物件。只有最新的 V2 用戶端可以使用金鑰承諾解密 V4-encrypted 物件。移至 `REQUIRE_ENCRYPT_REQUIRE_DECRYPT` 政策之前，您必須使用已啟用金鑰承諾的 V4 用戶端重新加密所有現有資料。

了解 V4 概念

V4 使用 AES-GCM 與內容加密的金鑰承諾，並引入增強加密資料保護的金鑰安全概念：

承諾政策

承諾政策控制加密用戶端在加密和解密操作期間處理金鑰承諾的方式。V4 支援三種承諾政策：

`FORBID_ENCRYPT_ALLOW_DECRYPT`

加密：沒有承諾

解密：允許非遞交物件

安全性：不強制執行承諾，並可能允許竄改

相容性：所有 V2 和 V4 實作都可以讀取使用此政策加密的物件

`REQUIRE_ENCRYPT_ALLOW_DECRYPT`

加密：使用金鑰承諾

解密：允許遞交和非遞交物件

安全性：新物件受到金鑰替代攻擊的保護，舊物件仍然可讀取

相容性：只有 V4 支援此政策

`REQUIRE_ENCRYPT_REQUIRE_DECRYPT` (V4 的預設)

加密：使用金鑰承諾

解密：僅遞交物件

安全：執行完整承諾以獲得最大的安全性

相容性：只有 V4 支援此政策

具有金鑰承諾的 AES GCM

V4 使用 AES-GCM 與內容加密的金鑰承諾，可提供增強的安全性：

- 竄改保護：它會以密碼編譯方式將金鑰繫結至加密的資料，以防止金鑰替代攻擊。
- 版本相容性：使用金鑰承諾加密的物件只能由 V4 用戶端和更新版本解密。

Warning

在生產環境中啟用金鑰承諾加密之前，請確保需要解密物件的所有應用程式都已升級至 V4 或更新版本，因為 V2 用戶端已棄用。

更新現有用戶端以讀取 V4 格式

V4 加密用戶端使用舊版用戶端不支援的加密演算法。遷移的第一步是更新您的 V2 用戶端，以便他們可以讀取新的 V4 格式。

更新 NuGet 套件相依性

更新您的應用程式，以使用包含 V4 支援的最新版本 [Amazon.Extensions.S3.Encryption](#) NuGet 套件。在每個應用程式上執行下列步驟：

1. 更新至最新的 [Amazon.Extensions.S3.Encryption](#) 套件。如果您的專案直接依賴 AWSSDK.S3 或 AWSSDK.KeyManagementService 套件，您必須更新或移除這些相依性，以便使用此新套件提取其更新版本。
2. 確保您的 using 陳述式參考正確的命名空間：

```
using Amazon.Extensions.S3.Encryption;  
using Amazon.Extensions.S3.Encryption.Primitives;
```

3. 重建並重新部署您的應用程式。

您現有的 V2 用戶端將繼續使用更新的套件，並能夠解密 V4 用戶端加密的物件（取決於所使用的承諾政策）。

建置和部署應用程式

更新 NuGet 套件相依性之後：

1. 建置您的應用程式，以確保正確解決所有相依性。
2. 在開發環境中測試您的應用程式，以驗證現有功能是否繼續運作。
3. 將更新的應用程式部署到您的生產環境。

此更新可讓您現有的 V2 用戶端解密將由 V4 用戶端加密的物件，以確保遷移過程中的相容性。

遷移至 V4 用戶端

更新現有用戶端以讀取新的加密格式後，您可以繼續安全地更新應用程式以使用 V4 加密和解密用戶端。V4 用戶端透過金鑰承諾提供增強的安全性，同時保持與現有加密物件的相容性。

4-Step遷移程序

從 V2 遷移到 V4 遵循結構化的 4 步驟程序，以確保相容性和安全性。每個步驟都代表特定的組態，該組態應該部署到所有應用程式，然後再繼續進行下一個步驟。

1. 步驟 0：V2 用戶端（起點）- 您現有的 V2 實作
2. 步驟 1：具有 V2 相容性的 V4 - 遷移至 V4 用戶端，同時維護 V2-compatible 加密行為
3. 步驟 2：具有金鑰承諾寫入的 V4 - 使用金鑰承諾開始加密，同時允許解密舊版物件
4. 步驟 3：具有完全強制執行的 V4 - 需要加密和解密的金鑰承諾

步驟 0：V2 用戶端（起點）

這代表您現有的 V2 用戶端組態。此步驟示範遷移之前的啟動狀態。

```
using Amazon.Extensions.S3.Encryption;
using Amazon.Extensions.S3.Encryption.Primitives;
using Amazon.S3.Model;

// Step 0: V2 Client - Starting configuration
var encryptionContext = new Dictionary<string, string>();
var encryptionMaterial = new EncryptionMaterialsV2(kmsKeyId, KmsType.KmsContext,
    encryptionContext);
```

```
#pragma warning disable 0618
var configuration = new AmazonS3CryptoConfigurationV2(SecurityProfile.V2);
#pragma warning enable 0618

var encryptionClient = new AmazonS3EncryptionClientV2(configuration,
    encryptionMaterial);

// Use the client for PutObject and GetObject operations
await encryptionClient.PutObjectAsync(new PutObjectRequest
{
    BucketName = bucket,
    Key = objectKey,
    ContentBody = content
});
```

步驟 1：具有 V2 相容性的 V4 V2

遷移至 V4 用戶端，同時維持與 V2 相同的行為。此步驟使用FORBID_ENCRYPT_ALLOW_DECRYPT政策來加密而不承諾，並允許解密所有物件。

```
using Amazon.Extensions.S3.Encryption;
using Amazon.Extensions.S3.Encryption.Primitives;
using Amazon.S3.Model;

// Step 1: V4 Client with V2 compatibility
var encryptionContext = new Dictionary<string, string>();
var encryptionMaterial = new EncryptionMaterialsV4(kmsKeyId, KmsType.KmsContext,
    encryptionContext);

var configuration = new AmazonS3CryptoConfigurationV4(
    SecurityProfile.V4,
    CommitmentPolicy.FORBID_ENCRYPT_ALLOW_DECRYPT,
    ContentEncryptionAlgorithm.AesGcm);

var encryptionClient = new AmazonS3EncryptionClientV4(configuration,
    encryptionMaterial);

// Use the client for PutObject and GetObject operations
await encryptionClient.PutObjectAsync(new PutObjectRequest
{
    BucketName = bucket,
    Key = objectKey,
```

```
        ContentBody = content  
    });
```

行為：在沒有承諾的情況下加密，可以解密遞交和非遞交物件。與 V2 行為相同。

步驟 2：具有金鑰承諾寫入的 V4

使用金鑰承諾開始加密，同時保持解密的回溯相容性。此步驟使用 REQUIRE_ENCRYPT_ALLOW_DECRYPT 政策。

Warning

部署步驟 2 之前，請確定所有讀取器都已更新至步驟 1 或更新版本，以處理金鑰承諾加密。

```
using Amazon.Extensions.S3.Encryption;  
using Amazon.Extensions.S3.Encryption.Primitives;  
using Amazon.S3.Model;  
  
// Step 2: V4 Client with key commitment writes  
var encryptionContext = new Dictionary<string, string>();  
var encryptionMaterial = new EncryptionMaterialsV4(kmsKeyId, KmsType.KmsContext,  
    encryptionContext);  
  
var configuration = new AmazonS3CryptoConfigurationV4(  
    SecurityProfile.V4,  
    CommitmentPolicy.REQUIRE_ENCRYPT_ALLOW_DECRYPT,  
    ContentEncryptionAlgorithm.AesGcmWithCommitment);  
  
var encryptionClient = new AmazonS3EncryptionClientV4(configuration,  
    encryptionMaterial);  
  
// Use the client for PutObject and GetObject operations  
await encryptionClient.PutObjectAsync(new PutObjectRequest  
{  
    BucketName = bucket,  
    Key = objectKey,  
    ContentBody = content  
});
```

行為：使用承諾加密，可以解密遞交和非遞交物件。新的物件會受到金鑰替代攻擊的保護。

步驟 3：具有完全強制執行的 V4

加密和解密都需要金鑰承諾。此步驟使用 `REQUIRE_ENCRYPT_REQUIRE_DECRYPT` 政策來達到最大的安全性。

Warning

部署步驟 3 之前，請確定系統中的所有物件都已透過金鑰承諾重新加密（步驟 2）。此步驟將無法解密未經承諾加密的物件。

```
using Amazon.Extensions.S3.Encryption;
using Amazon.Extensions.S3.Encryption.Primitives;
using Amazon.S3.Model;

// Step 3: V4 Client with full key commitment enforcement
var encryptionContext = new Dictionary<string, string>();
var encryptionMaterial = new EncryptionMaterialsV4(kmsKeyId, KmsType.KmsContext,
    encryptionContext);

var configuration = new AmazonS3CryptoConfigurationV4(
    SecurityProfile.V4,
    CommitmentPolicy.REQUIRE_ENCRYPT_REQUIRE_DECRYPT,
    ContentEncryptionAlgorithm.AesGcmWithCommitment);

var encryptionClient = new AmazonS3EncryptionClientV4(configuration,
    encryptionMaterial);

// Use the client for PutObject and GetObject operations
await encryptionClient.PutObjectAsync(new PutObjectRequest
{
    BucketName = bucket,
    Key = objectKey,
    ContentBody = content
});
```

行為：使用承諾加密，僅解密使用承諾加密的物件。針對金鑰替換攻擊的最大安全性。

其他組態範例

本節提供在遷移期間使用不同選項設定 V4 用戶端的其他範例。

啟用舊版支援

若要讓 V4 用戶端讀取 V1 和 V2 用戶端加密的物件，請使用允許舊版解密的承諾政策來設定用戶端：

```
using Amazon.Extensions.S3.Encryption;
using Amazon.Extensions.S3.Encryption.Primitives;

// Configure V4 client to read V1/V2 objects
var configuration = new
    AmazonS3CryptoConfigurationV4(CommitmentPolicy.REQUIRE_ENCRYPT_ALLOW_DECRYPT)
{
    StorageMode = CryptoStorageMode.ObjectMetadata
};

// This configuration allows:
// - Encryption: With commitment (secure)
// - Decryption: Both V2 (non-committing) and V4 (committing) objects
```

當您需要解密較舊用戶端加密的物件，同時確保新物件以增強的安全性加密時，請在遷移期間使用此組態。

設定儲存方法

V4 支援兩種加密中繼資料的儲存方法。選擇最適合您的使用案例的方法：

物件中繼資料（預設）

```
var configuration = new
    AmazonS3CryptoConfigurationV4(CommitmentPolicy.REQUIRE_ENCRYPT_ALLOW_DECRYPT)
{
    StorageMode = CryptoStorageMode.ObjectMetadata
};
// Encryption metadata is stored in S3 object metadata
```

指令檔案

```
var configuration = new
    AmazonS3CryptoConfigurationV4(CommitmentPolicy.REQUIRE_ENCRYPT_ALLOW_DECRYPT)
{
    StorageMode = CryptoStorageMode.InstructionFile
};
// Encryption metadata is stored in a separate S3 object (instruction file)
```

`InstructionFile` 當您需要保留物件中繼資料用於其他用途，或使用具有中繼資料大小限制的物件時，請使用。

設定承諾政策

根據您的安全需求和遷移階段選擇適當的承諾政策：

遷移階段 (V2 相容性)

```
// For migration: encrypt without commitment, allow all decryption
var migrationConfig = new
    AmazonS3CryptoConfigurationV4(CommitmentPolicy.FORBID_ENCRYPT_ALLOW_DECRYPT);
```

轉換階段 (建議)

```
// For transition: encrypt with commitment, allow legacy decryption
var transitionConfig = new
    AmazonS3CryptoConfigurationV4(CommitmentPolicy.REQUIRE_ENCRYPT_ALLOW_DECRYPT);
```

完整安全階段

```
// For maximum security: require commitment for both encryption and decryption
var secureConfig = new
    AmazonS3CryptoConfigurationV4(CommitmentPolicy.REQUIRE_ENCRYPT_REQUIRE_DECRYPT);
```

在初始遷移 `FORBID_ENCRYPT_ALLOW_DECRYPT` 期間從 開始，移至 `REQUIRE_ENCRYPT_ALLOW_DECRYPT` 進行轉換階段，最後在所有用戶端升級且所有物件都已承諾重新加密 `REQUIRE_ENCRYPT_REQUIRE_DECRYPT` 時使用。

的特殊考量 適用於 .NET 的 AWS SDK

本節包含一般組態或程序不適當或不足的特殊情況考量。

主題

- [取得的組件 適用於 .NET 的 AWS SDK](#)
- [在應用程式中存取登入資料和設定檔](#)
- [Unity 支援的特殊考量](#)
- [Xamarin 支援的特殊考量](#)

取得的組件 適用於 .NET 的 AWS SDK

本主題說明如何取得 AWSSDK 組件，並將其存放在本機（或內部部署）以供專案使用。這不是處理 SDK 參考的建議方法，但在某些環境中是必要的。

Note

處理 SDK 參考的建議方法是僅下載並安裝每個專案所需的 NuGet 套件。該方法如 [中所述使用 NuGet 安裝 AWSSDK 套件](#)。

如果您無法或無法依專案下載和安裝 NuGet 套件，您可以使用下列選項。

下載並擷取 ZIP 檔案

(請記住，這不是處理 [參考的建議方法](#) 適用於 .NET 的 AWS SDK。)

1. 下載下列其中一個 ZIP 檔案：

- [aws-sdk-net8.0.zip](#) - 支援 .NET 8 和更新版本的組件。
- [aws-sdk-netcoreapp3.1.zip](#) - 支援 .NET Core 3.1 和更新版本的組件。
- [aws-sdk-netstandard2.0.zip](#) - 支援 .NET Standard 2.0 和 2.1 的組件。
- [aws-sdk-net45.zip](#) - 支援 .NET Framework 4.5 和更新版本的組件。
- [aws-sdk-net35.zip](#) - 支援 .NET Framework 3.5 的組件。

⚠ Warning

從 2024 年 8 月 15 日開始，適用於 .NET 的 AWS SDK 將結束對 .NET Framework 3.5 的支援，並將最低 .NET Framework 版本變更為 4.7.2。如需詳細資訊，請參閱部落格文章 [.NET Framework 3.5 和 4.5 目標的重要變更 適用於 .NET 的 AWS SDK](#)。

2. 將組件解壓縮到檔案系統上的一些「下載」資料夾；位置並不重要。請記下此資料夾。
3. 當您設定專案時，您可以從此資料夾取得必要的組件，如中所述[安裝不含 NuGet 的 AWSSDK 組件](#)。

在應用程式中存取登入資料和設定檔

使用登入資料的偏好方法是允許 為您 適用於 .NET 的 AWS SDK 尋找和擷取登入資料，如 中所述[憑證和設定檔解析](#)。

不過，您也可以設定應用程式主動擷取設定檔和登入資料，然後在建立 AWS 服務用戶端時明確使用這些登入資料。

若要主動擷取設定檔和登入資料，請使用 [Amazon.Runtime.CredentialManagement](#) 命名空間中的類別。

- 若要在使用 AWS 登入資料檔案格式的檔案中尋找設定檔 ([其預設位置中的共用 AWS 登入資料檔案](#)或自訂登入資料檔案)，請使用 [SharedCredentialsFile](#) 類別。為了簡潔起見，此格式的檔案有時會在此文字中簡單地稱為登入資料檔案。
- 若要在 SDK Store 中尋找設定檔，請使用 [NetSDKCredentialsFile](#) 類別。
- 若要在登入資料檔案和 SDK Store 中搜尋，根據類別屬性的組態，請使用 [CredentialProfileStoreChain](#) 類別。

您可以使用此類別來尋找設定檔。您也可以使用此類別直接請求 AWS 登入資料，而不是使用 [AWSCredentialsFactory](#) 類別（接下來說明）。

- 若要從設定檔擷取或建立各種類型的登入資料，請使用 [AWSCredentialsFactory](#) 類別。

下列各節提供這些類別的範例。

類別 CredentialProfileStoreChain 的範例

您可以使用 [TryGetAWSCredentials](#) 或 [TryGetProfile](#) 方法，從 [CredentialProfileStoreChain](#) 類別取得登入資料或設定檔。類別的 ProfilesLocation 屬性決定方法的行為，如下所示：

- 如果 ProfilesLocation 是 null 或空白，請在平台支援時搜尋 SDK Store，然後在預設位置搜尋共用的 AWS 登入資料檔案。
- 如果 ProfilesLocation 屬性包含值，請搜尋 屬性中指定的登入資料檔案。

從 SDK Store 或共用的登入資料檔案取得 AWS 登入資料

此範例說明如何使用 CredentialProfileStoreChain 類別取得登入資料，然後使用登入資料來建立 [AmazonS3Client](#) 物件。登入資料可以來自軟體開發套件存放區，也可以來自預設位置的共用 AWS 登入資料檔案。

此範例也使用 [Amazon.Runtime.AWSCredentials](#) 類別。

```
var chain = new CredentialProfileStoreChain();
AWSCredentials awsCredentials;
if (chain.TryGetAWSCredentials("some_profile", out awsCredentials))
{
    // Use awsCredentials to create an Amazon S3 service client
    using (var client = new AmazonS3Client(awsCredentials))
    {
        var response = await client.ListBucketsAsync();
        Console.WriteLine($"Number of buckets: {response.Buckets.Count}");
    }
}
```

從 SDK Store 或共用 AWS 登入資料檔案取得設定檔

此範例說明如何使用 CredentialProfileStoreChain 類別取得設定檔。登入資料可以來自軟體開發套件存放區，也可以來自預設位置的共用 AWS 登入資料檔案。

此範例也會使用 [CredentialProfile](#) 類別。

```
var chain = new CredentialProfileStoreChain();
CredentialProfile basicProfile;
if (chain.TryGetProfile("basic_profile", out basicProfile))
{
```

```
// Use basicProfile
}
```

從自訂登入資料檔案取得登入資料

此範例說明如何使用 `CredentialProfileStoreChain` 類別取得登入資料。登入資料來自使用 AWS 登入資料檔案格式的檔案，但位於替代位置。

此範例也使用 [Amazon.Runtime.AWSCredentials](#) 類別。

```
var chain = new
    CredentialProfileStoreChain("c:\\Users\\sdkuser\\customCredentialsFile.ini");
AWSCredentials awsCredentials;
if (chain.TryGetAWSCredentials("basic_profile", out awsCredentials))
{
    // Use awsCredentials to create an AWS service client
}
```

SharedCredentialsFile 和 AWSCredentialsFactory 類別的範例

使用 SharedCredentialsFile 類別建立 AmazonS3Client

此範例說明如何在共用 AWS 登入資料檔案中尋找設定檔、從設定檔建立 AWS 登入資料，然後使用登入資料來建立 [AmazonS3Client](#) 物件。此範例使用 [SharedCredentialsFile](#) 類別。

此範例也會使用 [CredentialProfile](#) 類別和 [Amazon.Runtime.AWSCredentials](#) 類別。

```
CredentialProfile basicProfile;
AWSCredentials awsCredentials;
var sharedFile = new SharedCredentialsFile();
if (sharedFile.TryGetProfile("basic_profile", out basicProfile) &&
    AWSCredentialsFactory.TryGetAWSCredentials(basicProfile, sharedFile, out
    awsCredentials))
{
    // use awsCredentials to create an Amazon S3 service client
    using (var client = new AmazonS3Client(awsCredentials, basicProfile.Region))
    {
        var response = await client.ListBucketsAsync();
        Console.WriteLine($"Number of buckets: {response.Buckets.Count}");
    }
}
```

Note

[NetSDKCredentialsFile](#) 類別的使用方式完全相同，但您會執行個體化新的 `NetSDKCredentialsFile` 物件，而不是 `SharedCredentialsFile` 物件。

Unity 支援的特殊考量

為您的 Unity 應用程式使用 適用於 .NET 的 AWS SDK 和 [.NET Standard 2.0](#) 時，您的應用程式必須直接參考 適用於 .NET 的 AWS SDK 組件 (DLL 檔案)，而不是使用 NuGet。有鑑於此需求，以下是您需要執行的重要動作。

- 您需要取得 適用於 .NET 的 AWS SDK 組件並將其套用至您的專案。如需如何執行此操作的詳細資訊，請參閱主題 [下載並擷取 ZIP 檔案](#) 中的 [取得 AWSSDK 組件](#)。
- 您需要在 Unity 專案中包含下列 DLLs，以及 `AWSSDK.Core` 的 DLLs 和您正在使用的其他 AWS 服務。從 3.5.109 版開始 適用於 .NET 的 AWS SDK，.NET Standard ZIP 檔案包含這些額外的 DLLs。
 - [Microsoft.Bcl.AsyncInterfaces.dll](#)
 - [System.Runtime.CompilerServices.Unsafe.dll](#)
 - [System.Threading.Tasks.Extensions.dll](#)
- 如果您使用 [IL2CPP](#) 建置 Unity 專案，則必須將 `link.xml` 檔案新增至資產資料夾，以防止程式碼分割。`link.xml` 檔案必須列出您使用的所有 AWSSDK 組件，且每個組件都必須包含 `preserve="all"` 屬性。下列程式碼片段顯示此檔案的範例。

```
<linker>
  <assembly fullname="AWSSDK.Core" preserve="all"/>
  <assembly fullname="AWSSDK.DynamoDBv2" preserve="all"/>
  <assembly fullname="AWSSDK.Lambda" preserve="all"/>
</linker>
```


 Note

若要閱讀與此需求相關的有趣背景資訊，請參閱文章：<https://aws.amazon.com/blogs/developer/referencing-the-aws-sdk-for-net-standard-2-0-from-unity-xamarin-or-uwp/>。

除了這些特殊考量之外，[3.5 版的變更](#)如需將 Unity 應用程式遷移至 3.5 版的資訊，請參閱適用於 .NET 的 AWS SDK。

Xamarin 支援的特殊考量

Xamarin 專案 (全新和現有) 必須將目標鎖定於 .NET Standard 2.0。請參閱[Xamarin.Forms 中的 .NET Standard 2.0 支援](#)和 [.NET 實作支援](#)。

另請參閱[可攜式類別程式庫和 Xamarin](#) 的相關資訊。

的 API 參考 適用於 .NET 的 AWS SDK

適用於 .NET 的 AWS SDK 提供 API，您可用來存取 AWS 服務。若要查看 API 中有哪些類別和方法可用，請參閱 [適用於 .NET 的 AWS SDK API 參考](#)。

除了上述一般參考之外，[含指引的程式碼範例](#) 區段下的每個範例都包含對該範例中使用的特定方法和類別的參考。

關於 API 參考版本

前述的 API 參考適用於 3.0 版和更新版本 適用於 .NET 的 AWS SDK。

如需從舊版 SDK 遷移的資訊，請參閱 [遷移您的專案](#)

若要尋找舊版 SDK API 參考的已棄用內容，請參閱下列項目（項目）：

- [適用於 .NET 的 AWS SDK API 參考 V1（已棄用）](#)
- [適用於 .NET 的 AWS SDK API 參考 V2（已棄用）](#)

若要檢視已棄用的 適用於 .NET 的 AWS SDK API 參考，您需要擷取並設定 Web 瀏覽器。接下來顯示的指示是如何執行此操作的範例。它們是以在 Windows 系統上使用 Google Chrome Web 瀏覽器為基礎。將它們適應您的特定 Web 瀏覽器和作業系統。

檢視已棄用的 API 參考 V1

1. 下載已取代 適用於 .NET 的 AWS SDK API 參考 V1 的 ZIP 檔案。根據預設，ZIP 檔案名稱為 `sdkfornet-api-ref_v1_deprecated.zip`。該名稱將在這些說明中使用。
2. 將 ZIP 檔案放在您選擇的資料夾中。對於這些指示，資料夾名稱假設為 `C:\work\temp\api-refs\V1`。
3. 在 ZIP 檔案上按一下滑鼠右鍵，然後選擇全部解壓縮。接受預設位置，這 `C:\work\temp\api-refs\V1\sdkfornet-api-ref_v1` 適用於這些指示。
4. 在 `C:\work\temp\api-refs\V1` 資料夾中為 Google Chrome 建立捷徑。請小心不要移動原始應用程式。
5. 在新捷徑的屬性中，設定下列欄位：

- 目標："*<path to the Google Chrome application>*" --disable-web-security --user-data-dir=C:\work\temp\api-refs\V1\data "C:\work\temp\api-refs\V1\sdkfornet-api-ref_v1\Index.html"

針對 --user-data-dir 引數，請使用適用於您環境的資料夾名稱。資料夾不必存在。

- 從 開始：C:\work\temp\api-refs\V1
6. 為捷徑指定適當的名稱。
 7. 開啟捷徑以檢視舊的 API 參考。

檢視已棄用的 API 參考 V2

1. 下載已取代 適用於 .NET 的 AWS SDK API 參考 V2 的 ZIP 檔案。根據預設，ZIP 檔案名稱為 sdkfornet-api-ref_v2_deprecated.zip。該名稱將在這些說明中使用。
2. 將 ZIP 檔案放在您選擇的資料夾中。對於這些指示，資料夾名稱假設為 C:\work\temp\api-refs\V2。
3. 在 ZIP 檔案上按一下滑鼠右鍵，然後選擇全部擷取。接受預設位置，這 C:\work\temp\api-refs\V2\sdkfornet-api-ref_v2 適用於這些指示。
4. 在 C:\work\temp\api-refs\V2 資料夾中為 Google Chrome 建立捷徑。請小心不要移動原始應用程式。
5. 在新捷徑的屬性中，設定下列欄位：

- 目標："*<path to the Google Chrome application>*" --disable-web-security --user-data-dir=C:\work\temp\api-refs\V2\data "C:\work\temp\api-refs\V2\sdkfornet-api-ref_v2\Index.html"

針對 --user-data-dir 引數，請使用適用於您環境的資料夾名稱。資料夾不必存在。

- 從 開始：C:\work\temp\api-refs\V2
6. 為捷徑指定適當的名稱。
 7. 開啟捷徑以檢視舊的 API 參考。

文件歷史紀錄

下表說明自上次發行 適用於 .NET 的 AWS SDK 開發人員指南以來的重要變更。如需獲得此文件更新的通知，您可以訂閱 [RSS 摘要](#)。

變更	描述	日期
最新消息	新增有關 .NET CLI AWS 部署工具 2.0 版的備註。	2025 年 10 月 17 日
AWS OpsWorks	AWS OpsWorks 已達到生命週期結束。它已從文件中移除。	2025 年 9 月 16 日
最新消息	已宣布 V3 的 End-of-support 適用於 .NET 的 AWS SDK。	2025 年 8 月 21 日
訊息處理架構	.NET AWS 的訊息處理架構已達到一般可用性！	2025 年 5 月 5 日
最新消息	第 4 版 適用於 .NET 的 AWS SDK 已全面推出！如需詳細資訊，請參閱 適用於 .NET 的 AWS SDK (V4) 開發人員指南 ，特別是 遷移至第 4 版 的主題。	2025 年 4 月 28 日
重試和逾時	包含有關使用 CancellationToken 進行非同步方法呼叫的每種方法逾時的資訊。	2025 年 4 月 9 日
在 中 AWS 與 .NET ACache 整合 適用於 .NET 的 AWS SDK	在 中包含 AWS 如何與 .NET Aaze 整合的相關資訊 適用於 .NET 的 AWS SDK。	2025 年 2 月 15 日
可觀測性	已宣布 GA 版本以提供可觀測性	2025 年 2 月 10 日

最新消息	新增有關完整性保護新預設行為的資訊。	2025 年 1 月 15 日
S3 加密用戶端 V4 遷移	新增從 V2 遷移至 V4 的相關資訊。	2024 年 12 月 9 日
新功能	新增第四個 第 4 適用於 .NET 的 AWS SDK 版預覽版本的相關資訊。	2024 年 11 月 15 日
可觀測性	新增 中可觀測性的預覽資訊 適用於 .NET 的 AWS SDK，可收集遙測資料。	2024 年 9 月 13 日
的 API 參考 適用於 .NET 的 AWS SDK	V1 和 V2 的 適用於 .NET 的 AWS SDK API 參考已棄用。已包含有關此棄用的資訊，以及如何取得和檢視已棄用參考。	2024 年 9 月 4 日
新功能	新增 適用於 .NET 的 AWS SDK 第 4 版第一個預覽版本的相關資訊。	2024 年 8 月 16 日
最新消息	更新 .NET Framework 支援近期變更的相關資訊。	2024 年 6 月 20 日
最新消息	新增 .NET AWS 訊息處理架構預覽版本的相關資訊	2024 年 3 月 28 日
新功能	包含 .NET 8 支援的相關資訊。	2024 年 2 月 23 日
新功能	包含 .NET Framework 支援近期變更的相關資訊。	2024 年 2 月 18 日
取得 AWSSDK 組件	包含支援 .NET 8 和更新版本之組件的相關資訊。	2024 年 1 月 8 日

AWS 適用於 .NET 的訊息處理架構	包含訊息處理架構 Beta 版的相關資訊。	2023 年 12 月 10 日
使用 Amazon DynamoDB NoSQL 資料庫	更新文件和物件持久性程式設計模型的相關資訊。現在可以防止由於冷啟動和執行緒集區行為而導致的特定延遲或死結情況。	2023 年 11 月 15 日
納入了更多 IAM 最佳實務更新	更新了指南以符合 IAM 最佳實務。如需更多詳細資訊，請參閱 IAM 中的安全最佳實務 。	2023 年 10 月 5 日
取得 AWSSDK 組件	已移除使用已棄用之 適用於 Windows 的 AWS 工具 安裝程式 適用於 .NET 的 AWS SDK (也就是 MSI) 安裝 的相關資訊。	2023 年 9 月 25 日
IAM 最佳實務更新	更新了指南以符合 IAM 最佳實務。如需更多詳細資訊，請參閱 IAM 中的安全最佳實務 。	2023 年 7 月 18 日
Lambda 註釋	已針對一般可用性發佈 AWS Lambda 註釋架構。	2023 年 7 月 17 日
最新消息	新增 DynamoDB 分散式快取提供者預覽版本的相關資訊。	2023 年 7 月 15 日
目錄	更新了目錄，讓程式碼範例更容易探索。	2023 年 6 月 8 日
區域解析度	新增 SDK 如何解決遺失區域規格的相關資訊。	2023 年 3 月 14 日
支援 MSI	新增有關結束 適用於 Windows 的 AWS 工具 安裝程式 支援的說明。	2023 年 3 月 6 日

Lambda 註釋 (預覽版)	AWS Lambda 註釋架構的預覽。	2022 年 9 月 22 日
將應用程式部署至 AWS	將主要內容移至 GitHub Pages 網站： https://aws.github.io/aws-dotnet-deploy/	2022 年 6 月 28 日
淘汰 EC2-Classic	新增有關淘汰 EC2-Classic 的注意事項。	2022 年 4 月 13 日
使用的單一登入 適用於 .NET 的 AWS SDK	新增使用 時單一登入 (SSO) 的相關資訊 適用於 .NET 的 AWS SDK。	2022 年 3 月 17 日
強制執行最低 TLS 版本	新增 TLS 1.3 的相關資訊。	2022 年 3 月 16 日
使用 AWS 服務	包含 GitHub 上提供的程式碼範例清單。	2022 年 2 月 28 日
啟用 SDK 指標	已移除有關啟用已棄用之 SDK 指標的資訊。	2022 年 1 月 20 日
將應用程式部署到 AWS	新增 AWS Toolkit for Visual Studio 的參考，其提供與部署工具類似的 AWS 部署功能。	2021 年 10 月 26 日
適用於 .NET 的 AWS SDK 第 3 版指南整合	兩個 適用於 .NET 的 AWS SDK 版本 3 開發人員指南「V3」和「最新」已合併為「v3」URL 下的一個指南。	2021 年 8 月 18 日
從 .NET Standard 1.3 遷移	上的 .NET Standard 1.3 支援 適用於 .NET 的 AWS SDK 已終止。	2021 年 3 月 25 日
將應用程式部署至 AWS (預覽)	新增 AWS 部署工具的預覽資訊，您可以使用此工具從 .NET CLI 部署應用程式。	2021 年 3 月 15 日

3.5 版的 適用於 .NET 的 AWS SDK	3.5 版的 適用於 .NET 的 AWS SDK 已發行。	2020 年 8 月 25 日
分頁程式	將分頁程式新增至許多服務用戶端，讓 API 結果的分頁更加方便。	2020 年 8 月 24 日
重試和逾時	新增重試模式的相關資訊。	2020 年 8 月 20 日
使用 KMS 金鑰進行 S3 加密	更新範例以使用 S3 加密用戶端的第 2 版。	2020 年 8 月 6 日
從 .NET Standard 1.3 遷移	已新增資訊，說明在 2020 年底結束對 .NET Standard 1.3 的支援。	2020 年 5 月 18 日
快速入門	新增了一個有基本設置和教學課程的快速入門章節，以將適用於 .NET 的 AWS SDK 介紹給讀者。	2020 年 3 月 27 日
強制執行 TLS 1.2	新增有關如何在開發套件中強制執行 TLS 1.2 的資訊。	2020 年 3 月 10 日