aws

開發人員指南

# 適用於 Go 的 AWS SDK v2

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# 適用於 Go 的 AWS SDK v2: 開發人員指南

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# 什麼是 適用於 Go 的 AWS SDK v2？

適用於 Go 的 AWS SDK v2 提供 APIs 和公用程式，開發人員可用來建置使用 AWS 服務的 Go 應用程式，例如 Amazon Elastic Compute Cloud (Amazon EC2) 和 Amazon Simple Storage Service (Amazon S3)。

SDK 可消除直接針對 Web 服務界面進行編碼的複雜性。它會隱藏許多較低層級的管道，例如身分驗證、請求重試和錯誤處理。

軟體開發套件也包含實用的公用程式。例如，Amazon S3 下載和上傳管理員可以自動將大型物件分成多個部分並平行傳輸。

使用 適用於 Go 的 AWS SDK 開發人員指南來協助您安裝、設定和使用 SDK。本指南提供 SDK 公用程式的組態資訊、範本程式碼和簡介。

## 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

# 開始使用 適用於 Go 的 AWS SDK

適用於 Go 的 AWS SDK 需要 Go 1.23 的最低版本。您可以執行下列命令來檢視目前版本的 Go：

```
go version
```

如需有關安裝或升級 Go 版本的資訊，請參閱 Go 文件中的下載並安裝 。

## 取得 Amazon 帳戶

您必須先擁有 Amazon 帳戶，才能使用 適用於 Go 的 AWS SDK v2。如需詳細資訊，請參閱建立 AWS 帳戶。

## 安裝 適用於 Go 的 AWS SDK v2

適用於 Go 的 AWS SDK v2 使用 Go 模組，這是 Go 1.11 中推出的功能。執行下列 Go 命令來初始化您的本機專案。

```
go mod init example
```

初始化 Go 模組專案之後，您將可以使用 `go get`命令擷取 SDK 及其所需的相依性。這些相依性會記錄在由上一個命令建立的 `go.mod` 檔案中。

下列命令示範如何擷取要在應用程式中使用的標準 SDK 模組集。

```
go get github.com/aws/aws-sdk-go-v2
go get github.com/aws/aws-sdk-go-v2/config
```

這將擷取核心 SDK 模組，以及用於載入 AWS 共用組態的組態模組。

接下來，您可以安裝應用程式所需的一或多個 AWS 服務 API 用戶端。所有 API 用戶端都位於`github.com/aws/aws-sdk-go-v2/service`匯入階層下。您可以在這裡找到一組目前支援的 API 用戶端。若要安裝服務用戶端，請執行下列命令來擷取模組，並將相依性記錄在 `go.mod` 檔案中。在此範例中，我們擷取 Amazon S3 API 用戶端。

```
go get github.com/aws/aws-sdk-go-v2/service/s3
```

# 取得您的 AWS 存取金鑰

存取金鑰包含存取金鑰 ID 與 私密存取金鑰，這兩者可用來簽署您對 AWS提出的程式設計要求。如果您沒有存取金鑰，您可以使用 AWS 管理主控台來建立金鑰。我們建議您使用 IAM 存取金鑰，而不是 AWS 根帳戶存取金鑰。IAM 可讓您安全地控制對 AWS 帳戶中 AWS 服務和資源的存取。

> **Note**
>
> 若要建立存取金鑰，您必須具有執行必要 IAM 動作的許可。如需詳細資訊，請參閱《IAM 使用者指南》中的存取 IAM 資源所需的許可。

## 取得您的存取金鑰 ID 和私密存取金鑰。

1. 開啟 IAM 主控台。
2. 在導覽功能表中，選擇 Users (使用者)。
3. 選擇 IAM 使用者名稱 (非核取方塊)。
4. 開啟 Security credentials (安全憑證) 標籤，然後選擇 Create access key (建立存取金鑰)。
5. 若要查看新的存取金鑰，請選擇 Show (顯示)。您的憑證應類似以下內容：
   - 存取金鑰 ID：`AKIAIOSFODNN7EXAMPLE`
   - 私密存取金鑰：`wJalrXUtnFEMI/K7MDENG/bPxRfiCYEXAMPLEKEY`
6. 若要下載金鑰對，請選擇 Download .csv file (下載 .csv 檔案)。請將金鑰存放在安全位置。

> **Warning**
>
> 將金鑰保密，以保護 AWS 您的帳戶，絕不與組織外部的任何人共用。

## 相關主題

- IAM 使用者指南中的什麼是 IAM？。
- Amazon Web Services 一般參考中的AWS 安全登入資料。

# 叫用 操作

安裝 SDK 之後，您可以將 AWS 套件匯入 Go 應用程式以使用 SDK，如下列範例所示，匯入 AWS、Config 和 Amazon S3 程式庫。匯入 SDK 套件後，會載入 AWS SDK 共用組態、建構用戶端，並叫用 API 操作。

```
package main

import (
    "context"
    "log"
    "github.com/aws/aws-sdk-go-v2/aws"
    "github.com/aws/aws-sdk-go-v2/config"
    "github.com/aws/aws-sdk-go-v2/service/s3"
)

func main() {
    // Load the Shared AWS Configuration (~/.aws/config)
    cfg, err := config.LoadDefaultConfig(context.TODO())
    if err != nil {
        log.Fatal(err)
    }

    // Create an Amazon S3 service client
    client := s3.NewFromConfig(cfg)

    // Get the first page of results for ListObjectsV2 for a bucket
    output, err := client.ListObjectsV2(context.TODO(), &s3.ListObjectsV2Input{
        Bucket: aws.String("amzn-s3-demo-bucket"),
    })
    if err != nil {
        log.Fatal(err)
    }

    log.Println("first page results")
    for _, object := range output.Contents {
        log.Printf("key=%s size=%d", aws.ToString(object.Key), *object.Size)
    }
}
```

# 設定軟體開發套件

在 適用於 Go 的 AWS SDK V2 中，您可以設定服務用戶端的常見設定，例如記錄器、日誌層級和重試組態。大多數設定都是選用的。不過，您必須為每個服務用戶端指定 AWS 區域和您的登入資料。SDK 使用這些值將請求傳送至正確的區域，並使用正確的登入資料簽署請求。您可以在程式碼中或透過執行環境以程式設計方式指定這些值。

## 載入 AWS 共用組態檔案

有多種方式可初始化服務 API 用戶端，但以下是建議使用者使用的最常見模式。

若要設定 SDK 以使用 AWS 共用組態檔案，請使用下列程式碼：

```
import (
  "context"
  "log"
  "github.com/aws/aws-sdk-go-v2/config"
)

// ...

cfg, err := config.LoadDefaultConfig(context.TODO())
if err != nil {
  log.Fatalf("failed to load configuration, %v", err)
}
```

`config.LoadDefaultConfig(context.TODO())` 將使用 AWS 共用組態來源建構 aws.Config。這包括設定登入資料提供者、設定 AWS 區域，以及載入服務特定組態。服務用戶端可以使用載入的來建構`aws.Config`，提供一致的模式來建構用戶端。

如需 AWS 共用組態檔案的詳細資訊，請參閱《 AWS SDKs和工具參考指南》中的組態。

## 指定 AWS 區域

當您指定 區域時，您可以指定傳送請求的位置，例如 `us-west-2`或 `us-east-2`。如需每個服務的區域清單，請參閱《》中的服務端點和配額 Amazon Web Services 一般參考。

軟體開發套件沒有預設區域。若要指定區域：

- 將AWS_REGION環境變數設定為預設區域。
- 載入組態config.LoadDefaultConfig時，使用 config.WithRegion 明確地將區域設定為 的引數。

檢閱：如果您使用所有這些技術設定區域，開發套件會使用您明確指定的區域。

## 使用環境變數設定區域

### Linux、macOS 或 Unix

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

### Windows

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

## 以程式設計方式指定區域

```
cfg, err := config.LoadDefaultConfig(context.TODO(), config.WithRegion("us-west-2"))
```

# 指定憑證

適用於 Go 的 AWS SDK 需要登入資料（存取金鑰和私密存取金鑰）才能簽署請求 AWS。您可以根據您的特定使用案例，在多個位置指定您的登入資料。如需取得登入資料的資訊，請參閱 開始使用 適用於 Go 的 AWS SDK。

當您使用 初始化aws.Config執行個體時config.LoadDefaultConfig，開發套件會使用其預設登入資料鏈來尋找 AWS 登入資料。此預設登入資料鏈結會依下列順序尋找登入資料：

1. 環境變數.
   1. 靜態登入資料 (AWS_ACCESS_KEY_ID、AWS_SECRET_ACCESS_KEY、AWS_SESSION_TOKEN)
   2. Web 身分字符 (AWS_WEB_IDENTITY_TOKEN_FILE)
2. 共用組態檔案。
   1. SDK 預設為位於您電腦主.aws資料夾中 資料夾下的 credentials 檔案。
   2. SDK 預設為位於您電腦主.aws資料夾中 資料夾下的 config 檔案。
3. 如果您的應用程式使用 Amazon ECS 任務定義或 RunTask API 操作，則為任務使用 IAM 角色。
4. 如果您的應用程式在 Amazon EC2 執行個體上執行，則為 Amazon EC2 的 IAM 角色。

SDK 會自動偵測並使用內建提供者，而不需要手動設定。例如，如果您將 IAM 角色用於 Amazon EC2 執行個體，您的應用程式會自動使用執行個體的登入資料。您不需要在應用程式中手動設定登入資料。

最佳實務是， AWS 建議您依下列順序指定登入資料：

1. 如果您的應用程式使用 Amazon ECS 任務定義或 RunTask API 操作，請使用任務的 IAM 角色。
2. 將 IAM 角色用於 Amazon EC2 （如果您的應用程式在 Amazon EC2 執行個體上執行）。

   IAM 角色在執行個體上提供應用程式臨時安全登入資料來 AWS 呼叫 。IAM 角色提供在多個 Amazon EC2 執行個體上分佈和管理登入資料的簡單方法。
3. 使用共用登入資料或組態檔案。

   登入資料和組態檔案會與其他 AWS SDKs和 共用 AWS CLI。作為安全最佳實務，建議使用登入資料檔案來設定敏感值，例如存取金鑰 IDs和私密金鑰。以下是每個這些檔案的格式要求。
4. 使用環境變數。

   如果您在 Amazon EC2 執行個體以外的機器上執行開發工作，設定環境變數非常有用。

## 任務的 IAM 角色

如果您的應用程式使用 Amazon ECS 任務定義或`RunTask`操作，請使用任務的 IAM 角色來指定可由任務中的容器使用的 IAM 角色。

## Amazon EC2 執行個體的 IAM 角色

如果您是在 Amazon EC2 執行個體上執行應用程式，請使用執行個體的 IAM 角色取得臨時安全登入資料來呼叫 AWS。

如果您已將執行個體設定為使用 IAM 角色，軟體開發套件會自動將這些登入資料用於您的應用程式。您不需要手動指定這些登入資料。

## 共用登入資料和組態

共用的登入資料和組態檔案可用於在 AWS SDKs 和其他工具之間共用常見的組態。如果您將不同的登入資料用於不同的工具或應用程式，即可在同一個組態檔案中使用描述檔設定多個存取金鑰。

您可以使用 提供多個登入資料或組態檔案位置`config.LoadOptions`，根據預設，軟體開發套件會載入存放在 中提及的預設位置的檔案指定憑證。

```
import (
    "context"
    "github.com/aws/aws-sdk-go-v2/config"
)

// ...

cfg , err := config.LoadDefaultConfig(context.TODO(),
    config.WithSharedCredentialsFiles(
    []string{"test/credentials", "data/credentials"},
    ),
    config.WithSharedConfigFiles(
        []string{"test/config", "data/config"},
    )
)
```

使用共用登入資料和組態檔案時，如果指定了重複的設定檔，則會合併這些設定檔以解析設定檔。如果發生合併衝突，

1. 如果在相同的登入資料/組態檔案中指定重複的設定檔，則後者設定檔中指定的設定檔屬性優先。
2. 如果跨多個登入資料檔案或多個組態檔案指定了重複的設定檔，則會根據檔案輸入至 的順序來解析設定檔屬性config.LoadOptions。後者檔案中的設定檔屬性優先。
3. 如果 設定檔同時存在於登入資料檔案和組態檔案中，則登入資料檔案屬性優先。

如有需要，您可以在 LogConfigurationWarnings上啟用 config.LoadOptions 並記錄設定檔解析步驟。

## 建立登入資料檔案

如果您沒有共用的登入資料檔案 (.aws/credentials)，您可以使用任何文字編輯器在主目錄中建立一個。將下列內容新增至您的登入資料檔案，以您的登入資料取代 *<YOUR_ACCESS_KEY_ID>* 和 *<YOUR_SECRET_ACCESS_KEY>*。

```
[default]
aws_access_key_id = <YOUR_ACCESS_KEY_ID>
aws_secret_access_key = <YOUR_SECRET_ACCESS_KEY>
```

[default] 標題會定義預設設定檔的登入資料，除非您將其設定為使用另一個設定檔，否則軟體開發套件將使用該登入資料。

您也可以將工作階段字符新增至您的設定檔，以使用臨時安全登入資料，如下列範例所示：

```
[temp]
aws_access_key_id = <YOUR_TEMP_ACCESS_KEY_ID>
aws_secret_access_key = <YOUR_TEMP_SECRET_ACCESS_KEY>
aws_session_token = <YOUR_SESSION_TOKEN>
```

登入資料檔案中非預設設定檔的區段名稱不得以 字開頭`profile`。您可以在 AWS SDKs和工具參考指南中閱讀更多資訊。

### 建立 Config 檔案

如果您沒有共用的登入資料檔案 (`.aws/config`)，您可以使用任何文字編輯器在主目錄中建立一個。將下列內容新增至您的組態檔案，將 *<REGION>* 取代為所需的區域。

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

`[default]` 標題會定義預設設定檔的組態，除非您將其設定為使用另一個設定檔，否則軟體開發套件將使用它。

您可以使用具名設定檔，如下列範例所示：

```
[profile named-profile]
region = <REGION>
```

組態檔案中非預設設定檔的區段名稱必須一律以單字 開頭`profile`，後面接著預期的設定檔名稱。您可以在 AWS SDKs和工具參考指南中閱讀更多資訊。

### 指定設定檔

您可以在相同的組態檔案中包含多個存取金鑰，方法是將每組存取金鑰與設定檔建立關聯。例如，在您的登入資料檔案中，您可以宣告多個設定檔，如下所示。

```
[default]
aws_access_key_id = <YOUR_DEFAULT_ACCESS_KEY_ID>
aws_secret_access_key = <YOUR_DEFAULT_SECRET_ACCESS_KEY>

[test-account]
aws_access_key_id = <YOUR_TEST_ACCESS_KEY_ID>
```

```
aws_secret_access_key = <YOUR_TEST_SECRET_ACCESS_KEY>

[prod-account]
; work profile
aws_access_key_id = <YOUR_PROD_ACCESS_KEY_ID>
aws_secret_access_key = <YOUR_PROD_SECRET_ACCESS_KEY>
```

依預設，軟體開發套件會檢查 AWS_PROFILE 環境變數來判斷要使用哪個設定檔。如果未設定AWS_PROFILE變數，則 SDK 會使用 default設定檔。

有時，您可能想要在應用程式中使用不同的設定檔。例如，您想要將test-account登入資料與myapp應用程式搭配使用。您可以使用下列命令來使用此設定檔：

```
$ AWS_PROFILE=test-account myapp
```

您也可以使用指示 SDK 在呼叫 os.Setenv("AWS_PROFILE", "test-account")之前呼叫 來選取設定檔config.LoadDefaultConfig，或傳遞明確設定檔做為引數，如下列範例所示：

```
cfg, err := config.LoadDefaultConfig(context.TODO(),
    config.WithSharedConfigProfile("test-account"))
```

> **Note**
>
> 如果您在環境變數中指定登入資料，開發套件一律會使用這些登入資料，無論您指定的設定檔為何。

## 環境變數

根據預設，軟體開發套件會偵測您環境中設定的 AWS 登入資料，並使用它們來簽署請求 AWS。如此一來，您就不需要在應用程式中管理登入資料。

軟體開發套件會在下列環境變數中尋找登入資料：

- AWS_ACCESS_KEY_ID
- AWS_SECRET_ACCESS_KEY
- AWS_SESSION_TOKEN (選用)

下列範例示範如何設定環境變數。

### Linux、OS X，或 Unix

```
$ export AWS_ACCESS_KEY_ID=YOUR_AKID
$ export AWS_SECRET_ACCESS_KEY=YOUR_SECRET_KEY
$ export AWS_SESSION_TOKEN=TOKEN
```

### Windows

```
> set AWS_ACCESS_KEY_ID=YOUR_AKID
> set AWS_SECRET_ACCESS_KEY=YOUR_SECRET_KEY
> set AWS_SESSION_TOKEN=TOKEN
```

## 以程式設計方式指定登入資料

`config.LoadDefaultConfig` 可讓您在載入共用組態來源時提供明確的 aws.CredentialProvider。若要在載入共用組態時傳遞明確的登入資料提供者，請使用 config.WithCredentialsProvider。例如，如果 `customProvider參考aws.CredentialProvider實作的執行個體，它可以在組態載入期間傳遞，如下所示：`

```
cfg, err := config.LoadDefaultConfig(context.TODO(),
    config.WithCredentialsProvider(customProvider))
```

如果您明確提供登入資料，如本範例所示，開發套件只會使用這些登入資料。

> **Note**
>
> 傳遞至 或由 傳回的所有登入資料提供者`LoadDefaultConfig`都會自動包裝在 CredentialsCache 中。這可啟用並行安全的快取和登入資料輪換。如果您`aws.Config`直接在上明確設定提供者，您還必須使用 NewCredentialsCache 明確包裝具有此類型的提供者。

### 靜態登入資料

您可以使用登入資料在應用程式中硬式編碼登入資料。NewStaticCredentialsProvider 登入資料提供者可明確設定要使用的存取金鑰。例如：

```
cfg, err := config.LoadDefaultConfig(context.TODO(),
    config.WithCredentialsProvider(credentials.NewStaticCredentialsProvider("AKID",
 "SECRET_KEY", "TOKEN")),
```

```
)
```

> **Warning**
>
> 請勿在應用程式中內嵌登入資料。僅將此方法用於測試目的。

### 單一登入登入資料

開發套件提供登入資料提供者，以使用 擷取臨時 AWS 登入資料 AWS IAM Identity Center。使用 AWS CLI，您可以使用 AWS 存取入口網站進行身分驗證，並授權存取臨時 AWS 登入資料。然後，您將應用程式設定為載入單一登入 (SSO) 設定檔，開發套件會使用 SSO 登入資料來擷取臨時 AWS 登入資料，該登入資料將在過期時自動續約。如果您的 SSO 憑證過期，您必須再次使用 登入 IAM Identity Center 帳戶，以明確續約憑證 AWS CLI。

例如，您可以建立設定檔、`dev-profile`、使用 驗證和授權該設定檔 AWS CLI，以及設定您的應用程式，如下所示。

1. 首先建立 `profile`和 `sso-session`

```
[profile dev-profile]
sso_session = dev-session
sso_account_id = 012345678901
sso_role_name = Developer
region = us-east-1

[sso-session dev-session]
sso_region = us-west-2
sso_start_url = https://company-sso-portal.awsapps.com/start
sso_registration_scopes = sso:account:access
```

2. 使用 登入 AWS CLI 以驗證和授權 SSO 設定檔。

```
$ aws --profile dev-profile sso login
Attempting to automatically open the SSO authorization page in your default browser.
If the browser does not open or you wish to use a different device to authorize this
 request, open the following URL:

https://device.sso.us-west-2.amazonaws.com/
```

```
Then enter the code:

ABCD-EFGH
Successully logged into Start URL: https://company-sso-portal.awsapps.com/start
```

3. 接著，將應用程式設定為使用 SSO 設定檔。

```
import "github.com/aws/aws-sdk-go-v2/config"

// ...

cfg, err := config.LoadDefaultConfig(
    context.Background(),
    config.WithSharedConfigProfile("dev-profile"),
)
if err != nil {
    return err
}
```

如需設定 SSO 設定檔和使用 驗證的詳細資訊， AWS CLI 請參閱《 使用者指南》中的 AWS CLI 設定 AWS CLI 以使用 AWS IAM Identity Center 。如需以程式設計方式建構 SSO 憑證提供者的詳細資訊，請參閱 ssocreds API 參考文件。

### 登入憑證

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 會產生臨時登入資料，可用於 CLI AWS Tools for PowerShell 和 AWS SDKs AWS 等本機開發工具。此功能可簡化設定和管理 AWS CLI 登入資料的程序，尤其是如果您偏好互動式身分驗證，而不是管理長期存取金鑰。

1. 使用 CLI AWS 啟動登入流程，並遵循瀏覽器提示。在此範例中，我們會將登入工作階段儲存到新的設定檔 dev-profile，但這是選用的。

```
$ aws --profile dev-profile login
```

2. （選用）檢查您的 AWS 共用組態檔案，以確認工作階段已建立。

```
[profile dev-profile]
login_session = arn:aws:sts::account id>:role
```

3. 接著，將應用程式設定為使用登入設定檔。

```
import "github.com/aws/aws-sdk-go-v2/config"

// ...

cfg, err := config.LoadDefaultConfig(
    context.Background(),
    // only necessary if login session is saved to a non-default profile
    config.WithSharedConfigProfile("dev-profile"),
)
if err != nil {
    return err
}
```

如需設定登入設定檔及使用 AWS CLI 驗證的詳細資訊，請參閱使用主控台登入資料進行 AWS 本機開發的登入。

### 其他登入資料提供者

SDK 提供在登入資料模組中擷取登入資料的其他方法。例如，您可以從 擷取臨時安全登入資料 AWS Security Token Service ，或從加密儲存擷取登入資料。

可用的登入資料提供者：

- ec2rolecreds – 透過 Amazon EC2 IMDS 從 Amazon EC2 執行個體角色擷取登入資料。
- endpointcreds – 從任意 HTTP 端點擷取登入資料。
- processcreds – 從外部程序擷取登入資料，該程序將由主機環境的 shell 叫用。
- stscreds – 從 擷取登入資料 AWS STS

## 設定身分驗證

適用於 Go 的 AWS SDK 提供設定身分驗證行為服務的功能。在大多數情況下，預設組態就已足夠，但設定自訂身分驗證允許使用發行前服務功能等其他行為。

# 定義

本節提供 中身分驗證元件的高階描述 適用於 Go 的 AWS SDK。

## AuthScheme

AuthScheme 是定義工作流程的界面，開發套件會透過此工作流程擷取發起人身分並將其連接至操作請求。

驗證方案使用下列元件，以下進一步詳細說明：

- 識別方案的唯一 ID
- 身分解析程式，會傳回用於簽署程序的發起人身分 （例如您的 AWS 登入資料）
- 簽署者，執行將發起人身分實際注入操作的傳輸請求 （例如 `Authorization` HTTP 標頭）

每個服務用戶端選項都包含 `AuthSchemes` 欄位，預設會填入該服務支援的身分驗證方案清單。

## AuthSchemeResolver

每個服務用戶端選項都包含 `AuthSchemeResolver` 欄位。此界面是 SDK 呼叫的 API，用於判斷每個操作的可能身分驗證選項。

> **Important**
>
> 驗證方案解析程式不會指定使用哪個驗證方案。它會傳回可使用的方案清單 (「選項」)，最終方案是透過此處所述的固定演算法選取。

## 選項

選項代表可能的身分驗證選項`ResolverAuthSchemes`，從對 的呼叫傳回。

選項包含三組資訊：

- 代表可能方案的 ID
- 要提供給方案身分解析程式的不透明屬性集
- 要提供給方案簽署者的不透明屬性集

屬性的備註

對於 99% 的使用案例，發起人不需要擔心身分解析和簽署的不透明屬性。開發套件會提取每個方案的必要屬性，並將其傳遞至開發套件中公開的強類型界面。例如，服務的預設身分驗證解析程式會編碼 SigV4 選項，讓簽署名稱和區域的簽署者屬性具有，當選取 SigV4 時，其值會傳遞給用戶端設定的 v4.HTTPSigner 實作。

## Identity

Identity 是 SDK 發起人身分的抽象表示。

開發套件中使用的最常見身分類型是一組 `aws.Credentials`。對於大多數使用案例，發起人不需要將自己與 `Identity`視為抽象，並且可以直接使用具體類型。

> **Note**
>
> 為了保持回溯相容性並防止 API 混淆， AWS 開發套件特定的身分類型`aws.Credentials`不會直接滿足`Identity`界面。此映射會在內部處理。

## IdentityResolver

IdentityResolver 是擷取 的界面`Identity`。

軟體開發套件中`IdentityResolver`存在以強類型形式存在的具體版本 （ 例如 aws.CredentialsProvider)，軟體開發套件會在內部處理此映射。

發起人在定義外部身分驗證機制時，只需要直接實作`IdentityResolver`界面。

## Signer

Signer 是請求以擷取呼叫者 補充的界面`Identity`。

軟體開發套件會以強類型形式 （ 例如 v4.HTTPSigner) `Signer` 存在於軟體開發套件中的具體版本，軟體開發套件會在內部處理此映射。

發起人只需要在定義外部身分驗證機制時直接實作`Signer`界面。

## AuthResolverParameters

每個服務都會接受一組特定的輸入，這些輸入會傳遞至其解析度函數，在每個服務套件中定義為`AuthResolverParameters`。

基本解析程式參數如下：

| name | type | description |
| --- | --- | --- |
| `Operation` | `string` | 要叫用的 操作名稱。 |
| `Region` | `string` | 用戶端 AWS 的區域。僅適用於使用 SigV4【A】 的服務。 |

如果您要實作自己的解析程式，則永遠不需要建構自己的參數執行個體。開發套件會依請求取得這些值，並將其傳遞給您的實作。

## 驗證方案解析工作流程

當您透過 SDK 呼叫 AWS 服務操作時，請求序列化後會發生下列動作序列：

1. 軟體開發套件會呼叫用戶端的 `AuthSchemeResolver.ResolveAuthSchemes()` API，視需要取得輸入參數，以取得操作的可能選項清單。
2. SDK 會逐一查看該清單，然後選取第一個符合下列條件的方案。
   - 具有相符 ID 的方案存在於用戶端自己的`AuthSchemes`清單中
   - 方案的身分解析程式存在於（非`nil`) 用戶端的選項上（透過方案的 `GetIdentityResolver`方法檢查，對上述具體身分解析程式類型的映射會在內部處理）(1)
3. 假設已選取可行的方案，開發套件會叫用其 `GetIdentityResolver()` API 來擷取發起人的身分。例如，內建的 SigV4 驗證機制會在內部映射到用戶端的`Credentials`提供者。
4. SDK 會呼叫身分解析程式的 `GetIdentity()`（例如`aws.CredentialProvider.Retrieve()`，適用於 SigV4)。
5. SDK 會呼叫端點解析程式的 `ResolveEndpoint()`，以尋找請求的端點。端點可能包含會影響簽署程序的其他中繼資料（例如 S3 Object Lambda 的唯一簽署名稱）。
6. SDK 會呼叫身分驗證機制的 `Signer()` API 來擷取其簽署者，並使用其 `SignRequest()` API 來簽署具有先前擷取的呼叫者身分的請求。

(1) 如果 SDK 在清單中遇到匿名選項 (`IDsmithy.api#noAuth`)，則會自動選取，因為沒有對應的身分解析程式。

## 原生支援的 **AuthScheme**

原生支援下列身分驗證方案 適用於 Go 的 AWS SDK。

| 名稱 | 結構描述 ID | 身分解析程式 | Signer | 備註 |
| --- | --- | --- | --- | --- |
| SigV4 | `aws.auth#sigv4` | aws.CredentialsProvider | v4.HTTPSigner | 大多數 AWS 服務操作的目前預設值。 |
| SigV4A | `aws.auth#sigv4a` | aws.CredentialsProvider | N/A | SigV4A 用量目前受到限制，簽署者實作為內部。請參閱此公告，了解新的選擇加入模組 aws-http-auth，該模組公開用於簽署 HTTP 請求的一般用途 APIs。 |
| SigV4Express | `com.amazonaws.s3#sigv4express` | s3.ExpressCredentialsProvider | v4.HTTPSigner | 用於 Express One Zone。 |
| HTTP 承載器 | `smithy.api#httpBearerAuth` | smithybearer.TokenProvider | smithybearer.Signer | 由 codecatalyst 使用。 |
| 匿名 | `smithy.api#noAuth` | N/A | 無 | 無身分驗證 - 不需要身分，且請求未簽署或驗證。 |

## 身分組態

在 中 適用於 Go 的 AWS SDK，身分驗證方案的身分元件是在 SDK 用戶端 中設定`Options`。軟體開發套件會自動為呼叫 操作時所選取的配置，挑選並使用這些元件的值。

> **Note**
>
> 基於回溯相容性的原因，如果未設定身分解析程式，開發套件會隱含允許使用匿名身分驗證機制。這可以透過將用戶端 上的所有身分解析程式設定為 `Optionsnil`(sigv4 身分解析程式也可以設定為 `aws.AnonymousCredentials{}`) 來手動實現。

## 簽署者組態

在 中 適用於 Go 的 AWS SDK，身分驗證方案的簽署者元件是在 SDK 用戶端 中設定`Options`。軟體開發套件會自動為呼叫 操作時所選取的配置，挑選並使用這些元件的值。不需要額外的組態。

自訂身分驗證方案

為了定義自訂身分驗證方案並將其設定為使用，發起人必須執行下列動作：

1. 定義 AuthScheme 實作
2. 在 SDK 用戶端的`AuthSchemes`清單上註冊方案
3. 檢測 SDK 用戶端的 `AuthSchemeResolver`，在適用的情況下`Option`使用結構描述的 ID 傳回身分驗證

> **Warning**
>
> 下列服務具有唯一或自訂的身分驗證行為。如果您需要自訂身分驗證行為，建議您委派 給預設實作，並據此進行包裝：

| 服務 | 備註 |
| --- | --- |
| S3 | 根據操作輸入，有條件使用 SigV4A 和 SigV4Express。 |
| EventBridge | 根據操作輸入，有條件使用 SigV4A。 |
| Cognito | 某些操作僅限匿名。 |
| SSO | 某些操作僅限匿名。 |
| STS | 某些操作僅限匿名。 |

# 設定用戶端端點

> **Warning**
>
> 端點解析是進階 SDK 主題。透過變更這些設定，您可能會破壞程式碼。預設設定應適用於生產環境中的大多數使用者。

適用於 Go 的 AWS SDK 可讓您設定要用於服務的自訂端點。在大多數情況下，預設組態就足夠了。設定自訂端點允許其他行為，例如使用服務的發行前版本。

## 自訂

開發套件中有兩個端點解析組態的「版本」。

- v2，已於 202Q3發行，透過下列方式設定：
  - `EndpointResolverV2`
  - `BaseEndpoint`
- v1，與 SDK 一起發行，透過下列方式設定：
  - `EndpointResolver`

我們建議 v1 端點解析的使用者遷移至 v2，以取得較新的端點相關服務功能的存取權。

## V2：`EndpointResolverV2`+ `BaseEndpoint`

在解析 v2 中， `EndpointResolverV2`是端點解析發生的最終機制。針對您在 SDK 中提出的每個請求，系統會呼叫解析程式`ResolveEndpoint`的方法，做為工作流程的一部分。提出請求時，解析程式`Endpoint`傳回的 主機名稱會依原樣使用（不過，操作序列化程式仍然可以附加到 HTTP 路徑）。

解決方案 v2 包含額外的用戶端層級組態 `BaseEndpoint`，用於為您的服務執行個體指定 "base" 主機名稱。此處設定的值並非確定性 - 最終會在最終解析發生`EndpointResolverV2`時，以參數形式傳遞給用戶端的（如需`EndpointResolverV2`參數的詳細資訊，請參閱）。然後，解析程式實作有機會檢查並可能修改該值，以判斷最終端點。

例如，如果您使用已指定 的用戶端對指定的儲存貯體執行 S3 `GetObject`請求`BaseEndpoint`，預設解析程式會在與虛擬主機相容（假設您尚未在用戶端組態中停用虛擬託管） 時，將儲存貯體注入主機名稱。

實際上， BaseEndpoint 最有可能用來將用戶端指向服務的開發或預覽執行個體。

## EndpointResolverV2 參數

每個服務都會接受一組特定的輸入，這些輸入會傳遞至其解析度函數，並在每個服務套件中定義為 EndpointParameters。

每個服務都包含下列基本參數，用於促進 內的一般端點解析 AWS：

| name | type | description |
| --- | --- | --- |
| Region | string | 用戶端 AWS 的區域 |
| Endpoint | string | 在用戶端組態BaseEndpoint 中為 設定的值 |
| UseFips | bool | 是否在用戶端組態中啟用 FIPS 端點 |
| UseDualStack | bool | 是否在用戶端組態中啟用雙堆疊端點 |

服務可以指定解析所需的其他參數。例如，S3 的 EndpointParameters包含儲存貯體名稱，以及數個 S3-specific功能設定，例如是否啟用虛擬主機定址。

如果您正在實作自己的 EndpointResolverV2，則永遠不需要建構自己的 執行個體EndpointParameters。開發套件會取得每個請求的值，並將其傳遞給您的實作。

### 有關 Amazon S3 的備註

Amazon S3 是一種複雜的服務，其許多功能透過複雜的端點自訂建模，例如儲存貯體虛擬託管、S3 MRAP 等。

因此，建議您不要取代 S3 用戶端中的EndpointResolverV2實作。如果您需要擴展其解決行為，也許透過傳送請求到具有其他端點考量的本機開發堆疊，我們建議包裝預設實作，以便將其委派回預設值作為備用 （ 如以下範例所示 ）。

## 範例

### 搭配 **BaseEndpoint**

下列程式碼片段顯示如何將 S3 用戶端指向服務的本機執行個體，在此範例中，該執行個體託管在連接埠 8080 的迴路裝置上。

```
client := s3.NewFromConfig(cfg, func (o *svc.Options) {
    o.BaseEndpoint = aws.String("https://localhost:8080/")
})
```

### 搭配 **EndpointResolverV2**

下列程式碼片段說明如何使用 將自訂行為注入 S3 的端點解析EndpointResolverV2。

```
import (
    "context"
    "net/url"

    "github.com/aws/aws-sdk-go-v2/service/s3"
    smithyendpoints "github.com/aws/smithy-go/endpoints"
)

type resolverV2 struct {
    // you could inject additional application context here as well
}

func (*resolverV2) ResolveEndpoint(ctx context.Context, params s3.EndpointParameters) (
        smithyendpoints.Endpoint, error,
    ) {
    if /* input params or caller context indicate we must route somewhere */ {
        u, err := url.Parse("https://custom.service.endpoint/")
        if err != nil {
            return smithyendpoints.Endpoint{}, err
        }
        return smithyendpoints.Endpoint{
            URI: *u,
        }, nil
    }

    // delegate back to the default v2 resolver otherwise
    return s3.NewDefaultEndpointResolverV2().ResolveEndpoint(ctx, params)
```

```
}

func main() {
    // load config...

    client := s3.NewFromConfig(cfg, func (o *s3.Options) {
        o.EndpointResolverV2 = &resolverV2{
            // ...
        }
    })
}
```

使用兩者

下列範例程式示範 BaseEndpoint和 之間的互動EndpointResolverV2。這是進階使用案例：

```
import (
    "context"
    "fmt"
    "log"
    "net/url"

    "github.com/aws/aws-sdk-go-v2"
    "github.com/aws/aws-sdk-go-v2/config"
    "github.com/aws/aws-sdk-go-v2/service/s3"
    smithyendpoints "github.com/aws/smithy-go/endpoints"
)

type resolverV2 struct {}

func (*resolverV2) ResolveEndpoint(ctx context.Context, params s3.EndpointParameters) (
        smithyendpoints.Endpoint, error,
    ) {
    // s3.Options.BaseEndpoint is accessible here:
    fmt.Printf("The endpoint provided in config is %s\n", *params.Endpoint)

    // fallback to default
    return s3.NewDefaultEndpointResolverV2().ResolveEndpoint(ctx, params)
}

func main() {
    cfg, err := config.LoadDefaultConfig(context.Background())
    if (err != nil) {
        log.Fatal(err)
```

```
    }

    client := s3.NewFromConfig(cfg, func (o *s3.Options) {
        o.BaseEndpoint = aws.String("https://endpoint.dev/")
        o.EndpointResolverV2 = &resolverV2{}
    })

    // ignore the output, this is just for demonstration
    client.ListBuckets(context.Background(), nil)
}
```

執行時，上述程式會輸出下列項目：

```
The endpoint provided in config is https://endpoint.dev/
```

## V1： EndpointResolver

> **Warning**
>
> 端點解析 v1 會保留為回溯相容性，並與端點解析 v2 中的現代行為隔離。只有在呼叫者設定 EndpointResolver 欄位時，才會使用它。
> 使用 v1 很可能會阻止您存取 v2 解析度發行時或之後推出的端點相關服務功能。如需如何升級的說明，請參閱「遷移」。

EndpointResolver 可設定為為服務用戶端提供自訂端點解析邏輯。您可以使用自訂端點解析程式，為所有端點或僅特定區域端點覆寫服務的端點解析邏輯。如果自訂解析程式不希望解析請求的端點，自訂端點解析程式可以觸發服務的端點解析邏輯進行備用。EndpointResolverWithOptionsFunc 可用來輕鬆包裝函數以滿足EndpointResolverWithOptions界面。

EndpointResolver 您可以透過將包裝有 WithEndpointResolverWithOptions 的解析程式傳遞至 LoadDefaultConfig 來輕鬆設定 ，允許在載入登入資料時覆寫端點，以及aws.Config使用自訂端點解析程式設定結果。

端點解析程式以字串形式提供服務和區域，允許解析程式動態驅動其行為。每個服務用戶端套件都有匯出的ServiceID常數，可用來判斷哪個服務用戶端叫用您的端點解析程式。

端點解析程式可以使用 EndpointNotFoundError sentinel 錯誤值來觸發服務用戶端預設解析邏輯的備用解析。這可讓您選擇無縫覆寫一或多個端點，而無需處理備用邏輯。

如果您的端點解析程式實作傳回 以外的錯誤EndpointNotFoundError，端點解析會停止，而服務操作會傳回錯誤到您的應用程式。

## 範例

### 使用備用

下列程式碼片段顯示如何使用其他端點的備用行為，覆寫 DynamoDB 的單一服務端點：

```
customResolver := aws.EndpointResolverWithOptionsFunc(func(service, region string,
 options ...interface{}) (aws.Endpoint, error) {
    if service == dynamodb.ServiceID && region == "us-west-2" {
        return aws.Endpoint{
            PartitionID:   "aws",
            URL:           "https://test.us-west-2.amazonaws.com",
            SigningRegion: "us-west-2",
        }, nil
    }
    // returning EndpointNotFoundError will allow the service to fallback to it's
 default resolution
    return aws.Endpoint{}, &aws.EndpointNotFoundError{}
})

cfg, err := config.LoadDefaultConfig(context.TODO(),
 config.WithEndpointResolverWithOptions(customResolver))
```

### 無備用

下列程式碼片段顯示如何覆寫 DynamoDB 的單一服務端點，而沒有其他端點的備用行為：

```
customResolver := aws.EndpointResolverWithOptionsFunc(func(service, region string,
 options ...interface{}) (aws.Endpoint, error) {
    if service == dynamodb.ServiceID && region == "us-west-2" {
        return aws.Endpoint{
            PartitionID:   "aws",
            URL:           "https://test.us-west-2.amazonaws.com",
            SigningRegion: "us-west-2",
        }, nil
    }
    return aws.Endpoint{}, fmt.Errorf("unknown endpoint requested")
})
```

```
cfg, err := config.LoadDefaultConfig(context.TODO(),
 config.WithEndpointResolverWithOptions(customResolver))
```

### 不可變端點

> **Warning**
>
> 將端點設定為不可變可能會阻止某些服務用戶端功能正常運作，並可能導致未定義的行為。將端點定義為不可變時，應小心。

有些服務用戶端，例如 Amazon S3，可能會修改解析程式針對特定服務操作傳回的端點。例如，Amazon S3 會自動透過變更已解析的端點來處理虛擬儲存貯體定址。您可以將 HostnameImmutable 設定為 ，以防止 SDK 變更您的自訂端點`true`。例如：

```
customResolver := aws.EndpointResolverWithOptionsFunc(func(service, region string,
 options ...interface{}) (aws.Endpoint, error) {
    if service == dynamodb.ServiceID && region == "us-west-2" {
        return aws.Endpoint{
            PartitionID:   "aws",
            URL:           "https://test.us-west-2.amazonaws.com",
            SigningRegion: "us-west-2",
            HostnameImmutable: true,
        }, nil
    }
    return aws.Endpoint{}, fmt.Errorf("unknown endpoint requested")
})

cfg, err := config.LoadDefaultConfig(context.TODO(),
 config.WithEndpointResolverWithOptions(customResolver))
```

## 移轉

從 v1 遷移到 v2 端點解析時，適用下列一般原則：

- 將 HostnameImmutable 設定為 `false` 的端點傳回大約等同於`BaseEndpoint`將 設定為 v1 最初傳回的 URL，並保留`EndpointResolverV2`為預設值。
- 將 HostnameImmutable 設定為 `true` 的端點傳回大約等同於實作 `EndpointResolverV2`，這會傳回 v1 中最初傳回的 URL。
  - 主要例外是針對具有模型化端點字首的操作。這會進一步記下。

以下提供這些案例的範例。

> **Warning**
>
> V1 不可變端點和 V2 解析度在行為中不相等。例如，S3 Object Lambda 等自訂功能的簽署覆寫仍會針對透過 v1 程式碼傳回的不可變端點進行設定，但 v2 不會進行相同的操作。

## 主機字首注意事項

有些操作使用主機字首建模，以附加到已解析的端點。此行為必須與 ResolveEndpointV2 的輸出一起運作，因此主機字首仍會套用至該結果。

您可以套用中介軟體來手動停用端點主機字首，請參閱範例一節。

## 範例

### 可變端點

下列程式碼範例示範如何遷移基本 v1 端點解析程式，以傳回可修改的端點：

```
// v1
client := svc.NewFromConfig(cfg, func (o *svc.Options) {
    o.EndpointResolver = svc.EndpointResolverFromURL("https://custom.endpoint.api/")
})

// v2
client := svc.NewFromConfig(cfg, func (o *svc.Options) {
    // the value of BaseEndpoint is passed to the default EndpointResolverV2
    // implementation, which will handle routing for features such as S3 accelerate,
    // MRAP, etc.
    o.BaseEndpoint = aws.String("https://custom.endpoint.api/")
})
```

### 不可變端點

```
// v1
client := svc.NewFromConfig(cfg, func (o *svc.Options) {
    o.EndpointResolver = svc.EndpointResolverFromURL("https://custom.endpoint.api/",
 func (e *aws.Endpoint) {
        e.HostnameImmutable = true
```

```
    })
})

// v2
import (
    smithyendpoints "github.com/aws/smithy-go/endpoints"
)

type staticResolver struct {}

func (*staticResolver) ResolveEndpoint(ctx context.Context, params
 svc.EndpointParameters) (
        smithyendpoints.Endpoint, error,
    ) {
    // This value will be used as-is when making the request.
    u, err := url.Parse("https://custom.endpoint.api/")
    if err != nil {
        return smithyendpoints.Endpoint{}, err
    }
    return smithyendpoints.Endpoint{
        URI: *u,
    }, nil
}

client := svc.NewFromConfig(cfg, func (o *svc.Options) {
    o.EndpointResolverV2 = &staticResolver{}
})
```

### 停用主機字首

```
import (
    "context"
    "fmt"
    "net/url"

    "github.com/aws/aws-sdk-go-v2/aws"
    "github.com/aws/aws-sdk-go-v2/config"
    "github.com/aws/aws-sdk-go-v2/service/<service>"
    smithyendpoints "github.com/aws/smithy-go/endpoints"
    "github.com/aws/smithy-go/middleware"
    smithyhttp "github.com/aws/smithy-go/transport/http"
)
```

```
// disableEndpointPrefix applies the flag that will prevent any
// operation-specific host prefix from being applied
type disableEndpointPrefix struct{}

func (disableEndpointPrefix) ID() string { return "disableEndpointPrefix" }

func (disableEndpointPrefix) HandleInitialize(
    ctx context.Context, in middleware.InitializeInput, next
 middleware.InitializeHandler,
) (middleware.InitializeOutput, middleware.Metadata, error) {
    ctx = smithyhttp.SetHostnameImmutable(ctx, true)
    return next.HandleInitialize(ctx, in)
}

func addDisableEndpointPrefix(o *<service>.Options) {
    o.APIOptions = append(o.APIOptions, (func(stack *middleware.Stack) error {
        return stack.Initialize.Add(disableEndpointPrefix{}, middleware.After)
    }))
}

type staticResolver struct{}

func (staticResolver) ResolveEndpoint(ctx context.Context, params
 <service>.EndpointParameters) (
    smithyendpoints.Endpoint, error,
) {
    u, err := url.Parse("https://custom.endpoint.api/")
    if err != nil {
        return smithyendpoints.Endpoint{}, err
    }

    return smithyendpoints.Endpoint{URI: *u}, nil
}


func main() {
    cfg, err := config.LoadDefaultConfig(context.Background())
    if err != nil {
        panic(err)
    }

    svc := <service>.NewFromConfig(cfg, func(o *<service>.Options) {
        o.EndpointResolverV2 = staticResolver{}
    })
```

```
    _, err = svc.<Operation>(context.Background(), &<service>.<OperationInput>{ /* ...
 */ },
        addDisableEndpointPrefix)
    if err != nil {
        panic(err)
    }
}
```

# 自訂 HTTP 用戶端

適用於 Go 的 AWS SDK 使用具有預設組態值的預設 HTTP 用戶端。雖然您可以變更其中一些組態值，但在具有高輸送量和低延遲需求的環境中，使用 適用於 Go 的 AWS SDK 的客戶預設 HTTP 用戶端和傳輸並未充分設定。如需詳細資訊，請參閱，常見問答集因為組態建議會因特定工作負載而有所不同。本節說明如何設定自訂 HTTP 用戶端，並使用該用戶端來建立 適用於 Go 的 AWS SDK 呼叫。

為了協助您建立自訂 HTTP 用戶端，本節說明如何使用 NewBuildableClient 來設定自訂設定，並搭配適用於 Go 的 AWS SDK 服務用戶端使用該用戶端。

讓我們定義要自訂的內容。

## 在組態載入期間覆寫

呼叫 LoadDefaultConfig 時，可以使用 WithHTTPClient 包裝用戶端並將產生的值傳遞給 ，以提供自訂 HTTP 用戶端LoadDefaultConfig。例如，若要以用戶端customClient身分傳遞：

```
cfg, err := config.LoadDefaultConfig(context.TODO(),
 config.WithHTTPClient(customClient))
```

## 逾時

BuildableHTTPClient 可以設定請求逾時限制。此逾時包含連線、處理任何重新導向以及讀取完整回應內文的時間。例如，若要修改用戶端逾時：

```
import "github.com/aws/aws-sdk-go-v2/aws/transport/http"

// ...

httpClient := http.NewBuildableClient().WithTimeout(time.Second*5)
```

## 撥號程式

BuildableHTTPClient 提供建置器機制，用於建構具有修改撥號器選項的用戶端。下列範例示範如何設定用戶端Dialer設定。

```
import awshttp "github.com/aws/aws-sdk-go-v2/aws/transport/http"
import "net"

// ...

httpClient := awshttp.NewBuildableClient().WithDialerOptions(func(d *net.Dialer) {
    d.KeepAlive = -1
    d.Timeout = time.Millisecond*500
})
```

### 設定

Dialer.KeepAlive

此設定代表作用中網路連線的持續作用期間。

設定為負值以停用保持連線。

如果通訊協定和作業系統支援，請將 設為 0 以啟用保持連線。

不支援保持連線的網路通訊協定或作業系統會忽略此欄位。根據預設，TCP 會啟用保持運作。

請參閱 https://golang.org/pkg/net/#Dialer.KeepAlive

KeepAlive 設定為 time.Duration。

Dialer.Timeout

此設定代表撥號等待建立連線的時間上限。

預設為 30 秒。

請參閱 https://golang.org/pkg/net/#Dialer.Timeout

Timeout 設定為 time.Duration。

## 傳輸

BuildableHTTPClient 提供建置器機制，以建構具有修改傳輸選項的用戶端。

## 設定 Proxy

如果您無法直接連線至網際網路，您可以使用 Go 支援的環境變數 (HTTP_PROXY/HTTPS_PROXY) 或建立自訂 HTTP 用戶端來設定代理。下列範例會將用戶端設定為使用 PROXY_URL 做為代理端點：

```
import awshttp "github.com/aws/aws-sdk-go-v2/aws/transport/http"
import "net/http"

// ...

httpClient := awshttp.NewBuildableClient().WithTransportOptions(func(tr
 *http.Transport) {
    proxyURL, err := url.Parse("PROXY_URL")
    if err != nil {
        log.Fatal(err)
    }
    tr.Proxy = http.ProxyURL(proxyURL)
})
```

## 其他設定

以下是可以修改以調整 HTTP 用戶端的幾個其他Transport設定。您可以在傳輸類型文件中找到此處未描述的任何其他設定。這些設定可以套用，如下列範例所示：

```
import awshttp "github.com/aws/aws-sdk-go-v2/aws/transport/http"
import "net/http"

// ...

httpClient := awshttp.NewBuildableClient().WithTransportOptions(func(tr
 *http.Transport) {
    tr.ExpectContinueTimeout = 0
    tr.MaxIdleConns = 10
})
```

### Transport.ExpectContinueTimeout

如果請求具有「預期：100-continue」標頭，則此設定代表完整寫入請求標頭後等待伺服器第一個回應標頭的時間上限，此時間不包含傳送請求標頭的時間。HTTP 用戶端會在此逾時結束後傳送其承載。

預設 1 秒。

設為 0 表示沒有逾時，並在不等待的情況下傳送請求承載。其中一個使用案例是，當您遇到代理或第三方服務的問題時，該問題會採用類似稍後在 函數中使用 Amazon S3 的工作階段。

請參閱 https://golang.org/pkg/net/http/#Transport.ExpectContinueTimeout

`ExpectContinue` 設定為 time.Duration。

Transport.IdleConnTimeout

此設定代表 HTTP 請求之間保持閒置網路連線存活的時間上限。

設為 0 表示沒有限制。

請參閱 https://golang.org/pkg/net/http/#Transport.IdleConnTimeout

`IdleConnTimeout` 設定為 time.Duration。

Transport.MaxIdleConns

此設定代表所有主機的閒置（保持連線）連線數目上限。提高此值的一個使用案例是當您在短時間內從相同用戶端看到許多連線時

0 表示沒有限制。

請參閱 https://golang.org/pkg/net/http/#Transport.MaxIdleConns

設定為`MaxIdleConns` int。

Transport.MaxIdleConnsPerHost

此設定代表保持每個主機的閒置（保持連線）連線數目上限。提高此值的一個使用案例是當您在短時間內從相同用戶端看到許多連線時

預設為每個主機兩個閒置連線。

設為 0 以使用 DefaultMaxIdleConnsPerHost (2)。

請參閱 https://golang.org/pkg/net/http/#Transport.MaxIdleConnsPerHost

`MaxIdleConnsPerHost` 設定為 int。

Transport.ResponseHeaderTimeout

此設定代表等待用戶端讀取回應標頭的時間上限。

如果用戶端無法在此持續時間內讀取回應的標頭，請求會失敗並出現逾時錯誤。

使用長時間執行的 Lambda 函數時，請小心設定此值，因為在 Lambda 函數完成或逾時之前，操作不會傳回任何回應標頭。不過，您仍可使用此選項搭配 ** InvokeAsync** API 操作。

預設為不逾時；請等待一段時間。

請參閱 https://golang.org/pkg/net/http/#Transport.ResponseHeaderTimeout

`ResponseHeaderTimeout` 設定為 time.Duration。

Transport.TLSHandshakeTimeout

此設定代表等待 TLS 交握完成的時間上限。

預設為 10 秒。

零表示沒有逾時。

請參閱 https://golang.org/pkg/net/http/#Transport.TLSHandshakeTimeout

`TLSHandshakeTimeout` 設定為 time.Duration。

# HTTP 攔截器

您可以使用攔截器來勾結 API 請求和回應的執行。攔截器是開放式機制，其中 SDK 會呼叫您編寫的程式碼，將行為注入請求/回應生命週期。如此一來，您就可以修改處理中的請求、除錯請求處理、檢視例外狀況等等。

## 攔截器與中介軟體

適用於 Go 的 AWS SDK v2 同時提供攔截器和中介軟體，以自訂請求處理。雖然兩者都有類似用途，但它們是專為不同的對象和使用案例而設計：

- 攔截器是專為想要使用簡單、著重於 HTTP 的 API 自訂請求/回應處理的 SDK 使用者而設計。它們在請求生命週期中提供特定的掛接點，並直接使用 HTTP 請求和回應。
- 中介軟體是更進階、傳輸無關的系統，主要由 SDK 在內部使用。雖然功能強大，但中介軟體需要更深入的 SDK 內部知識，並涉及更複雜的界面。

在常見使用案例中，攔截器相較於中介軟體的主要優勢：

- 以 HTTP 為重心：攔截器可直接處理 HTTP 請求和回應，無需檢查中介軟體所需的傳輸類型。

- 更簡單的界面：每個攔截器勾點都有特定的聚焦界面，而不是通用中介軟體模式。
- 更清晰的執行模型：攔截器在請求生命週期中明確定義的點執行，而無需了解中介軟體堆疊排序。

> **Note**
>
> 攔截器建置在現有的中介軟體系統之上，因此兩者可以共存於相同的應用程式中。中介軟體仍然適用於需要傳輸無關行為或複雜堆疊操作的進階使用案例。

## 可用的攔截器掛鉤

適用於 Go 的 AWS SDK v2 在請求生命週期的各個階段提供攔截器掛鉤。每個勾點對應至您可以實作的特定界面：

- `BeforeExecution` - 在操作執行期間呼叫的第一個勾點
- `BeforeSerialization` - 將輸入訊息序列化為傳輸請求之前
- `AfterSerialization` - 將輸入訊息序列化為傳輸請求之後
- `BeforeRetryLoop` - 進入重試迴圈之前
- `BeforeAttempt` - 在重試迴圈中呼叫的第一個勾點
- `BeforeSigning` - 簽署傳輸請求之前
- `AfterSigning` - 簽署傳輸請求後
- `BeforeTransmit` - 傳送傳輸請求之前
- `AfterTransmit` - 收到傳輸回應後
- `BeforeDeserialization` - 傳輸回應還原序列化之前
- `AfterDeserialization` - 取消封送傳輸回應之後
- `AfterAttempt` - 在重試迴圈中呼叫的最後一個勾點
- `AfterExecution` - 操作執行期間呼叫的最後一個勾點

您可以在單一攔截器中實作多個界面，以掛鉤至請求生命週期的多個階段。

## 攔截器註冊

您可以在建構服務用戶端或覆寫特定操作的組態時註冊攔截器。註冊會因您希望攔截器套用到用戶端的所有操作或僅套用特定操作而有所不同。

攔截器是透過攔截器登錄檔進行管理，該登錄檔提供新增和移除攔截器的方法。下列範例顯示簡單的攔截器，在簽署程序之前將 AWS X-Ray 追蹤 ID 標頭新增至傳出請求：

```
type recursionDetection struct{}

func (recursionDetection) BeforeSigning(ctx context.Context, in
 *smithyhttp.InterceptorContext) error {
    if traceID := os.Getenv("_X_AMZN_TRACE_ID"); traceID != "" {
        in.Request.Header.Set("X-Amzn-Trace-Id", traceID)
    }
    return nil
}

// use it on the client
svc := s3.NewFromConfig(cfg, func(o *s3.Options) {
    o.Interceptors.AddBeforeSigning(recursionDetection{})
})
```

攔截器登錄檔會新增至用戶端選項，以啟用每個操作攔截器組態：

```
// ... or use it per-operation
s3.ListBuckets(context.Background(), &s3.ListBucketsInput{
}, func(o *s3.Options) {
   o.Interceptors.AddBeforeSigning(recursionDetection{})
})
```

## 全域攔截器組態

您也可以使用 `config.LoadDefaultConfig`函數搭配每個攔截器類型的適當`With*`選項，全域註冊攔截器。這會將攔截器套用至從該組態建立的所有 AWS 服務用戶端：

```
type myExecutionInterceptor struct{}

func (*myExecutionInterceptor) AfterExecution(ctx context.Context, in
 *smithyhttp.InterceptorContext) error {
    // Add your custom logic here
    return nil
}

cfg, err := config.LoadDefaultConfig(context.Background(),
    config.WithAfterExecution(&myExecutionInterceptor{}))
```

```
if err != nil {
    panic(err)
}

// every service client created from the above config
// will include this interceptor
svc := s3.NewFromConfig(cfg)
```

# 日誌

適用於 Go 的 AWS SDK 有可用的記錄設施，可讓您的應用程式啟用偵錯資訊，以偵錯和診斷請求問題或失敗。Logger 界面和 ClientLogMode 是您可以用來決定用戶端應如何記錄和記錄內容的主要元件。

## Logger

使用 LoadDefaultConfig 建構 Config 時，預設Logger會設定為將日誌訊息傳送至程序的標準錯誤 (stderr)。滿足 Logger 界面的自訂記錄器，可以透過使用 config.WithLogger LoadDefaultConfig包裝來做為 的引數傳遞至 。

例如，若要將用戶端設定為使用我們的 applicationLogger：

```
cfg, err := config.LoadDefaultConfig(context.TODO(),
 config.WithLogger(applicationLogger))
```

現在，使用 建構的 設定的用戶端aws.Config會將日誌訊息傳送至 applicationLogger。

### 內容感知記錄器

Logger 實作可能會實作選用的 ContextLogger 介面。實作此界面的記錄器會使用目前內容叫用其WithContext方法。這可讓您的記錄實作傳回新的 Logger，根據內容中存在的值來寫入額外的記錄中繼資料。

## ClientLogMode

根據預設，服務用戶端不會產生日誌訊息。若要設定用戶端傳送日誌訊息以進行偵錯，請在 上使用 ClientLogMode 成員Config。 ClientLogMode 可設定為啟用偵錯訊息：

- Signature 第 4 版 (SigV4) 簽署

- 請求重試
- HTTP 請求
- HTTP 回應

例如，若要啟用 HTTP 請求和重試的記錄：

```
cfg, err := config.LoadDefaultConfig(context.TODO(),
 config.WithClientLogMode(aws.LogRetries | aws.LogRequest))
```

請參閱 ClientLogMode，了解可用的不同用戶端日誌模式。

# 重試和逾時

適用於 Go 的 AWS SDK 可讓您設定 HTTP 服務請求的重試行為。根據預設，服務用戶端會使用 retry.Standard 做為其預設的 retryer。如果預設組態或行為不符合您的應用程式需求，您可以調整重試器組態或提供您自己的重試器實作。

適用於 Go 的 AWS SDK 提供 aws.Retryer 界面，可定義要實作的重試實作所需的一組方法。開發套件提供兩種重試實作：retry.Standard 和 aws.NoOpRetryer。

## 標準重試器

retry.Standard retryer 是 SDK 用戶端使用的預設`aws.Retryer`實作。標準重試器是速率有限的重試器，具有可設定的嘗試次數上限，以及調整請求退避政策的功能。

下表定義此重試器的預設值：

| 屬性 | 預設 |
| --- | --- |
| 嘗試次數上限 | 3 |
| 最大退避延遲 | 20 秒 |

當調用您的請求時發生可重試錯誤時，標準重試器將使用其提供的組態來延遲請求，然後重試請求。重試會將 新增至請求的整體延遲，如果預設組態不符合您的應用程式需求，您必須設定重試器。

如需標準重試器實作將哪些錯誤視為可重試的詳細資訊，請參閱重試套件文件。

## NopRetryer

aws.NopRetryer 是如果您想要停用所有重試嘗試時所提供的aws.Retryer實作。叫用服務用戶端操作時，此重試器只會允許嘗試一次請求，而任何產生的錯誤都會傳回給呼叫應用程式。

## 自訂行為

SDK 提供一組協助程式公用程式，可包裝 aws.Retryer實作，並傳回以所需重試行為包裝的提供的重試程式。您可以根據您的應用程式需求，覆寫所有用戶端、每個用戶端或每個操作的預設重試器。若要查看顯示如何執行此操作的其他範例，請參閱重試套件文件範例。

> **Warning**
>
> 如果使用 指定全域aws.Retryer實作config.WithRetryer，您必須確保傳回aws.Retryer每次調用的新執行個體。這將確保您不會在所有服務用戶端之間建立全域重試權杖儲存貯體。

### 限制最大嘗試次數

您可以使用 retry.AddWithMaxAttempts 來包裝aws.Retryer實作，將最大嘗試次數設定為所需的值。

> **Warning**
>
> 使用 retry.AddWithMaxAttempts搭配值為零，將允許 SDK 重試所有可重試的錯誤，直到請求成功，或傳回不可重試的錯誤。允許 SDK 無限重試可能會導致工作負載失控和計費週期膨脹。

```
import "context"
import "github.com/aws/aws-sdk-go-v2/aws/retry"
import "github.com/aws/aws-sdk-go-v2/config"
import "github.com/aws/aws-sdk-go-v2/service/s3"

// ...

// MaxAttempts will be infinite (will retry indefinitely)
```

```
cfg, err := config.LoadDefaultConfig(context.TODO(), config.WithRetryer(func()
 aws.Retryer {
    return retry.AddWithMaxAttempts(retry.NewStandard(), 0)
}))
if err != nil {
    return err
}

client := s3.NewFromConfig(cfg)
```

請注意，使用功能選項直接設定 MaxAttempts 來執行個體化重試器的行為會略有不同。更具體地說，設定小於或等於零的值會導致重試器使用預設的嘗試次數上限 3 次，而不是無限次重試：

```
import "context"
import "github.com/aws/aws-sdk-go-v2/aws/retry"
import "github.com/aws/aws-sdk-go-v2/config"
import "github.com/aws/aws-sdk-go-v2/service/s3"

// ...

// MaxAttempts will default to 3
cfg, err := config.LoadDefaultConfig(context.TODO(), config.WithRetryer(func()
 aws.Retryer {
    return retry.NewStandard(func(o *retry.StandardOptions) {
        o.MaxAttempts = 0
    })
}))
if err != nil {
    return err
}

client := s3.NewFromConfig(cfg)
```

## 限制最大退避延遲

您可以使用 retry.AddWithMaxBackoffDelay 來包裝`aws.Retryer`實作，並限制重試失敗請求之間允許發生的最大退避延遲。

例如，您可以下列程式碼，以 5 秒的所需最大延遲包裝標準用戶端重試器：

```
import "context"
import "time"
import "github.com/aws/aws-sdk-go-v2/aws/retry"
```

```
import "github.com/aws/aws-sdk-go-v2/config"
import "github.com/aws/aws-sdk-go-v2/service/s3"

// ...

cfg, err := config.LoadDefaultConfig(context.TODO(), config.WithRetryer(func()
 aws.Retryer {
    return retry.AddWithMaxBackoffDelay(retry.NewStandard(), time.Second*5)
}))
if err != nil {
    return err
}

client := s3.NewFromConfig(cfg)
```

## 重試其他 API 錯誤代碼

您可以使用 retry.AddWithErrorCodes 來包裝aws.Retryer實作，並包含應視為可重試的其他 API 錯誤代碼。

例如，您可以下列程式碼來包裝標準用戶端重試器，以包含可重試的 Amazon S3 NoSuchBucketException例外狀況。

```
import "context"
import "time"
import "github.com/aws/aws-sdk-go-v2/aws/retry"
import "github.com/aws/aws-sdk-go-v2/config"
import "github.com/aws/aws-sdk-go-v2/service/s3"
import "github.com/aws/aws-sdk-go-v2/service/s3/types"

// ...

cfg, err := config.LoadDefaultConfig(context.TODO(), config.WithRetryer(func()
 aws.Retryer {
    return retry.AddWithErrorCodes(retry.NewStandard(), (*types.NoSuchBucketException)
(nil).ErrorCode())
}))
if err != nil {
    return err
}

client := s3.NewFromConfig(cfg)
```

## 用戶端速率限制

在標準重試政策中 適用於 Go 的 AWS SDK 引入新的用戶端速率限制機制，以符合現代 SDKs的行為。這是由重試器選項上的 RateLimiter 欄位所控制的行為。

RateLimiter 會以具有設定容量的字符儲存貯體運作，其中操作嘗試失敗會使用字符。嘗試使用超過可用權杖而導致 QuotaExceededError 操作失敗的重試。

預設實作的參數化方式如下（如何修改每個設定）：

- 容量為 500（使用 NewTokenRateLimit 在 StandardOptions 上設定 RateLimiter 的值） NewTokenRateLimit
- 逾時成本 10 個字符所造成的重試（在 StandardOptions 上設定 RetryTimeoutCost)
- 其他錯誤導致的重試需要 5 個字符（在 StandardOptions 上設定 RetryCost)
- 在第一次嘗試時成功的 操作會新增 1 個字符（在 StandardOptions 上設定 NoRetryIncrement)
  - 第 2 次或之後嘗試成功的操作不會新增任何字符

如果您發現預設行為不符合應用程式的需求，您可以使用 ratelimit.None 將其停用。

範例：修改速率限制器

```
import (
    "context"

    "github.com/aws/aws-sdk-go-v2/aws"
    "github.com/aws/aws-sdk-go-v2/aws/ratelimit"
    "github.com/aws/aws-sdk-go-v2/aws/retry"
    "github.com/aws/aws-sdk-go-v2/config"
)

// ...

cfg, err := config.LoadDefaultConfig(context.Background(), config.WithRetryer(func()
 aws.Retryer {
    return retry.NewStandard(func(o *retry.StandardOptions) {
        // Makes the rate limiter more permissive in general. These values are
        // arbitrary for demonstration and may not suit your specific
        // application's needs.
        o.RateLimiter = ratelimit.NewTokenRateLimit(1000)
        o.RetryCost = 1
        o.RetryTimeoutCost = 3
```

```
        o.NoRetryIncrement = 10
    })
}))
```

範例：沒有使用 ratelimit.None 的速率限制

```
import (
    "context"

    "github.com/aws/aws-sdk-go-v2/aws"
    "github.com/aws/aws-sdk-go-v2/aws/ratelimit"
    "github.com/aws/aws-sdk-go-v2/aws/retry"
    "github.com/aws/aws-sdk-go-v2/config"
)

// ...

cfg, err := config.LoadDefaultConfig(context.Background(), config.WithRetryer(func()
 aws.Retryer {
    return retry.NewStandard(func(o *retry.StandardOptions) {
        o.RateLimiter = ratelimit.None
    })
}))
```

## 逾時

叫用服務用戶端操作時，您可以使用內容套件來設定逾時或截止日期。使用 內容。WithDeadline 可包裝您的應用程式內容，並將截止日期設定為必須完成調用操作的特定時間。在特定time.Duration使用內容之後設定逾時。WithTimeout。軟體開發套件會在叫用服務 API 時，將提供的 傳遞context.Context給 HTTP 傳輸用戶端。如果在叫用 操作時，傳遞到軟體開發套件的內容已取消或變成取消，軟體開發套件將不會進一步重試請求，並會返回呼叫應用程式。如果提供給 SDK 的內容遭到取消，您必須在應用程式中適當地處理內容取消。

### 設定逾時

下列範例示範如何設定服務用戶端操作的逾時。

```
import "context"
import "time"

// ...
```

```
ctx := context.TODO() // or appropriate context.Context value for your application

client := s3.NewFromConfig(cfg)

// create a new context from the previous ctx with a timeout, e.g. 5 seconds
ctx, cancel := context.WithTimeout(ctx, 5*time.Second)
defer cancel()

resp, err := client.GetObject(ctx, &s3.GetObjectInput{
    // input parameters
})
if err != nil {
    // handle error
}
```

# 使用 適用於 Go 的 AWS SDK

了解 適用於 Go 的 AWS SDK 在應用程式中使用 進行程式設計的常見和建議方法。

主題


- 建構服務用戶端
- 呼叫 服務操作
- 同時使用 服務用戶端
- 使用操作分頁器
- 使用等待程式
- 處理 適用於 Go 的 AWS SDK V2 中的錯誤


## 建構服務用戶端

您可以使用服務用戶端 Go 套件中可用的 New或 NewFromConfig函數來建構服務用戶端。每個函數都會傳回結構Client類型，其中包含叫用服務 APIs的方法。New 和NewFromConfig每個 提供相同的一組可設定選項來建構服務用戶端，但提供稍有不同的建構模式，我們將在以下各節中查看。

### NewFromConfig

NewFromConfig 函數提供一致的界面，用於使用 aws.Config 建構服務用戶端。aws.Config 您可以使用 config.LoadDefaultConfig 載入 。如需建構 的詳細資訊aws.Config，請參閱 設定軟體開發套件。下列範例示範如何使用 aws.Config和 NewFromConfig函數建構 Amazon S3 服務用戶端：

```
import "context"
    import "github.com/aws/aws-sdk-go-v2/config"
    import "github.com/aws/aws-sdk-go-v2/service/s3"

    // ...

    cfg, err := config.LoadDefaultConfig(context.TODO())
    if err != nil {
        panic(err)
    }

    client := s3.NewFromConfig(cfg)
```

### 覆寫組態

NewFromConfig 可以採用一或多個功能引數，以變更用戶端的組態Options結構。這可讓您進行特定覆寫，例如變更區域，或修改服務特定選項，例如 Amazon S3 UseAccelerate選項。例如：

```
import "context"
    import "github.com/aws/aws-sdk-go-v2/config"
    import "github.com/aws/aws-sdk-go-v2/service/s3"

    // ...

    cfg, err := config.LoadDefaultConfig(context.TODO())
    if err != nil {
        panic(err)
    }

    client := s3.NewFromConfig(cfg, func(o *s3.Options) {
        o.Region = "us-west-2"
        o.UseAccelerate = true
    })
```

覆寫用戶端Options值取決於函數引數提供給 的順序NewFromConfig。

## 新增

> **Note**
>
> New 被視為更進階的用戶端建構形式。我們建議您使用 NewFromConfig進行用戶端建構，因為它允許使用 aws.Config 結構進行建構。這樣就不需要為應用程式所需的每個服務用戶端建構Options結構執行個體。

New 函數是用戶端建構函數，提供了一個介面，用於僅使用用戶端套件Options結構來定義用戶端的組態選項來建構用戶端。例如，使用 建構 Amazon S3 用戶端New：

```
import "github.com/aws/aws-sdk-go-v2/aws"
    import "github.com/aws/aws-sdk-go-v2/credentials"
    import "github.com/aws/aws-sdk-go-v2/service/s3"

    // ...
```

```
    client := s3.New(s3.Options{
        Region:      "us-west-2",
        Credentials:
 aws.NewCredentialsCache(credentials.NewStaticCredentialsProvider(accessKey, secretKey,
 "")),
    })
```

### 覆寫組態

New 可以採用一或多個功能引數，以變更用戶端的組態Options結構。這可讓您進行特定覆寫，例如變更區域或修改服務特定選項，例如 Amazon S3 UseAccelerate選項。例如：

```
import "github.com/aws/aws-sdk-go-v2/aws"
    import "github.com/aws/aws-sdk-go-v2/credentials"
    import "github.com/aws/aws-sdk-go-v2/service/s3"

    // ...

    options := s3.Options{
        Region:      "us-west-2",
        Credentials:
 aws.NewCredentialsCache(credentials.NewStaticCredentialsProvider(accessKey, secretKey,
 "")),
    }

    client := s3.New(options, func(o *s3.Options) {
        o.Region = "us-east-1"
        o.UseAccelerate = true
    })
```

覆寫用戶端Options值取決於函數引數提供給 的順序New。

## 呼叫 服務操作

擁有服務用戶端執行個體之後，您可以使用它來呼叫服務的操作。例如，若要呼叫 Amazon S3 GetObject操作：

```
response, err := client.GetObject(context.TODO(), &s3.GetObjectInput{
        Bucket: aws.String("amzn-s3-demo-bucket"),
```

```
        Key:    aws.String("obj-key"),
    })
```

當您呼叫服務操作時，軟體開發套件會同步驗證輸入、序列化請求、使用登入資料簽署請求、將其傳送至 AWS，然後還原序列化回應或錯誤。在大多數情況下，您可以直接呼叫 服務操作。每個服務操作用戶端方法都會傳回操作回應結構和錯誤界面類型。在嘗試存取服務操作的回應結構之前，您應該一律檢查error類型以判斷是否發生錯誤。

## 將參數傳遞至服務操作

每個服務操作方法都採用內容。內容值可用於設定 SDK 將遵守的請求截止日期。此外，每個服務操作都會採用服務個別 Go <OperationName>Input 套件中找到的結構。您可以使用 操作輸入結構傳入 API 輸入參數。

操作輸入結構可以具有輸入參數，例如標準 Go 數值、布林值、字串、映射和清單類型。在更複雜的 API 操作中，服務可能會有更複雜的輸入參數建模。這些其他類型，例如服務特定的結構和列舉值，可在服務的 types Go 套件中找到。

此外，服務可能會區分 Go 類型的預設值，以及使用者是否設定該值。在這些情況下，輸入參數可能需要您將指標參考傳遞至有問題的類型。對於標準 Go 類型，例如數字、布林值和字串，aws 中提供 <Type>和 From<Type> 便利函數，以簡化此轉換。例如，aws.String 可用來將 轉換為需要指向字串的輸入參數string*string類型。反之，aws.ToString 可用來將 *string 轉換為 ，string同時提供保護，避免取消參考 nil 指標。這些To<Type>函數在處理服務回應時很有幫助。

讓我們看看如何使用 Amazon S3 用戶端呼叫 GetObject API 的範例，並使用 types套件和aws.<Type>協助程式建構我們的輸入。

```
import "context"
    import "github.com/aws/aws-sdk-go-v2/config"
    import "github.com/aws/aws-sdk-go-v2/service/s3"
    import "github.com/aws/aws-sdk-go-v2/service/s3/types"

    // ...

    cfg, err := config.LoadDefaultConfig(context.TODO())
    if err != nil {
        panic(err)
    }

    client := s3.NewFromConfig(cfg)
```

```
    resp, err := client.GetObject(context.TODO(), &s3.GetObjectInput{
        Bucket:       aws.String("amzn-s3-demo-bucket"),
        Key:          aws.String("keyName"),
        RequestPayer: types.RequestPayerRequester,
    })
```

## 覆寫操作呼叫的用戶端選項

與使用功能引數建構用戶端期間修改用戶端操作選項的方式類似，在呼叫操作方法時，可以透過向服務操作方法提供一或多個功能引數來修改用戶端選項。此動作是並行安全的，不會影響用戶端上的其他並行操作。

例如，若要覆寫從 "us-west-2" 到 "us-east-1" 的用戶端區域：

```
cfg, err := config.LoadDefaultConfig(context.TODO(), config.WithRegion("us-west-2"))
    if err != nil {
        log.Printf("error: %v", err)
        return
    }

    client := s3.NewFromConfig(cfg)

    params := &s3.GetObjectInput{
        // ...
    }

    resp, err := client.GetObject(context.TODO(), params, func(o *Options) {
        o.Region = "us-east-1"
    })
```

## 處理操作回應

每個服務操作都有相關聯的輸出結構，其中包含服務的操作回應成員。輸出結構遵循下列命名模式 `<OperationName>Output`。有些操作可能沒有為其操作輸出定義的成員。呼叫服務操作後，應一律檢查傳回`error`引數類型，以判斷呼叫服務操作時是否發生錯誤。傳回的錯誤範圍從用戶端輸入驗證錯誤到傳回給用戶端的服務端錯誤回應。如果用戶端傳回非 nil 錯誤，則不應存取操作的輸出結構。

例如，若要記錄操作錯誤並提早從呼叫函數傳回：

```
response, err := client.GetObject(context.TODO())
    if err != nil {
        log.Printf("GetObject error: %v", err)
        return
    }
```

如需錯誤處理的詳細資訊，包括如何檢查特定錯誤類型，請參閱 TODO

## 使用 的回應 `io.ReadCloser`

有些 API 操作會傳回回應結構，其中包含 的輸出成員`io.ReadCloser`。這種情況適用於在 HTTP 回應本身內文中公開其輸出某些元素的 API 操作。

例如，Amazon S3 `GetObject`操作會傳回回應，其`Body`成員是 ，`io.ReadCloser`用於存取物件承載。

> **Warning**
>
> 您必須一律`Close()`使用任何`io.ReadCloser`輸出成員，無論您是否已使用其內容。否則，可能會洩漏資源，並可能在未來對呼叫的操作讀取回應主體產生問題。

```
resp, err := s3svc.GetObject(context.TODO(), &s3.GetObjectInput{...})
    if err != nil {
        // handle error
        return
    }
    // Make sure to always close the response Body when finished
    defer resp.Body.Close()

    decoder := json.NewDecoder(resp.Body)
    if err := decoder.Decode(&myStruct); err != nil {
        // handle error
        return
    }
```

### 回應中繼資料

所有服務操作輸出結構都包含類型為 middleware.Metadata `ResultMetadata`的成員。 軟體開發套件中介軟體`middleware.Metadata`會使用 來提供來自非由服務建模之服務回應的其他資訊。這包括中繼資料，例如 `RequestID`。例如，若要擷取與服務回應`RequestID`相關聯的 ，以協助 AWS Support 對請求進行故障診斷：

```
import "fmt"
    import "log"
    import "github.com/aws/aws-sdk-go-v2/aws/middleware"
    import "github.com/aws/aws-sdk-go-v2/service/s3"

    // ..

    resp, err := client.GetObject(context.TODO(), &s3.GetObjectInput{
        // ...
    })
    if err != nil {
        log.Printf("error: %v", err)
        return
    }

    requestID, ok := middleware.GetRequestIDMetadata(resp.ResultMetadata)
    if !ok {
        fmt.Println("RequestID not included with request")
    }

    fmt.Printf("RequestID: %s\n", requestID)
```

## 同時使用 服務用戶端

您可以建立同時使用相同服務用戶端傳送多個請求的 goroutine。您可以使用服務用戶端搭配任意數量的 goroutine。

在下列範例中，Amazon S3 服務用戶端用於多個 goroutine。此範例會同時將兩個物件上傳至 Amazon S3 儲存貯體。

```
import "context"
    import "log"
    import "strings"
```

```
    import "github.com/aws/aws-sdk-go-v2/config"
    import "github.com/aws/aws-sdk-go-v2/service/s3"

    // ...

    cfg, err := config.LoadDefaultConfig(context.TODO())
    if err != nil {
        log.Printf("error: %v", err)
        return
    }

    client := s3.NewFromConfig(cfg)

    type result struct {
        Output *s3.PutObjectOutput
        Err    error
    }

    results := make(chan result, 2)

    var wg sync.WaitGroup
    wg.Add(2)

    go func() {
    defer wg.Done()
        output, err := client.PutObject(context.TODO(), &s3.PutObjectInput{
            Bucket: aws.String("amzn-s3-demo-bucket"),
            Key:    aws.String("foo"),
            Body:   strings.NewReader("foo body content"),
        })
        results <- result{Output: output, Err: err}
    }()

    go func() {
        defer wg.Done()
        output, err := client.PutObject(context.TODO(), &s3.PutObjectInput{
            Bucket: aws.String("amzn-s3-demo-bucket"),
            Key:    aws.String("bar"),
            Body:   strings.NewReader("bar body content"),
        })
        results <- result{Output: output, Err: err}
    }()

    wg.Wait()
```

```
    close(results)

    for result := range results {
        if result.Err != nil {
            log.Printf("error: %v", result.Err)
            continue
        }
        fmt.Printf("etag: %v", aws.ToString(result.Output.ETag))
    }
```

# 使用操作分頁器

一般而言，當您擷取項目清單時，您可能需要檢查權杖或標記的輸出結構，以確認 AWS 服務是否傳回請求中的所有結果。如果字符或標記存在，您可以使用它來請求下一頁的結果。您可以使用服務套件的可用分頁器類型，而不是管理這些字符或標記。

分頁程式協助程式可用於支援的 服務操作，可在服務用戶端的 Go 套件中找到。若要為支援的操作建構分頁程式，請使用 New<OperationName>Paginator函數。分頁器建構函數採用服務 Client、操作的<OperationName>Input輸入參數，以及一組選用的功能引數，可讓您設定其他選用分頁器設定。

傳回的操作分頁器類型提供便利的方式來逐一查看分頁操作，直到您到達最後一個頁面，或找到應用程式正在搜尋的項目為止。分頁程式類型有兩種方法： HasMorePages和 NextPage。true如果尚未擷取第一個頁面，或者可以使用 操作擷取其他頁面，則 會HasMorePages傳回布林值。若要擷取操作的第一頁或後續頁面，必須呼叫 NextPage操作。 會NextPage取得context.Context並傳回操作輸出和任何對應的錯誤。如同用戶端操作方法傳回參數，在嘗試使用傳回的回應結構之前，應一律檢查傳回錯誤。請參閱 處理操作回應。

下列範例使用分頁器，從 ListObjectsV2 ListObjectV2操作列出最多三頁的物件金鑰。每個頁面最多包含 10 個金鑰，由Limit分頁器選項定義。

```
import "context"
    import "log"
    import "github.com/aws/aws-sdk-go-v2/config"
    import "github.com/aws/aws-sdk-go-v2/aws"
    import "github.com/aws/aws-sdk-go-v2/service/s3"

    // ...
```

```
    cfg, err := config.LoadDefaultConfig(context.TODO())
    if err != nil {
        log.Printf("error: %v", err)
        return
    }

    client := s3.NewFromConfig(cfg)

    params := &s3.ListObjectsV2Input{
        Bucket: aws.String("amzn-s3-demo-bucket"),
    }

    paginator := s3.NewListObjectsV2Paginator(client, params, func(o
*s3.ListObjectsV2PaginatorOptions) {
        o.Limit = 10
    })

    pageNum := 0
    for paginator.HasMorePages() && pageNum < 3 {
        output, err := paginator.NextPage(context.TODO())
        if err != nil {
            log.Printf("error: %v", err)
            return
        }
        for _, value := range output.Contents {
            fmt.Println(*value.Key)
        }
        pageNum++
    }
```

與用戶端操作方法類似，可以透過提供一或多個功能引數給 來修改請求區域之類的用戶端選項NextPage。如需在呼叫 操作時覆寫用戶端選項的詳細資訊，請參閱 覆寫操作呼叫的用戶端選項。

# 使用等待程式

與非同步 AWS APIs 互動時，您通常需要等待特定資源變成可用，才能對其執行進一步的動作。

例如，Amazon DynamoDB CreateTable API 會立即傳回 CREATING 的 TableStatus，而且在資料表狀態轉換為 之前，您無法叫用讀取或寫入操作ACTIVE。

編寫邏輯以持續輪詢資料表狀態可能會很麻煩且容易出錯。等待程式有助於消除複雜性，並且是為您處理輪詢任務的簡單 APIs。

例如，您可以使用等待程式輪詢 DynamoDB 資料表是否已建立並準備好進行寫入操作。

```
import "context"
    import "fmt"
    import "log"
    import "time"
    import "github.com/aws/aws-sdk-go-v2/aws"
    import "github.com/aws/aws-sdk-go-v2/config"
    import "github.com/aws/aws-sdk-go-v2/service/dynamodb"

    // ...

    cfg, err := config.LoadDefaultConfig(context.TODO())
    if err != nil {
        log.Printf("error: %v", err)
        return
    }

    client := dynamodb.NewFromConfig(cfg)

    // we create a waiter instance by directly passing in a client
    // that satisfies the waiters client Interface.
    waiter :=  dynamodb.NewTableExistsWaiter(client)

    // params is the input to api operation used by the waiter
    params := &dynamodb.DescribeTableInput {
        TableName: aws.String("test-table")
    }

    // maxWaitTime is the maximum wait time, the waiter will wait for
    // the resource status.
    maxWaitTime := 5 * time.Minutes

    // Wait will poll until it gets the resource status, or max wait time
    // expires.
    err := waiter.Wait(context.TODO(), params, maxWaitTime)
    if err != nil {
        log.Printf("error: %v", err)
        return
    }
    fmt.Println("Dynamodb table is now ready for write operations")
```

# 覆寫等待程式組態

根據預設，軟體開發套件會使用針對不同 APIs AWS 的服務所定義的最佳值所設定的最小延遲和最大延遲值。您可以在等待程式建構期間提供功能選項，或在叫用等待程式操作時，覆寫等待程式組態。

例如，在等待程式建構期間覆寫等待程式組態

```
import "context"
    import "fmt"
    import "log"
    import "time"
    import "github.com/aws/aws-sdk-go-v2/aws"
    import "github.com/aws/aws-sdk-go-v2/config"
    import "github.com/aws/aws-sdk-go-v2/service/dynamodb"

    // ...

    cfg, err := config.LoadDefaultConfig(context.TODO())
    if err != nil {
        log.Printf("error: %v", err)
        return
    }

    client := dynamodb.NewFromConfig(cfg)

    // we create a waiter instance by directly passing in a client
    // that satisfies the waiters client Interface.
    waiter :=  dynamodb.NewTableExistsWaiter(client, func (o
 *dynamodb.TableExistsWaiterOptions) {

        // override minimum delay to 10 seconds
        o.MinDelay = 10 * time.Second

        // override maximum default delay to 300 seconds
        o.MaxDelay = 300 * time.Second
    })
```

每個等待器上的 `Wait`函數也會採用功能選項。與上述範例類似，您可以覆寫每個`Wait`請求的等待程式組態。

```
// params is the input to api operation used by the waiter
```

```
    params := &dynamodb.DescribeTableInput {
        TableName: aws.String("test-table")
    }

    // maxWaitTime is the maximum wait time, the waiter will wait for
    // the resource status.
    maxWaitTime := 5 * time.Minutes

    // Wait will poll until it gets the resource status, or max wait time
    // expires.
    err := waiter.Wait(context.TODO(), params, maxWaitTime, func (o
 *dynamodb.TableExistsWaiterOptions) {

        // override minimum delay to 5 seconds
        o.MinDelay = 5 * time.Second

        // override maximum default delay to 120 seconds
        o.MaxDelay = 120 * time.Second
    })
    if err != nil {
        log.Printf("error: %v", err)
        return
    }
    fmt.Println("Dynamodb table is now ready for write operations")
```

## 進階等待程式組態覆寫

您還可以透過提供自訂可重試函數來自訂等待程式預設行為。等待程式特定的選項也提供APIOptions自訂操作中介軟體的選項。

例如，設定進階等待程式覆寫。

```
import "context"
    import "fmt"
    import "log"
    import "time"
    import "github.com/aws/aws-sdk-go-v2/aws"
    import "github.com/aws/aws-sdk-go-v2/config"
    import "github.com/aws/aws-sdk-go-v2/service/dynamodb"
    import "github.com/aws/aws-sdk-go-v2/service/dynamodb/types"
    // ...
```

```
    cfg, err := config.LoadDefaultConfig(context.TODO())
    if err != nil {
        log.Printf("error: %v", err)
        return
    }

    client := dynamodb.NewFromConfig(cfg)

    // custom retryable defines if a waiter state is retryable or a terminal state.
    // For example purposes, we will configure the waiter to not wait
    // if table status is returned as `UPDATING`
    customRetryable := func(ctx context.Context, params *dynamodb.DescribeTableInput,
        output *dynamodb.DescribeTableOutput, err error) (bool, error) {
        if output.Table != nil {
            if output.Table.TableStatus == types.TableStatusUpdating {
                // if table status is `UPDATING`, no need to wait
                return false, nil
            }
        }
    }

    // we create a waiter instance by directly passing in a client
    // that satisfies the waiters client Interface.
    waiter :=  dynamodb.NewTableExistsWaiter(client, func (o
 *dynamodb.TableExistsWaiterOptions) {

        // override the service defined waiter-behavior
        o.Retryable = customRetryable
    })
```

# 處理 適用於 Go 的 AWS SDK V2 中的錯誤

適用於 Go 的 AWS SDK 會傳回滿足 Go `error` 介面類型的錯誤。您可以使用 `Error()`方法取得 SDK 錯誤訊息的格式化字串，無需任何特殊處理。開發套件傳回的錯誤可能會實作 `Unwrap`方法。軟體開發套件會使用 `Unwrap`方法，為錯誤提供額外的內容資訊，同時提供基礎錯誤或錯誤鏈的存取權。`Unwrap` 方法應與 errors.As 搭配使用，以處理取消包裝的錯誤鏈。

您的應用程式必須檢查呼叫可傳回 `error` 界面類型的函數或方法後是否發生錯誤。最基本的錯誤處理形式類似於下列範例：

```
if err != nil {
```

```
    // Handle error
    return
}
```

## 記錄錯誤

最簡單的錯誤處理形式傳統上是在返回或退出應用程式之前記錄或列印錯誤訊息。

```
import "log"

// ...

if err != nil {
    log.Printf("error: %s", err.Error())
    return
}
```

## 服務用戶端錯誤

開發套件使用 smithy.OperationError 錯誤類型包裝服務用戶端傳回的所有錯誤。
OperationError提供與基礎錯誤相關聯之服務名稱和操作的相關內容資訊。此資訊適用於透過集中式錯誤處理機制對一或多個 服務執行批次操作的應用程式。您的應用程式可以使用 errors.As 存取此OperationError中繼資料。

```
import "log"
import "github.com/aws/smithy-go"

// ...

if err != nil {
    var oe *smithy.OperationError
    if errors.As(err, &oe) {
        log.Printf("failed to call service: %s, operation: %s, error: %v",
 oe.Service(), oe.Operation(), oe.Unwrap())
    }
    return
}
```

## API 錯誤回應

服務操作可以傳回建模錯誤類型，以指出特定錯誤。這些建模類型可與 搭配使用`errors.As`，以取消包裝並判斷操作失敗是否是由於特定錯誤所致。例如，如果同名儲存貯體已存在，Amazon S3 `CreateBucket`可以傳回 BucketAlreadyExists 錯誤。

例如，若要檢查錯誤是否為`BucketAlreadyExists`錯誤：

```
import "log"
import "github.com/aws/aws-sdk-go-v2/service/s3/types"

// ...

if err != nil {
    var bne *types.BucketAlreadyExists
    if errors.As(err, &bne) {
        log.Println("error:", bne)
    }
    return
}
```

所有服務 API 回應錯誤都會實作 smithy.APIError 介面類型。此界面可用於處理模型化或未模型化的服務錯誤回應。此類型可讓您存取 服務傳回的錯誤碼和訊息。此外，如果知道錯誤是否由用戶端或伺服器造成，此類型會提供指示。

```
import "log"
import "github.com/aws/smithy-go"

// ...

if err != nil {
    var ae smithy.APIError
    if errors.As(err, &ae) {
        log.Printf("code: %s, message: %s, fault: %s", ae.ErrorCode(),
 ae.ErrorMessage(), ae.ErrorFault().String())
    }
    return
}
```

# 擷取請求識別符

使用 AWS Support 時，您可能需要提供請求識別符，以識別您嘗試故障診斷的請求。您可以使用 http.ResponseError，並使用 ServiceRequestID()方法擷取與錯誤回應相關聯的請求識別符。

```
import "log"
import awshttp "github.com/aws/aws-sdk-go-v2/aws/transport/http"

// ...

if err != nil {
    var re *awshttp.ResponseError
    if errors.As(err, &re) {
        log.Printf("requestID: %s, error: %v", re.ServiceRequestID(), re.Unwrap());
    }
    return
}
```

## Amazon S3 請求識別符

Amazon S3 請求包含其他識別符，可用於協助 AWS Support 對您的請求進行故障診斷。您可以使用 s3.ResponseError 和 呼叫 ServiceRequestID() 和 ServiceHostID()來擷取請求 ID 和主機 ID。

```
import "log"
import "github.com/aws/aws-sdk-go-v2/service/s3"

// ...

if err != nil {
    var re s3.ResponseError
    if errors.As(err, &re) {
        log.Printf("requestID: %s, hostID: %s request failure", re.ServiceRequestID(),
 re.ServiceHostID());
    }
    return
}
```

# 搭配 AWS 服務使用 適用於 Go 的 AWS SDK v2

若要呼叫 AWS 服務，您必須先建構服務用戶端執行個體。服務用戶端提供該服務每個 API 動作的低階存取權。例如，您可以建立 Amazon S3 服務用戶端來呼叫 Amazon S3 APIs。

當您呼叫服務操作時，您會將輸入參數做為結構傳入。成功呼叫將產生包含服務 API 回應的輸出結構。例如，在您成功呼叫 Amazon S3 建立儲存貯體動作後，該動作會傳回具有儲存貯體位置的輸出結構。

如需服務用戶端的清單，包括其方法和參數，請參閱 適用於 Go 的 AWS SDK API 參考。

## 使用檢查總和保護資料完整性

Amazon Simple Storage Service (Amazon S3) 可讓您在上傳物件時指定檢查總和。當您指定檢查總和時，它會與 物件一起存放，並在下載物件時驗證。

當您傳輸檔案時，檢查總和可提供多一層的資料完整性。透過檢查總和，您可以確認收到的檔案符合原始檔案，以驗證資料一致性。如需使用 Amazon S3 檢查總和的詳細資訊，請參閱 Amazon Simple Storage Service 使用者指南，包括支援的演算法。

您可以靈活地選擇最符合您需求的演算法，並讓 SDK 計算檢查總和。或者，您可以使用其中一個支援的演算法提供預先計算的檢查總和值。

> **Note**
>
> 從 Amazon S3 模組 1.74.1 版開始，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。如果您未提供預先計算的檢查總和值，或未指定 SDK 應該用來計算檢查總和的演算法，則 SDK 會計算此檢查總和。
> 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和工具參考指南中閱讀這些保護。

我們討論兩個請求階段的檢查總和：上傳物件和下載物件。

### 上傳物件

當您使用 `putObject`方法上傳物件並提供檢查總和演算法時，軟體開發套件會計算指定演算法的檢查總和。

下列程式碼片段顯示使用CRC32檢查總和上傳物件的請求。當 SDK 傳送請求時，它會計算CRC32檢查總和並上傳物件。Amazon S3 透過計算檢查總和並將其與 SDK 提供的檢查總和進行比較，來驗證內容的完整性。然後，Amazon S3 會將檢查總和與 物件一起存放。

```
out, err := s3Client.PutObject(context.Background(), &s3.PutObjectInput{
     Bucket:            aws.String("bucket"),
     Key:               aws.String("key"),
     ChecksumAlgorithm: types.ChecksumAlgorithmCrc32,
     Body:              strings.NewReader("Hello World"),
 })
```

如果您未隨請求提供檢查總和演算法，檢查總和行為會因您使用的 SDK 版本而異，如下表所示。

未提供檢查總和演算法時的檢查總和行為

| 的 Amazon S3 模組版本 適用於 Go 的 AWS SDK | 檢查總和行為 |
| --- | --- |
| 早於 v1.74.1 | 軟體開發套件不會自動計算以 CRC 為基礎的檢查總和，並在請求中提供該檢查總和。 |
| v1.74.1 或更新版本 | SDK 使用CRC32演算法來計算檢查總和，並在請求中提供檢查總和。Amazon S3 透過計算自己的CRC32檢查總和來驗證傳輸的完整性，並將其與 SDK 提供的檢查總和進行比較。如果檢查總和相符，檢查總和會與 物件一起儲存。 |

## 使用預先計算的檢查總和值

請求隨附的預先計算檢查總和值會停用 SDK 的自動運算，並改用提供的值。

下列範例顯示具有預先計算 SHA256 檢查總和的請求。

```
out, err := s3Client.PutObject(context.Background(), &s3.PutObjectInput{
     Bucket:        aws.String("bucket"),
     Key:           aws.String("key"),
     ChecksumCRC32: aws.String("checksumvalue"),
     Body:          strings.NewReader("Hello World"),
 })
```

如果 Amazon S3 判斷指定演算法的檢查總和值不正確，則服務會傳回錯誤回應。

### 分段上傳

您也可以搭配分段上傳使用檢查總和。

適用於 Go 的 AWS SDK 提供兩個選項，以使用具有分段上傳的檢查總和。第一個選項使用指定上傳CRC32演算法的傳輸管理員。

```
s3Client := s3.NewFromConfig(cfg)
     transferManager := manager.NewUploader(s3Client)
     out, err := transferManager.Upload(context.Background(), &s3.PutObjectInput{
             Bucket:            aws.String("bucket"),
             Key:               aws.String("key"),
             Body:              large file to trigger multipart upload,
             ChecksumAlgorithm: types.ChecksumAlgorithmCrc32,
     })
```

如果您在使用傳輸管理員進行上傳時未提供檢查總和演算法，軟體開發套件會根據CRC32演算法自動計算和檢查總和。軟體開發套件會針對所有版本的軟體開發套件執行此計算。

第二個選項使用 Amazon S3 用戶端來執行分段上傳。如果您使用此方法指定檢查總和，則必須指定啟動上傳時要使用的演算法。您還必須為每一個分段請求指定演算法，並在每一個分段上傳後提供為其計算的總和檢查。

```
s3Client := s3.NewFromConfig(cfg)
     createMultipartUploadOutput, err :=
 s3Client.CreateMultipartUpload(context.Background(), &s3.CreateMultipartUploadInput{
             Bucket:            aws.String("bucket"),
             Key:               aws.String("key"),
             ChecksumAlgorithm: types.ChecksumAlgorithmCrc32,
          })
     if err != nil {
             log.Fatal("err create multipart upload ", err)
     }

     var partsBody []io.Reader // this is just an example parts content, you should
 load your target file in your code
     partNum := int32(1)
     var completedParts []types.CompletedPart
     for _, body := range partsBody {
         uploadPartOutput, err := s3Client.UploadPart(context.Background(),
 &s3.UploadPartInput{
```

```
            Bucket:            aws.String("bucket"),
            Key:               aws.String("key"),
            ChecksumAlgorithm: types.ChecksumAlgorithmCrc32,
            Body:              body,
            PartNumber:        aws.Int32(partNum),
            UploadId:          createMultipartUploadOutput.UploadId,
        })
        if err != nil {
            log.Fatal("err upload part ", err)
        }

        completedParts = append(completedParts, types.CompletedPart{
            PartNumber:    aws.Int32(partNum),
            ETag:          uploadPartOutput.ETag,
            ChecksumCRC32: uploadPartOutput.ChecksumCRC32,
        })
        partNum++
    }

    completeMultipartUploadOutput, err :=
s3Client.CompleteMultipartUpload(context.Background(),
&s3.CompleteMultipartUploadInput{
        Bucket:   aws.String("bucket"),
        Key:      aws.String("key"),
        UploadId: createMultipartUploadOutput.UploadId,
        MultipartUpload: &types.CompletedMultipartUpload{
            Parts: completedParts,
        },
    })
    if err != nil {
        log.Fatal("err complete multipart upload ", err)
    }
```

## 下載物件

當您使用 GetObject 方法下載物件時，開發套件會在 的 ChecksumMode 欄位GetObjectInput設定為 時自動驗證檢查總和types.ChecksumModeEnabled。

以下程式碼片段中的請求會指示 SDK 透過計算檢查總和並比較值來驗證回應中的檢查總和。

```
out, err := s3Client.GetObject(context.Background(), &s3.GetObjectInput{
    Bucket:       aws.String("bucket"),
    Key:          aws.String("key"),
```

```
    ChecksumMode: types.ChecksumModeEnabled,
})
```

如果物件未使用檢查總和上傳，則不會進行驗證。

# 使用 適用於 Go 的 AWS SDK 公用程式

適用於 Go 的 AWS SDK 包含下列公用程式，可協助您更輕鬆地使用 AWS 服務。在相關的 AWS 服務套件中尋找 SDK 公用程式。

## Amazon RDS 公用程式

### IAM 身分驗證

驗證套件提供公用程式來產生身分驗證字符，以連線至 Amazon RDS MySQL 和 PostgreSQL 資料庫執行個體。使用 BuildAuthToken 方法，您可以提供資料庫端點、 AWS 區域、使用者名稱和 aws.CredentialProvider 實作來產生資料庫授權字符，該實作會傳回具有使用 IAM 資料庫身分驗證連線至資料庫之許可的 IAM 憑證。若要進一步了解如何使用 IAM 身分驗證設定 Amazon RDS，請參閱下列 Amazon RDS 開發人員指南資源：

- 啟用和停用 IAM 資料庫身分驗證
- 建立和使用 IAM 資料庫存取的 IAM 政策
- 使用 IAM 身分驗證建立資料庫帳戶

下列範例顯示如何產生身分驗證字符以連線至 Amazon RDS 資料庫：

```
import "context"
import "github.com/aws/aws-sdk-go-v2/config"
import "github.com/aws/aws-sdk-go-v2/feature/rds/auth"

// ...

cfg, err := config.LoadDefaultConfig(context.TODO())
if err != nil {
    panic("configuration error: " + err.Error())
}

authenticationToken, err := auth.BuildAuthToken(
    context.TODO(),
    "mydb.123456789012.us-east-1.rds.amazonaws.com:3306", // Database Endpoint (With
 Port)
    "us-east-1", // AWS Region
    "jane_doe", // Database Account
```

```
    cfg.Credentials,
)
if err != nil {
    panic("failed to create authentication token: " + err.Error())
}
```

# Amazon CloudFront 公用程式

## Amazon CloudFront URL 簽署者

Amazon CloudFront URL 簽署者可簡化建立已簽署 URLs的程序。簽章的 URL 包含的資訊，例如過期日期和時間，可讓您控制對內容的存取。當您想要透過網際網路分發內容，但想要限制特定使用者的存取 （例如，付費的使用者） 時，簽章URLs 非常有用。

若要簽署 URL，請使用您的 CloudFront 金鑰對 ID 和相關聯的私有金鑰來建立URLSigner執行個體。然後呼叫 Sign或 SignWithPolicy方法，並包含要簽署的 URL。如需 Amazon CloudFront 金鑰對的詳細資訊，請參閱《CloudFront 開發人員指南》中的為您的信任簽署者建立 CloudFront 金鑰對。CloudFront

下列範例會建立簽章的 URL，該 URL 會在建立後一小時內有效。

```
import "github.com/aws/aws-sdk-go-v2/feature/cloudfront/sign"

// ...

signer := sign.NewURLSigner(keyID, privKey)

signedURL, err := signer.Sign(rawURL, time.Now().Add(1*time.Hour))
if err != nil {
    log.Fatalf("Failed to sign url, err: %s\n", err.Error())
    return
}
```

如需簽署公用程式的詳細資訊，請參閱 適用於 Go 的 AWS SDK API 參考中的簽署套件。

# Amazon EC2 執行個體中繼資料服務

您可以使用 適用於 Go 的 AWS SDK 來存取 Amazon EC2 執行個體中繼資料服務。feature/ec2/imds Go 套件提供可用來存取 Amazon EC2 執行個體中繼資料服務的用戶端類型。Client 和相關聯的操作

可以使用類似於 SDK 提供的其他 AWS 服務用戶端。若要進一步了解如何設定 SDK，以及如何使用服務用戶端，請參閱 設定軟體開發套件和 搭配 AWS 服務使用 適用於 Go 的 AWS SDK v2。

用戶端可協助您輕鬆擷取應用程式執行所在執行個體的相關資訊，例如其 AWS 區域或本機 IP 地址。一般而言，您必須建立並提交 HTTP 請求，才能擷取執行個體中繼資料。反之，請建立 `imds.Client`以使用程式設計用戶端存取 Amazon EC2 執行個體中繼資料服務，例如其他 AWS 服務。

例如，若要建構用戶端：

```
import "context"
import "github.com/aws/aws-sdk-go-v2/config"
import "github.com/aws/aws-sdk-go-v2/feature/ec2/imds"

// ...

cfg, err := config.LoadDefaultConfig(context.TODO())
if err != nil {
    log.Printf("error: %v", err)
    return
}

client := imds.NewFromConfig(cfg)
```

然後使用 服務用戶端從中繼資料類別擷取資訊，例如 `local-ipv4`（執行個體的私有 IP 地址）。

```
localIp, err := client.GetMetadata(context.TODO(), &imds.GetMetadataInput{
    Path: "local-ipv4",
})
if err != nil {
    log.Printf("Unable to retrieve the private IP address from the EC2 instance: %s\n",
 err)
    return
}
content, _ := io.ReadAll(localIp.Content)
fmt.Printf("local-ip: %v\n", string(content))
```

如需所有中繼資料類別的清單，請參閱《Amazon EC2 使用者指南》中的執行個體中繼資料類別。

# Amazon S3 公用程式

## Amazon S3 Transfer Manager

Amazon S3 上傳和下載管理員可以分解大型物件，因此可以以多個部分平行傳輸。這可讓您輕鬆恢復中斷的傳輸。

### Amazon S3 上傳管理員

Amazon S3 上傳管理員會判斷檔案是否可以分割成較小的部分並平行上傳。您可以自訂平行上傳的數量和上傳組件的大小。

下列範例使用 Amazon S3 Uploader上傳檔案。使用 Uploader 類似於 s3.PutObject()操作。

```
import "context"
import "github.com/aws/aws-sdk-go-v2/config"
import "github.com/aws/aws-sdk-go-v2/service/s3"
import "github.com/aws/aws-sdk-go-v2/feature/s3/manager"

// ...

cfg, err := config.LoadDefaultConfig(context.TODO())
if err != nil {
    log.Printf("error: %v", err)
    return
}

client := s3.NewFromConfig(cfg)

uploader := manager.NewUploader(client)
result, err := uploader.Upload(context.TODO(), &s3.PutObjectInput{
    Bucket: aws.String("amzn-s3-demo-bucket"),
    Key:    aws.String("my-object-key"),
    Body:   uploadFile,
})
```

#### 組態選項

當您使用 NewUploader 執行個體化Uploader執行個體時，您可以指定數個組態選項來自訂物件的上傳方式。選項是透過提供一或多個引數給 來覆寫NewUploader。這些選項包括：

- PartSize – 指定要上傳之每個部分的緩衝區大小，以位元組為單位。每個部分的最小大小為 5 MiB。
- Concurrency – 指定要平行上傳的組件數量。
- LeavePartsOnError – 指出是否要在 Amazon S3 中保留成功上傳的組件。

Concurrency 值會限制特定Upload呼叫可能發生的並行部分上傳數量。這不是全域用戶端並行限制。調整 PartSize和 Concurrency組態值以尋找最佳組態。例如，具有高頻寬連線的系統可以平行傳送更大的部分和更多的上傳。

例如，您的應用程式Uploader使用 Concurrency的 設定 5。如果您的應用程式接著Upload從兩個不同的 goroutine 呼叫 ，則結果為10並行部分上傳 (2 個 goroutines * 5)Concurrency。

> **Warning**
>
> 預期您的應用程式會將並行呼叫限制為 Upload ，以防止應用程式資源耗盡。

以下是在Uploader建立期間設定預設組件大小的範例：

```
uploader := manager.NewUploader(client, func(u *Uploader) {
    u.PartSize = 10 * 1024 * 1024, // 10 MiB
})
```

如需 Uploader及其組態的詳細資訊，請參閱 適用於 Go 的 AWS SDK API 參考中的上傳者。

PutObjectInput 內文欄位 (io.ReadSeeker 與 io.Reader)

s3.PutObjectInput 結構的 Body 欄位是 io.Reader類型。不過，此欄位可以填入同時滿足 io.ReadSeeker和 io.ReaderAt 界面的類型，以改善主機環境的應用程式資源使用率。下列範例會建立滿足兩個界面ReadSeekerAt的類型：

```
type ReadSeekerAt interface {
    io.ReadSeeker
    io.ReaderAt
}
```

對於 io.Reader類型，讀取器的位元組必須在記憶體中緩衝，才能上傳組件。當您增加 PartSize或 Concurrency值時， 所需的記憶體 (RAM) 會大幅Uploader增加。所需的記憶體約為 *PartSize* * *Concurrency*。例如，為 指定 100 MB，為 PartSize 指定 10Concurrency， 至少需要 1 GB。

由於 io.Reader類型無法在讀取其位元組之前判斷其大小，因此 Uploader無法計算上傳的組件數量。因此，如果您設定PartSize過低， Uploader可以達到大型檔案 10，000 個部分的 Amazon S3 上傳限制。如果您嘗試上傳超過 10，000 個組件，上傳會停止並傳回錯誤。

對於實作 ReadSeekerAt類型的body值， Uploader不會在傳送至 Amazon S3 之前緩衝記憶體中的內文內容。 會在將檔案上傳至 Amazon S3 之前Uploader計算預期的組件數量。如果目前的值PartSize需要超過 10，000 個組件才能上傳檔案， Uploader會增加組件大小值，因此需要較少的組件。

處理失敗的上傳

如果上傳至 Amazon S3 的 依預設失敗， Uploader 會使用 Amazon S3 AbortMultipartUpload操作來移除上傳的組件。此功能可確保失敗的上傳不會使用 Amazon S3 儲存體。

您可以LeavePartsOnError設為 true，讓 Uploader不會刪除成功上傳的組件。這對於恢復部分完成的上傳非常有用。若要在上傳的組件上操作，您必須取得失敗上傳UploadID的 。下列範例示範如何使用manager.MultiUploadFailure錯誤界面類型來取得 UploadID。

```
result, err := uploader.Upload(context.TODO(), &s3.PutObjectInput{
    Bucket: aws.String("amzn-s3-demo-bucket"),
    Key:    aws.String("my-object-key"),
    Body:   uploadFile,
})
output, err := u.upload(input)
if err != nil {
    var mu manager.MultiUploadFailure
    if errors.As(err, &mu) {
        // Process error and its associated uploadID
        fmt.Println("Error:", mu)
        _ = mu.UploadID() // retrieve the associated UploadID
    } else {
        // Process error generically
        fmt.Println("Error:", err.Error())
    }
    return
}
```

### 每次上傳覆寫上傳者選項

您可以透過為 方法提供一或多個引數Upload來覆寫呼叫時Uploader的選項。這些覆寫是並行安全的修改，不會影響對管理員的持續上傳或後續Upload呼叫。例如，若要覆寫特定上傳請求的PartSize組態：

```
params := &s3.PutObjectInput{
    Bucket: aws.String("amzn-s3-demo-bucket"),
    Key:    aws.String("my-key"),
    Body:   myBody,
}
resp, err := uploader.Upload(context.TODO(), params, func(u *manager.Uploader) {
    u.PartSize = 10 * 1024 * 1024, // 10 MiB
})
```

### 範例

#### 將資料夾上傳至 Amazon S3

下列範例使用 path/filepath套件以遞迴方式收集檔案清單，並將其上傳至指定的 Amazon S3 儲存貯體。Amazon S3 物件的金鑰字首為檔案的相對路徑。

```
package main

import (
    "context"
    "log"
    "os"
    "path/filepath"

    "github.com/aws/aws-sdk-go-v2/aws"
    "github.com/aws/aws-sdk-go-v2/config"
    "github.com/aws/aws-sdk-go-v2/feature/s3/manager"
    "github.com/aws/aws-sdk-go-v2/service/s3"
)

var (
    localPath string
    bucket    string
    prefix    string
)

func init() {
```

```
    if len(os.Args) != 4 {
        log.Fatalln("Usage:", os.Args[0], "<local path> <bucket> <prefix>")
    }
    localPath = os.Args[1]
    bucket = os.Args[2]
    prefix = os.Args[3]
}

func main() {
    walker := make(fileWalk)
    go func() {
        // Gather the files to upload by walking the path recursively
        if err := filepath.Walk(localPath, walker.Walk); err != nil {
            log.Fatalln("Walk failed:", err)
        }
        close(walker)
    }()

    cfg, err := config.LoadDefaultConfig(context.TODO())
    if err != nil {
        log.Fatalln("error:", err)
    }

    // For each file found walking, upload it to Amazon S3
    uploader := manager.NewUploader(s3.NewFromConfig(cfg))
    for path := range walker {
        rel, err := filepath.Rel(localPath, path)
        if err != nil {
            log.Fatalln("Unable to get relative path:", path, err)
        }
        file, err := os.Open(path)
        if err != nil {
            log.Println("Failed opening file", path, err)
            continue
        }
        defer file.Close()
        result, err := uploader.Upload(context.TODO(), &s3.PutObjectInput{
            Bucket: &bucket,
            Key:    aws.String(filepath.Join(prefix, rel)),
            Body:   file,
        })
        if err != nil {
            log.Fatalln("Failed to upload", path, err)
        }
```

```
        log.Println("Uploaded", path, result.Location)
    }
}

type fileWalk chan string

func (f fileWalk) Walk(path string, info os.FileInfo, err error) error {
    if err != nil {
        return err
    }
    if !info.IsDir() {
        f <- path
    }
    return nil
}
```

## Download Manager

Amazon S3 Downloader Manager 會判斷檔案是否可以分割成較小的部分並平行下載。您可以自訂平行下載的數量，以及下載組件的大小。

**範例：下載檔案**

下列範例使用 Amazon S3 `Downloader`下載檔案。使用 `Downloader` 類似於 s3.GetObject 操作。

```
import "context"
import "github.com/aws/aws-sdk-go-v2/aws"
import "github.com/aws/aws-sdk-go-v2/config"
import "github.com/aws/aws-sdk-go-v2/service/s3"
import "github.com/aws/aws-sdk-go-v2/feature/s3/manager"

// ...

cfg, err := config.LoadDefaultConfig(context.TODO())
if err != nil {
    log.Println("error:", err)
    return
}

client := s3.NewFromConfig(cfg)

downloader := manager.NewDownloader(client)
numBytes, err := downloader.Download(context.TODO(), downloadFile, &s3.GetObjectInput{
```

```
    Bucket: aws.String("amzn-s3-demo-bucket"),
    Key:    aws.String("my-key"),
})
```

downloadFile 參數是 io.WriterAt類型。介面WriterAt可讓 平行Downloader寫入檔案的多個部分。

組態選項

當您執行個體執行個體化時Downloader，您可以指定組態選項來自訂物件的下載方式：

- PartSize – 指定要下載的每個部分的緩衝區大小，以位元組為單位。每個組件的大小下限為 5 MB。
- Concurrency – 指定要平行下載的組件數量。

Concurrency 值會限制特定Download呼叫可能發生的並行部分下載數量。這不是全域用戶端並行限制。調整 PartSize和 Concurrency組態值以尋找最佳組態。例如，具有高頻寬連線的系統可以平行接收更大的部分和更多的下載。

例如，您的應用程式Downloader會使用 Concurrency的 來設定 5。然後，您的應用程式Download會從兩個不同的 goroutine 呼叫 ，結果將是10並行部分下載 (2 個 goroutines * 5)Concurrency。

> **Warning**
>
> 預期您的應用程式會將並行呼叫限制為 Download ，以防止應用程式資源耗盡。

如需 Downloader 及其其他組態選項的詳細資訊，請參閱 適用於 Go 的 AWS SDK API 參考中的 manager.Downloader。

每次下載覆寫下載程式選項

您可以透過為 方法提供一或多個功能引數Download來覆寫呼叫時Downloader的選項。這些覆寫是並行安全修改，不會影響持續上傳或後續Download呼叫管理員。例如，若要覆寫特定上傳請求的PartSize組態：

```
params := &s3.GetObjectInput{
    Bucket: aws.String("amzn-s3-demo-bucket"),
    Key:    aws.String("my-key"),
}
```

```
resp, err := downloader.Download(context.TODO(), targetWriter, params, func(u
 *manager.Downloader) {
    u.PartSize = 10 * 1024 * 1024, // 10 MiB
})
```

### 範例

#### 下載儲存貯體中的所有物件

下列範例使用分頁從 Amazon S3 儲存貯體收集物件清單。然後，它會將每個物件下載到本機檔案。

```
package main

import (
    "context"
    "fmt"
    "log"
    "os"
    "path/filepath"

    "github.com/aws/aws-sdk-go-v2/aws"
    "github.com/aws/aws-sdk-go-v2/config"
    "github.com/aws/aws-sdk-go-v2/feature/s3/manager"
    "github.com/aws/aws-sdk-go-v2/service/s3"
)

var (
    Bucket         = "amzn-s3-demo-bucket" // Download from this bucket
    Prefix         = "logs/"    // Using this key prefix
    LocalDirectory = "s3logs"   // Into this directory
)

func main() {
    cfg, err := config.LoadDefaultConfig(context.TODO())
    if err != nil {
        log.Fatalln("error:", err)
    }

    client := s3.NewFromConfig(cfg)
    manager := manager.NewDownloader(client)

    paginator := s3.NewListObjectsV2Paginator(client, &s3.ListObjectsV2Input{
        Bucket: &Bucket,
        Prefix: &Prefix,
```

```
    })

    for paginator.HasMorePages() {
        page, err := paginator.NextPage(context.TODO())
        if err != nil {
            log.Fatalln("error:", err)
        }
        for _, obj := range page.Contents {
            if err := downloadToFile(manager, LocalDirectory, Bucket,
 aws.ToString(obj.Key)); err != nil {
                log.Fatalln("error:", err)
            }
        }
    }
}

func downloadToFile(downloader *manager.Downloader, targetDirectory, bucket, key
 string) error {
    // Create the directories in the path
    file := filepath.Join(targetDirectory, key)
    if err := os.MkdirAll(filepath.Dir(file), 0775); err != nil {
        return err
    }

    // Set up the local file
    fd, err := os.Create(file)
    if err != nil {
        return err
    }
    defer fd.Close()

    // Download the file using the AWS SDK for Go
    fmt.Printf("Downloading s3://%s/%s to %s...\n", bucket, key, file)
    _, err = downloader.Download(context.TODO(), fd, &s3.GetObjectInput{Bucket:
 &bucket, Key: &key})

    return err
}
```

### GetBucketRegion

GetBucketRegion 是一種公用程式函數，用於判斷 Amazon S3 儲存貯 AWS 體的區域位置。GetBucketRegion採用 Amazon S3 用戶端，並使用它來判斷請求的儲存貯體在與用戶端設定區域相關聯之 AWS 分割區內的位置。

例如，若要尋找儲存貯體 的區域*amzn-s3-demo-bucket*：

```
cfg, err := config.LoadDefaultConfig(context.TODO())
if err != nil {
    log.Println("error:", err)
    return
}

bucket := "amzn-s3-demo-bucket"
region, err := manager.GetBucketRegion(ctx, s3.NewFromConfig(cfg), bucket)
if err != nil {
    var bnf manager.BucketNotFound
    if errors.As(err, &bnf) {
        log.Printf("unable to find bucket %s's Region\n", bucket)
    } else {
        log.Println("error:", err)
    }
    return
}
fmt.Printf("Bucket %s is in %s region\n", bucket, region)
```

如果 GetBucketRegion 無法解析儲存貯體的位置，則 函數會傳回 BucketNotFound 錯誤類型，如範例所示。

## 不可查看的串流輸入

對於 PutObject和 等 API 操作UploadPart，Amazon S3 用戶端預期Body輸入參數的值預設會實作 io.Seeker 介面。用戶端會使用 io.Seeker 介面來判斷要上傳的值長度，以及計算請求簽章的承載雜湊。如果Body輸入參數值未實作 io.Seeker，您的應用程式將收到錯誤。

```
operation error S3: PutObject, failed to compute payload hash: failed to seek
body to start, request stream is not seekable
```

您可以使用中介軟體功能選項修改操作方法的 ，以變更此行為。WithAPIOptions 協助程式會傳回零或多個中介軟體變動器的功能選項。若要停用運算承載雜湊的用戶端並使用未簽署承載請求簽章，請新增 v4.SwapComputePayloadSHA256ForUnsignedPayloadMiddleware。

```
resp, err := client.PutObject(context.TODO(), &s3.PutObjectInput{
    Bucket: &bucketName,
    Key: &objectName,
    Body: bytes.NewBuffer([]byte(`example object!`)),
    ContentLength: 15, // length of body
}, s3.WithAPIOptions(
    v4.SwapComputePayloadSHA256ForUnsignedPayloadMiddleware,
))
```

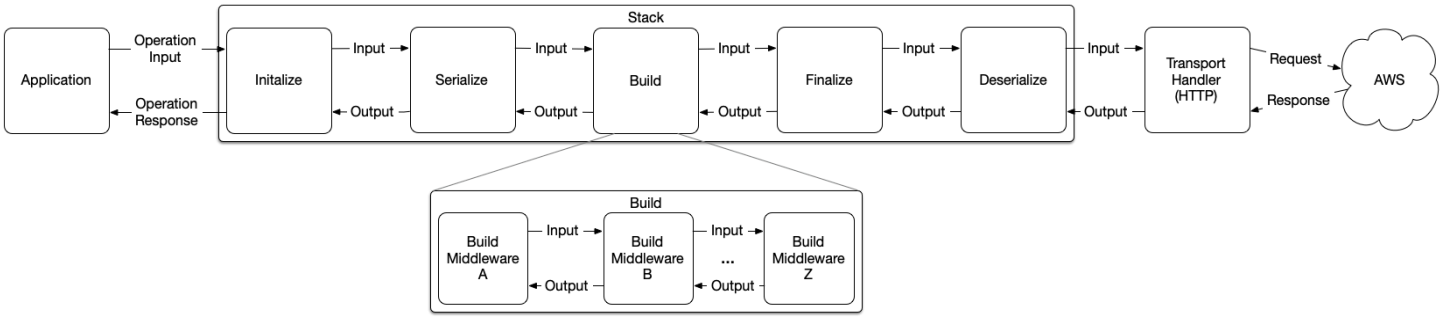
**Warning**

Amazon S3 要求為所有上傳至儲存貯體的物件提供內容長度。由於Body輸入參數未實作io.Seeker界面，用戶端將無法計算請求的 ContentLength 參數。參數必須由應用程式提供。如果未提供 ContentLength 參數，請求將會失敗。
將 SDK 的 Amazon S3 上傳管理員 用於無法尋找且沒有已知長度的上傳。

# 使用中介軟體自訂 適用於 Go 的 AWS SDK v2 用戶端請求

> **Warning**
>
> 修改用戶端請求管道可能會導致格式錯誤/無效請求，或可能導致非預期的應用程式錯誤。此功能適用於 SDK 界面預設未提供的進階使用案例。

您可以透過將一或多個中介軟體註冊到服務操作的堆疊來自訂 適用於 Go 的 AWS SDK 用戶端請求。堆疊由一系列步驟組成：初始化、序列化、建置、最終化和還原序列化。每個步驟都包含零個或多個中介軟體，這些中介軟體會在該步驟的輸入和輸出類型上運作。下圖和表格提供 操作請求和回應如何周遊堆疊的概觀。




| 堆疊步驟 | 描述 |
| --- | --- |
| 初始化 | 準備輸入，並視需要設定任何預設參數。 |
| 序列化 | 將輸入序列化為適合目標傳輸層的通訊協定格式。 |
| 組建 | 將其他中繼資料連接至序列化輸入，例如 HTTP Content-Length。 |
| 完成 | 最終訊息準備，包括重試和身分驗證 (SigV4 簽署）。 |
| 還原序列化 | 將通訊協定格式的回應還原序列化為結構化類型或錯誤。 |

指定步驟中的每個中介軟體都必須具有唯一的識別符，該識別符由中介軟體的 ID方法決定。中介軟體識別符可確保只有一個指定中介軟體的執行個體註冊到一個步驟，並允許插入與其相關的其他步驟中介軟體。

您可以使用步驟的 Insert或 Add方法連接步驟中介軟體。您可以使用 Add將中介軟體指定為 RelativePosition https://pkg.go.dev/github.com/aws/smithy-go/middleware#Before和中介軟體，以將中介軟體連接到步驟的開頭。在 附加到步驟的結尾之後。您可以使用 Insert將中介軟體連接至步驟，方法是將中介軟體插入相對於另一個步驟中介軟體。

> **Warning**
>
> 您必須使用 Add方法安全地插入自訂步驟中介軟體。使用 會在您的自訂中介軟體與相對於您插入的中介軟體之間Insert建立相依性。堆疊步驟中的中介軟體必須被視為不透明，以避免應用程式發生中斷變更。

## 撰寫自訂中介軟體

每個堆疊步驟都有一個您必須滿足的界面，以便將中介軟體連接到指定步驟。您可以使用其中一個提供的*Step*MiddlewareFunc函數來快速滿足此界面。下表概述步驟、其界面和可用於滿足界面的協助程式函數。

| 步驟 | 介面 | Helper 函數 |
| --- | --- | --- |
| 初始化 | InitializeMiddleware | InitializeMiddlewareFunc |
| 組建 | BuildMiddleware | BuildMiddlewareFunc |
| 序列化 | SerializeMiddleware | SerializeMiddlewareFunc |
| 完成 | FinalizeMiddleware | FinalizeMiddlewareFunc |
| 還原序列化 | DeserializeMiddleware | DeserializeMiddlewareFunc |

下列範例示範如何撰寫自訂中介軟體，以填入未提供的 Amazon S3 GetObject API 呼叫的儲存貯體成員。在繼續範例中將參考此中介軟體，以示範如何將步驟中介軟體連接至堆疊。

```
import "github.com/aws/smithy-go/aws"
import "github.com/aws/smithy-go/middleware"
```

```
import "github.com/aws/aws-sdk-go-v2/service/s3"

// ...

var defaultBucket = middleware.InitializeMiddlewareFunc("DefaultBucket", func(
    ctx context.Context, in middleware.InitializeInput, next
 middleware.InitializeHandler,
) (
    out middleware.InitializeOutput, metadata middleware.Metadata, err error,
) {
    // Type switch to check if the input is s3.GetObjectInput, if so and the bucket is
 not set, populate it with
    // our default.
    switch v := in.Parameters.(type) {
    case *s3.GetObjectInput:
        if v.Bucket == nil {
            v.Bucket = aws.String("amzn-s3-demo-bucket")
        }
    }

    // Middleware must call the next middleware to be executed in order to continue
 execution of the stack.
    // If an error occurs, you can return to prevent further execution.
    return next.HandleInitialize(ctx, in)
})
```

## 將中介軟體連接至所有用戶端

您可以使用 aws.Config 類型APIOptions的成員新增中介軟體，將自訂步驟中介軟體連接至每個用戶端。下列範例會將defaultBucket中介軟體連接至使用應用程式aws.Config物件建構的每個用戶端：

```
import "context"
import "github.com/aws/aws-sdk-go-v2/aws"
import "github.com/aws/aws-sdk-go-v2/config"
import "github.com/aws/aws-sdk-go-v2/service/s3"
import "github.com/aws/smithy-go/middleware"

// ...

cfg, err := config.LoadDefaultConfig(context.TODO())
if err != nil {
```

```
    // handle error
}

cfg.APIOptions = append(cfg.APIOptions, func(stack *middleware.Stack) error {
    // Attach the custom middleware to the beginning of the Initialize step
    return stack.Initialize.Add(defaultBucket, middleware.Before)
})

client := s3.NewFromConfig(cfg)
```

## 將中介軟體連接至特定操作

您可以使用 操作的變數引數清單來修改用戶端APIOptions的成員，以將自訂步驟中介軟體連接至特定用戶端操作。下列範例會將defaultBucket中介軟體連接至特定的 Amazon S3 GetObject操作調用：

```
import "context"
import "github.com/aws/aws-sdk-go-v2/aws"
import "github.com/aws/aws-sdk-go-v2/config"
import "github.com/aws/aws-sdk-go-v2/service/s3"
import "github.com/aws/smithy-go/middleware"

// ...

// registerDefaultBucketMiddleware registers the defaultBucket middleware with the
 provided stack.
func registerDefaultBucketMiddleware(stack *middleware.Stack) error {
    // Attach the custom middleware to the beginning of the Initialize step
    return stack.Initialize.Add(defaultBucket, middleware.Before)
}

// ...

cfg, err := config.LoadDefaultConfig(context.TODO())
if err != nil {
    // handle error
}

client := s3.NewFromConfig(cfg)

object, err := client.GetObject(context.TODO(), &s3.GetObjectInput{
    Key: aws.String("my-key"),
```

```
}, func(options *s3.Options) {
    // Register the defaultBucketMiddleware for this operation only
    options.APIOptions = append(options.APIOptions, registerDefaultBucketMiddleware)
})
```

## 傳遞中繼資料到堆疊

在某些情況下，您可能會發現透過共用資訊或狀態，需要兩個或多個中介軟體才能同時運作。您可以使用 context.Context，透過使用中介軟體傳遞此中繼資料。WithStackValue。 會將指定的鍵值對middleware.WithStackValue連接至提供的內容，並將範圍安全地限制為目前正在執行的堆疊。這些堆疊範圍值可以使用 middleware.GetStackValue 從內容擷取，並提供用於存放對應值的金鑰。金鑰必須相當，而且您必須將自己的類型定義為內容金鑰，以避免衝突。下列範例顯示兩個中介軟體如何使用 context.Context 將資訊傳遞至堆疊。

```
import "context"
import "github.com/aws/smithy-go/middleware"

// ...

type customKey struct {}

func GetCustomKey(ctx context.Context) (v string) {
    v, _ = middleware.GetStackValue(ctx, customKey{}).(string)
    return v
}

func SetCustomKey(ctx context.Context, value string) context.Context {
    return middleware.WithStackValue(ctx, customKey{}, value)
}

// ...

var customInitalize = middleware.InitializeMiddlewareFunc("customInitialize", func(
    ctx context.Context, in middleware.InitializeInput, next
 middleware.InitializeHandler,
) (
    out middleware.InitializeOutput, metadata middleware.Metadata, err error,
) {
    ctx = SetCustomKey(ctx, "my-custom-value")

    return next.HandleInitialize(ctx, in)
})
```

```
var customBuild = middleware.BuildMiddlewareFunc("customBuild", func(
    ctx context.Context, in middleware.BuildInput, next middleware.BuildHandler,
) (
    out middleware.BuildOutput, metadata middleware.Metadata, err error,
) {
    customValue := GetCustomKey(ctx)

    // use customValue

    return next.HandleBuild(ctx, in)
})
```

### 軟體開發套件提供的中繼資料

適用於 Go 的 AWS SDK 提供數個中繼資料值，可從提供的內容擷取。這些值可用來啟用更動態的中介軟體，根據執行中的服務、操作或目標區域來修改其行為。下表提供一些可用的金鑰：

| 金鑰 | 擷取器 | 描述 |
| --- | --- | --- |
| ServiceID | GetServiceID | 擷取執行中堆疊的服務識別符。這可以與服務用戶端套件的`ServiceID` 常數進行比較。 |
| OperationName | GetOperationName | 擷取執行中堆疊的操作名稱。 |
| Logger | GetLogger | 從中介軟體擷取可用於記錄訊息的記錄器。 |

## 將中繼資料傳遞至堆疊

您可以使用 middleware.Metadata 新增中繼資料索引鍵和值對，透過堆疊傳遞中繼資料。每個中介軟體步驟都會傳回輸出結構、中繼資料和錯誤。您的自訂中介軟體必須傳回從 步驟中呼叫下一個處理常式收到的中繼資料。這可確保下游中介軟體新增的中繼資料傳播到叫用服務操作的應用程式。產生的中繼資料可透過 操作的輸出形狀，透過 `ResultMetadata`結構成員來呼叫應用程式。

下列範例顯示自訂中介軟體如何新增在操作輸出中傳回的中繼資料。

```
import "context"
import "github.com/aws/aws-sdk-go-v2/service/s3"
import "github.com/aws/smithy-go/middleware"

// ...

type customKey struct{}

func GetCustomKey(metadata middleware.Metadata) (v string) {
    v, _ = metadata.Get(customKey{}).(string)
    return v
}

func SetCustomKey(metadata *middleware.Metadata, value string) {
    metadata.Set(customKey{}, value)
}

// ...

var customInitalize = middleware.InitializeMiddlewareFunc("customInitialize", func (
    ctx context.Context, in middleware.InitializeInput, next
 middleware.InitializeHandler,
) (
    out middleware.InitializeOutput, metadata middleware.Metadata, err error,
) {
    out, metadata, err = next.HandleInitialize(ctx, in)
    if err != nil {
        return out, metadata, err
    }

    SetCustomKey(&metadata, "my-custom-value")

    return out, metadata, nil
})

// ...

client := s3.NewFromConfig(cfg, func (options *s3.Options) {
    options.APIOptions = append(options.APIOptions, func(stack *middleware.Stack) error
 {
        return stack.Initialize.Add(customInitalize, middleware.After)
    })
})
```

```
out, err := client.GetObject(context.TODO(), &s3.GetObjectInput{
    // input parameters
})
if err != nil {
    // handle error
}

customValue := GetCustomKey(out.ResponseMetadata)
```

# 常見問答集

## 如何設定 SDK 的 HTTP 用戶端？ 是否有任何指導方針或最佳實務？

我們無法為客戶提供有關如何以對其特定工作負載最有效的方式設定其 HTTP 工作流程的指導。答案是多變量方程式的乘積，其輸入因素包括但不限於：

- 應用程式的網路足跡 (TPS、輸送量等）
- 正在使用的服務
- 部署的運算特性
- 部署的地理本質
- 應用程式本身所需的應用程式行為或需求 (SLAs、計時等）

## 如何設定操作逾時？

就像上一個問題一樣，它取決於。此處要考慮的元素包括下列項目：

- 上述有關 HTTP 用戶端組態的所有因素
- 您自己的應用程式時間或 SLA 限制條件 （例如，如果您將流量提供給其他消費者）

此問題的答案幾乎絕不應基於對上游行為的純粹經驗觀察 - 例如「我對此操作進行了 1000 次呼叫，最多需要 5 秒，因此我將根據安全因素 2 倍到 10 秒的逾時設定逾時」。環境條件可能會變更、服務可能會暫時降級，而且這些類型的假設可能會在沒有警告的情況下變成錯誤。

## 開發套件提出的請求逾時或耗時太久，如何修正此問題？

由於花費在線路上的時間較長，我們無法協助進行延長或逾時的操作呼叫。開發套件中的「換線時間」定義為下列任何一項：

- 在 SDK 用戶端`HTTPClient.Do()`方法中花費的時間
- 在已轉送給發起人的 HTTP 回應內文`Read()`上花費的時間 （例如 `GetObject`)

如果您因為操作延遲或逾時而遇到問題，您的第一個動作應該是取得 SDK 操作生命週期的遙測，以判斷花費在線路上的時間和操作的周圍額外負荷之間的時間明細。請參閱 SDK 操作的計時指南，其中包含可達成此目標的可重複使用程式碼片段。

## 如何修正read: connection reset錯誤？

依預設，軟體開發套件會重試符合connection reset模式的任何錯誤。這將涵蓋大多數操作的錯誤處理，其中操作的 HTTP 回應已完全消耗，並還原序列化為其建模的結果類型。

不過，此錯誤仍可能發生在重試迴圈之外的內容中：某些服務操作會將 API 的 HTTP 回應內文直接轉送給發起人，以便直接從線路中取用 io.ReadCloser（例如 GetObject的物件承載）。在回應內文Read上執行 時，您可能會遇到此錯誤。

此錯誤表示您的主機、服務或任何中介方（例如 NAT 閘道、代理、負載平衡器）在嘗試讀取回應時關閉連線。

發生這種情況的原因有幾個：

- 在收到回應本身後（在呼叫服務操作之後），一段時間內您並未消耗回應內文。對於這些類型的操作，我們建議您盡快使用 HTTP 回應內文。
- 您未關閉先前收到的回應內文。這可能會導致某些平台上的連線重設。您必須關閉 操作回應中提供的任何**io.ReadCloser**執行個體，無論您是否取用其內容。

除此之外，請嘗試在網路邊緣（例如，在您控制的任何代理之後）tcpdump 為受影響的連線執行 。如果您看到 AWS 端點似乎正在傳送 TCP RST，您應該使用 AWS 支援主控台針對違規的服務開啟案例。準備好提供問題發生時的請求 IDs 和特定時間戳記。

## 為什麼在搭配 SDK 使用 HTTP 代理時收到「無效的簽章」錯誤？

AWS 服務的簽章演算法（通常是 sigv4) 與序列化請求的標頭繫結，更具體地說，大多數字首為 的標頭X-。代理很容易透過新增其他轉送資訊（通常透過 X-Forwarded-For標頭）來修改傳出請求，這實際上會破壞 SDK 計算的簽章。

如果您使用 HTTP 代理並遇到簽章錯誤，您應該在請求從代理傳出時努力擷取請求，並判斷其是否不同。

# 計時 SDK 操作

在 SDK 中偵錯逾時/延遲問題時，請務必識別操作生命週期的元件，這些元件需要比預期更多的時間來執行。作為起點，您通常需要檢查整體操作呼叫和 HTTP 呼叫本身之間的時間明細。

下列範例程式實作適用於 SQS 用戶端的smithy-go中介軟體的基本檢測探查，並示範其使用方式。探查會針對每個操作呼叫發出下列資訊：

- AWS 請求 ID
- 服務 ID
- 操作名稱
- 操作調用時間
- http 呼叫時間

每個發出的訊息字首都會加上唯一的（單一操作）「叫用 ID」，該 ID 會在處理常式堆疊的開頭設定。

檢測的進入點公開為 WithOperationTiming，其參數化為接受訊息處理函數，該函數會將檢測「事件」接收為格式化字串。 PrintfMSGHandler 提供是為了方便起見，只需將訊息傾印至 stdout。

這裡使用的服務是可互換的 - 所有服務用戶端選項接受 APIOptions和 HTTPClient做為組態。例如， WithOperationTiming 可以改為宣告為：

```
func WithOperationTiming(msgHandler func(string)) func(*s3.Options)
func WithOperationTiming(msgHandler func(string)) func(*dynamodb.Options)
// etc.
```

如果您變更它，請務必變更它傳回的函數簽章。

```
import (
    "context"
    "fmt"
    "log"
    "net/http"
    "sync"
    "time"

    awsmiddleware "github.com/aws/aws-sdk-go-v2/aws/middleware"
    awshttp "github.com/aws/aws-sdk-go-v2/aws/transport/http"
    "github.com/aws/aws-sdk-go-v2/config"
```

```
    "github.com/aws/aws-sdk-go-v2/service/sqs"
    "github.com/aws/smithy-go/middleware"
    smithyrand "github.com/aws/smithy-go/rand"
)

// WithOperationTiming instruments an SQS client to dump timing information for
// the following spans:
//   - overall operation time
//   - HTTPClient call time
//
// This instrumentation will also emit the request ID, service name, and
// operation name for each invocation.
//
// Accepts a message "handler" which is invoked with formatted messages to be
// handled externally, you can use the declared PrintfMSGHandler to simply dump
// these values to stdout.
func WithOperationTiming(msgHandler func(string)) func(*sqs.Options) {
    return func(o *sqs.Options) {
        o.APIOptions = append(o.APIOptions, addTimingMiddlewares(msgHandler))
        o.HTTPClient = &timedHTTPClient{
            client:     awshttp.NewBuildableClient(),
            msgHandler: msgHandler,
        }
    }
}

// PrintfMSGHandler writes messages to stdout.
func PrintfMSGHandler(msg string) {
    fmt.Printf("%s\n", msg)
}

type invokeIDKey struct{}

func setInvokeID(ctx context.Context, id string) context.Context {
    return middleware.WithStackValue(ctx, invokeIDKey{}, id)
}

func getInvokeID(ctx context.Context) string {
    id, _ := middleware.GetStackValue(ctx, invokeIDKey{}).(string)
    return id
}

// Records the current time, and returns a function to be called when the
// target span of events is completed. The return function will emit the given
```

```
// span name and time elapsed to the given message consumer.
func timeSpan(ctx context.Context, name string, consumer func(string)) func() {
    start := time.Now()
    return func() {
        elapsed := time.Now().Sub(start)
        consumer(fmt.Sprintf("[%s] %s: %s", getInvokeID(ctx), name, elapsed))
    }
}

type timedHTTPClient struct {
    client     *awshttp.BuildableClient
    msgHandler func(string)
}

func (c *timedHTTPClient) Do(r *http.Request) (*http.Response, error) {
    defer timeSpan(r.Context(), "http", c.msgHandler)()

    resp, err := c.client.Do(r)
    if err != nil {
        return nil, fmt.Errorf("inner client do: %v", err)
    }

    return resp, nil
}

type addInvokeIDMiddleware struct {
    msgHandler func(string)
}

func (*addInvokeIDMiddleware) ID() string { return "addInvokeID" }

func (*addInvokeIDMiddleware) HandleInitialize(ctx context.Context, in
 middleware.InitializeInput, next middleware.InitializeHandler) (
    out middleware.InitializeOutput, md middleware.Metadata, err error,
) {
    id, err := smithyrand.NewUUID(smithyrand.Reader).GetUUID()
    if err != nil {
        return out, md, fmt.Errorf("new uuid: %v", err)
    }

    return next.HandleInitialize(setInvokeID(ctx, id), in)
}

type timeOperationMiddleware struct {
```

```
    msgHandler func(string)
}

func (*timeOperationMiddleware) ID() string { return "timeOperation" }

func (m *timeOperationMiddleware) HandleInitialize(ctx context.Context, in
 middleware.InitializeInput, next middleware.InitializeHandler) (
    middleware.InitializeOutput, middleware.Metadata, error,
) {
    defer timeSpan(ctx, "operation", m.msgHandler)()
    return next.HandleInitialize(ctx, in)
}

type emitMetadataMiddleware struct {
    msgHandler func(string)
}

func (*emitMetadataMiddleware) ID() string { return "emitMetadata" }

func (m *emitMetadataMiddleware) HandleInitialize(ctx context.Context, in
 middleware.InitializeInput, next middleware.InitializeHandler) (
    middleware.InitializeOutput, middleware.Metadata, error,
) {
    out, md, err := next.HandleInitialize(ctx, in)

    invokeID := getInvokeID(ctx)
    requestID, _ := awsmiddleware.GetRequestIDMetadata(md)
    service := awsmiddleware.GetServiceID(ctx)
    operation := awsmiddleware.GetOperationName(ctx)
    m.msgHandler(fmt.Sprintf(`[%s] requestID = "%s"`, invokeID, requestID))
    m.msgHandler(fmt.Sprintf(`[%s] service   = "%s"`, invokeID, service))
    m.msgHandler(fmt.Sprintf(`[%s] operation = "%s"`, invokeID, operation))

    return out, md, err
}

func addTimingMiddlewares(mh func(string)) func(*middleware.Stack) error {
    return func(s *middleware.Stack) error {
        if err := s.Initialize.Add(&timeOperationMiddleware{msgHandler: mh},
 middleware.Before); err != nil {
            return fmt.Errorf("add time operation middleware: %v", err)
        }
        if err := s.Initialize.Add(&addInvokeIDMiddleware{msgHandler: mh},
 middleware.Before); err != nil {
```

```
            return fmt.Errorf("add invoke id middleware: %v", err)
        }
        if err := s.Initialize.Insert(&emitMetadataMiddleware{msgHandler: mh},
 "RegisterServiceMetadata", middleware.After); err != nil {
            return fmt.Errorf("add emit metadata middleware: %v", err)
        }
        return nil
    }
}

func main() {
    cfg, err := config.LoadDefaultConfig(context.Background())
    if err != nil {
        log.Fatal(fmt.Errorf("load default config: %v", err))
    }

    svc := sqs.NewFromConfig(cfg, WithOperationTiming(PrintfMSGHandler))

    var wg sync.WaitGroup

    for i := 0; i < 6; i++ {
        wg.Add(1)
        go func() {
            defer wg.Done()

            _, err = svc.ListQueues(context.Background(), nil)
            if err != nil {
                fmt.Println(fmt.Errorf("list queues: %v", err))
            }
        }()
    }
    wg.Wait()
}
```

此程式的範例輸出：

```
[e9a801bb-c51d-45c8-8e9f-a202e263fde8] http: 192.24067ms
[e9a801bb-c51d-45c8-8e9f-a202e263fde8] requestID = "dbee3082-96a3-5b23-
adca-6d005696fa94"
[e9a801bb-c51d-45c8-8e9f-a202e263fde8] service   = "SQS"
[e9a801bb-c51d-45c8-8e9f-a202e263fde8] operation = "ListQueues"
[e9a801bb-c51d-45c8-8e9f-a202e263fde8] operation: 193.098393ms
[0740f0e0-953e-4328-94fc-830a5052e763] http: 195.185732ms
```

```
[0740f0e0-953e-4328-94fc-830a5052e763] requestID = "48b301fa-
fc9f-5f1f-9007-5c783caa9322"
[0740f0e0-953e-4328-94fc-830a5052e763] service   = "SQS"
[0740f0e0-953e-4328-94fc-830a5052e763] operation = "ListQueues"
[0740f0e0-953e-4328-94fc-830a5052e763] operation: 195.725491ms
[c0589832-f351-4cc7-84f1-c656eb79dbd7] http: 200.52383ms
[444030d0-6743-4de5-bd91-bc40b2b94c55] http: 200.525919ms
[c0589832-f351-4cc7-84f1-c656eb79dbd7] requestID = "4a73cc82-b47b-56e1-
b327-9100744e1b1f"
[c0589832-f351-4cc7-84f1-c656eb79dbd7] service   = "SQS"
[c0589832-f351-4cc7-84f1-c656eb79dbd7] operation = "ListQueues"
[c0589832-f351-4cc7-84f1-c656eb79dbd7] operation: 201.214365ms
[444030d0-6743-4de5-bd91-bc40b2b94c55] requestID = "ca1523ed-1879-5610-
bf5d-7e6fd84cabee"
[444030d0-6743-4de5-bd91-bc40b2b94c55] service   = "SQS"
[444030d0-6743-4de5-bd91-bc40b2b94c55] operation = "ListQueues"
[444030d0-6743-4de5-bd91-bc40b2b94c55] operation: 201.197071ms
[079e8dbd-bb93-43ab-89e5-a7bb392b86a5] http: 206.449568ms
[12b2b39d-df86-4648-a436-ff0482d13340] http: 206.526603ms
[079e8dbd-bb93-43ab-89e5-a7bb392b86a5] requestID = "64229710-b552-56ed-8f96-
ca927567ec7b"
[079e8dbd-bb93-43ab-89e5-a7bb392b86a5] service   = "SQS"
[079e8dbd-bb93-43ab-89e5-a7bb392b86a5] operation = "ListQueues"
[079e8dbd-bb93-43ab-89e5-a7bb392b86a5] operation: 207.252357ms
[12b2b39d-df86-4648-a436-ff0482d13340] requestID =
 "76d9cbc0-07aa-58aa-98b7-9642c79f9851"
[12b2b39d-df86-4648-a436-ff0482d13340] service   = "SQS"
[12b2b39d-df86-4648-a436-ff0482d13340] operation = "ListQueues"
[12b2b39d-df86-4648-a436-ff0482d13340] operation: 207.360621ms
```

# 使用 適用於 Go 的 AWS SDK v2 進行單位測試

在應用程式中使用 SDK 時，您會想要模擬應用程式單元測試的 SDK。模擬 SDK 可讓您的測試專注於您想要測試的內容，而不是 SDK 的內部內容。

若要支援模擬，請使用 Go 介面，而非具體服務用戶端、分頁程式和等待程式類型，例如 `s3.Client`。這可讓您的應用程式使用相依性注入等模式來測試應用程式邏輯。

## 模擬用戶端操作

在此範例中， `S3GetObjectAPI` 是定義 `GetObjectFromS3`函數所需 Amazon S3 API 操作集的界面。 `S3GetObjectAPI` 由 Amazon S3 用戶端的 GetObject 方法滿足。

```
import "context"
import "github.com/aws/aws-sdk-go-v2/service/s3"

// ...

type S3GetObjectAPI interface {
    GetObject(ctx context.Context, params *s3.GetObjectInput,
 optFns ...func(*s3.Options)) (*s3.GetObjectOutput, error)
}

func GetObjectFromS3(ctx context.Context, api S3GetObjectAPI, bucket, key string)
 ([]byte, error) {
    object, err := api.GetObject(ctx, &s3.GetObjectInput{
        Bucket: &bucket,
        Key:    &key,
    })
    if err != nil {
        return nil, err
    }
    defer object.Body.Close()

    return ioutil.ReadAll(object.Body)
}
```

若要測試 `GetObjectFromS3`函數，請使用 `mockGetObjectAPI` 滿足`S3GetObjectAPI`界面定義。然後使用 `mockGetObjectAPI`類型模擬從服務用戶端傳回的輸出和錯誤回應。

```
import "testing"
```

```
import "github.com/aws/aws-sdk-go-v2/service/s3"

// ...

type mockGetObjectAPI func(ctx context.Context, params *s3.GetObjectInput,
 optFns ...func(*s3.Options)) (*s3.GetObjectOutput, error)

func (m mockGetObjectAPI) GetObject(ctx context.Context, params *s3.GetObjectInput,
 optFns ...func(*s3.Options)) (*s3.GetObjectOutput, error) {
    return m(ctx, params, optFns...)
}

func TestGetObjectFromS3(t *testing.T) {
    cases := []struct {
        client func(t *testing.T) S3GetObjectAPI
        bucket string
        key string
        expect []byte
    }{
        {
            client: func(t *testing.T) S3GetObjectAPI {
                return mockGetObjectAPI(func(ctx context.Context, params
 *s3.GetObjectInput, optFns ...func(*s3.Options)) (*s3.GetObjectOutput, error) {
                    t.Helper()
                    if params.Bucket == nil {
                        t.Fatal("expect bucket to not be nil")
                    }
                    if e, a := "fooBucket", *params.Bucket; e != a {
                        t.Errorf("expect %v, got %v", e, a)
                    }
                    if params.Key == nil {
                        t.Fatal("expect key to not be nil")
                    }
                    if e, a := "barKey", *params.Key; e != a {
                        t.Errorf("expect %v, got %v", e, a)
                    }

                    return &s3.GetObjectOutput{
                        Body: ioutil.NopCloser(bytes.NewReader([]byte("this is the body
 foo bar baz"))),
                    }, nil
                })
            },
            bucket: "amzn-s3-demo-bucket>",
```

```
            key:    "barKey",
            expect: []byte("this is the body foo bar baz"),
        },
    }

    for i, tt := range cases {
        t.Run(strconv.Itoa(i), func(t *testing.T) {
            ctx := context.TODO()
            content, err := GetObjectFromS3(ctx, tt.client(t), tt.bucket, tt.key)
            if err != nil {
                t.Fatalf("expect no error, got %v", err)
            }
            if e, a := tt.expect, content; bytes.Compare(e, a) != 0 {
                t.Errorf("expect %v, got %v", e, a)
            }
        })
    }
}
```

## 模擬分頁程式

與服務用戶端類似，可透過定義分頁器的 Go 界面來模擬分頁器。該界面將由應用程式的程式碼使用。這可讓軟體開發套件的實作在應用程式執行時使用，以及用於測試的模擬實作。

在下列範例中，`ListObjectsV2Pager` 是一個界面，定義 `CountObjects`函數所需的 Amazon S3 ListObjectsV2Paginator 行為。

```
import "context"
import "github.com/aws/aws-sdk-go-v2/service/s3"

// ...

type ListObjectsV2Pager interface {
    HasMorePages() bool
    NextPage(context.Context, ...func(*s3.Options)) (*s3.ListObjectsV2Output, error)
}

func CountObjects(ctx context.Context, pager ListObjectsV2Pager) (count int, err error)
 {
    for pager.HasMorePages() {
        var output *s3.ListObjectsV2Output
        output, err = pager.NextPage(ctx)
```

```
        if err != nil {
            return count, err
        }
        count += int(output.KeyCount)
    }
    return count, nil
}
```

若要測試 CountObjects，請建立 mockListObjectsV2Pager類型以滿足ListObjectsV2Pager界面定義。然後使用 mockListObjectsV2Pager複寫來自服務操作分頁程式的輸出和錯誤回應的分頁行為。

```
import "context"
import  "fmt"
import "testing"
import "github.com/aws/aws-sdk-go-v2/service/s3"

// ...

type mockListObjectsV2Pager struct {
    PageNum int
    Pages   []*s3.ListObjectsV2Output
}

func (m *mockListObjectsV2Pager) HasMorePages() bool {
    return m.PageNum < len(m.Pages)
}

func (m *mockListObjectsV2Pager) NextPage(ctx context.Context, f ...func(*s3.Options))
 (output *s3.ListObjectsV2Output, err error) {
    if m.PageNum >= len(m.Pages) {
        return nil, fmt.Errorf("no more pages")
    }
    output = m.Pages[m.PageNum]
    m.PageNum++
    return output, nil
}

func TestCountObjects(t *testing.T) {
    pager := &mockListObjectsV2Pager{
        Pages: []*s3.ListObjectsV2Output{
            {
                KeyCount: 5,
```

```
            },
            {
                KeyCount: 10,
            },
            {
                KeyCount: 15,
            },
        },
    }
    objects, err := CountObjects(context.TODO(), pager)
    if err != nil {
        t.Fatalf("expect no error, got %v", err)
    }
    if expect, actual := 30, objects; expect != actual {
        t.Errorf("expect %v, got %v", expect, actual)
    }
}
```

# SDK for Go V2 程式碼範例

本主題中的程式碼範例說明如何搭配 使用 適用於 Go 的 AWS SDK V2 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

- 使用適用於 Go V2 的 SDK 的 API Gateway 範例
- 使用適用於 Go V2 的 SDK 的 Aurora 範例
- 使用適用於 Go V2 的 SDK 的 Amazon Bedrock 範例
- 使用適用於 Go V2 的 SDK 的 Amazon Bedrock 執行時期範例
- CloudFormation 使用 SDK for Go V2 的範例
- 使用適用於 Go V2 的 SDK 的 CloudWatch Logs 範例
- 使用適用於 Go V2 的 SDK 的 Amazon Cognito 身分提供者範例
- 使用適用於 Go V2 的 SDK 的 Amazon DocumentDB 範例
- 使用適用於 Go V2 的 SDK 的 DynamoDB 範例
- 使用適用於 Go V2 的 SDK 的 IAM 範例
- 使用適用於 Go V2 的 SDK 的 Kinesis 範例
- 使用適用於 Go V2 的 SDK 的 Lambda 範例
- 使用適用於 Go V2 的 SDK 的 Amazon MSK 範例
- 使用適用於 Go V2 的 SDK 的 Partner Central 範例
- 使用適用於 Go V2 的 SDK 的 Amazon RDS 範例
- 使用適用於 Go V2 的 SDK 的 Amazon Redshift 範例
- 使用適用於 Go V2 的 SDK 的 Amazon S3 範例
- 使用適用於 Go V2 的 SDK 的 Amazon SNS 範例
- 使用適用於 Go V2 的 SDK 的 Amazon SQS 範例

# 使用適用於 Go V2 的 SDK 的 API Gateway 範例

下列程式碼範例示範如何使用 適用於 Go 的 AWS SDK V2 搭配 API Gateway 來執行動作和實作常見案例。

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

- AWS 社群貢獻

## 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

SDK for Go V2

示範如何使用 Go 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

# 使用適用於 Go V2 的 SDK 的 Aurora 範例

下列程式碼範例示範如何使用 適用於 Go 的 AWS SDK V2 搭配 Aurora 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 Aurora

下列程式碼範例示範如何開始使用 Aurora。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
package main

import (
 "context"
 "fmt"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/config"
 "github.com/aws/aws-sdk-go-v2/service/rds"
)

// main uses the AWS SDK for Go V2 to create an Amazon Aurora client and list up to
 20
// DB clusters in your account.
// This example uses the default settings specified in your shared credentials
```

```
// and config files.
func main() {
 ctx := context.Background()
 sdkConfig, err := config.LoadDefaultConfig(ctx)
 if err != nil {
  fmt.Println("Couldn't load default configuration. Have you set up your AWS
 account?")
  fmt.Println(err)
  return
 }
 auroraClient := rds.NewFromConfig(sdkConfig)
 const maxClusters = 20
 fmt.Printf("Let's list up to %v DB clusters.\n", maxClusters)
 output, err := auroraClient.DescribeDBClusters(
  ctx, &rds.DescribeDBClustersInput{MaxRecords: aws.Int32(maxClusters)})
 if err != nil {
  fmt.Printf("Couldn't list DB clusters: %v\n", err)
  return
 }
 if len(output.DBClusters) == 0 {
  fmt.Println("No DB clusters found.")
 } else {
  for _, cluster := range output.DBClusters {
   fmt.Printf("DB cluster %v has database %v.\n", *cluster.DBClusterIdentifier,
    *cluster.DatabaseName)
  }
 }
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的 DescribeDBClusters。

## 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 Aurora 資料庫叢集參數群組並設定參數值。
- 建立使用該參數群組的資料庫叢集。
- 建立包含該資料庫的資料庫執行個體。

- 拍攝該資料庫叢集的快照，並清理資源。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，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。

```
import (
 "aurora/actions"
 "context"
 "fmt"
 "log"
 "slices"
 "sort"
 "strconv"
 "strings"
 "time"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/rds"
 "github.com/aws/aws-sdk-go-v2/service/rds/types"
 "github.com/awsdocs/aws-doc-sdk-examples/gov2/demotools"
 "github.com/google/uuid"
)

// GetStartedClusters is an interactive example that shows you how to use the AWS
 SDK for Go
// with Amazon Aurora to do the following:
//
// 1. Create a custom DB cluster parameter group and set parameter values.
// 2. Create an Aurora DB cluster that is configured to use the parameter group.
// 3. Create a DB instance in the DB cluster that contains a database.
// 4. Take a snapshot of the DB cluster.
// 5. Delete the DB instance, DB cluster, and parameter group.
type GetStartedClusters struct {
 sdkConfig  aws.Config
```

```
 dbClusters actions.DbClusters
 questioner demotools.IQuestioner
 helper     IScenarioHelper
 isTestRun  bool
}

// NewGetStartedClusters constructs a GetStartedClusters instance from a
 configuration.
// It uses the specified config to get an Amazon Relational Database Service (Amazon
 RDS)
// client and create wrappers for the actions used in the scenario.
func NewGetStartedClusters(sdkConfig aws.Config, questioner demotools.IQuestioner,
 helper IScenarioHelper) GetStartedClusters {
 auroraClient := rds.NewFromConfig(sdkConfig)
 return GetStartedClusters{
  sdkConfig:  sdkConfig,
  dbClusters: actions.DbClusters{AuroraClient: auroraClient},
  questioner: questioner,
  helper:     helper,
 }
}

// Run runs the interactive scenario.
func (scenario GetStartedClusters) Run(ctx context.Context, dbEngine string,
 parameterGroupName string,
 clusterName string, dbName string) {
 defer func() {
  if r := recover(); r != nil {
   log.Println("Something went wrong with the demo.")
  }
 }()

 log.Println(strings.Repeat("-", 88))
 log.Println("Welcome to the Amazon Aurora DB Cluster demo.")
 log.Println(strings.Repeat("-", 88))

 parameterGroup := scenario.CreateParameterGroup(ctx, dbEngine, parameterGroupName)
 scenario.SetUserParameters(ctx, parameterGroupName)
 cluster := scenario.CreateCluster(ctx, clusterName, dbEngine, dbName,
 parameterGroup)
 scenario.helper.Pause(5)
 dbInstance := scenario.CreateInstance(ctx, cluster)
 scenario.DisplayConnection(cluster)
 scenario.CreateSnapshot(ctx, clusterName)
```

```
 scenario.Cleanup(ctx, dbInstance, cluster, parameterGroup)

 log.Println(strings.Repeat("-", 88))
 log.Println("Thanks for watching!")
 log.Println(strings.Repeat("-", 88))
}

// CreateParameterGroup shows how to get available engine versions for a specified
// database engine and create a DB cluster parameter group that is compatible with a
// selected engine family.
func (scenario GetStartedClusters) CreateParameterGroup(ctx context.Context,
 dbEngine string,
 parameterGroupName string) *types.DBClusterParameterGroup {

 log.Printf("Checking for an existing DB cluster parameter group named %v.\n",
  parameterGroupName)
 parameterGroup, err := scenario.dbClusters.GetParameterGroup(ctx,
 parameterGroupName)
 if err != nil {
  panic(err)
 }
 if parameterGroup == nil {
  log.Printf("Getting available database engine versions for %v.\n", dbEngine)
  engineVersions, err := scenario.dbClusters.GetEngineVersions(ctx, dbEngine, "")
  if err != nil {
   panic(err)
  }

  familySet := map[string]struct{}{}
  for _, family := range engineVersions {
   familySet[*family.DBParameterGroupFamily] = struct{}{}
  }
  var families []string
  for family := range familySet {
   families = append(families, family)
  }
  sort.Strings(families)
  familyIndex := scenario.questioner.AskChoice("Which family do you want to use?\n",
 families)
  log.Println("Creating a DB cluster parameter group.")
  _, err = scenario.dbClusters.CreateParameterGroup(
   ctx, parameterGroupName, families[familyIndex], "Example parameter group.")
  if err != nil {
   panic(err)
```

```
  }
  parameterGroup, err = scenario.dbClusters.GetParameterGroup(ctx,
 parameterGroupName)
  if err != nil {
   panic(err)
  }
 }
 log.Printf("Parameter group %v:\n", *parameterGroup.DBParameterGroupFamily)
 log.Printf("\tName: %v\n", *parameterGroup.DBClusterParameterGroupName)
 log.Printf("\tARN: %v\n", *parameterGroup.DBClusterParameterGroupArn)
 log.Printf("\tFamily: %v\n", *parameterGroup.DBParameterGroupFamily)
 log.Printf("\tDescription: %v\n", *parameterGroup.Description)
 log.Println(strings.Repeat("-", 88))
 return parameterGroup

}

// SetUserParameters shows how to get the parameters contained in a custom parameter
// group and update some of the parameter values in the group.
func (scenario GetStartedClusters) SetUserParameters(ctx context.Context,
 parameterGroupName string) {
 log.Println("Let's set some parameter values in your parameter group.")
 dbParameters, err := scenario.dbClusters.GetParameters(ctx, parameterGroupName, "")
 if err != nil {
  panic(err)
 }
 var updateParams []types.Parameter
 for _, dbParam := range dbParameters {
  if strings.HasPrefix(*dbParam.ParameterName, "auto_increment") &&
   *dbParam.IsModifiable && *dbParam.DataType == "integer" {
   log.Printf("The %v parameter is described as:\n\t%v",
    *dbParam.ParameterName, *dbParam.Description)
   rangeSplit := strings.Split(*dbParam.AllowedValues, "-")
   lower, _ := strconv.Atoi(rangeSplit[0])
   upper, _ := strconv.Atoi(rangeSplit[1])
   newValue := scenario.questioner.AskInt(
    fmt.Sprintf("Enter a value between %v and %v:", lower, upper),
    demotools.InIntRange{Lower: lower, Upper: upper})
   dbParam.ParameterValue = aws.String(strconv.Itoa(newValue))
   updateParams = append(updateParams, dbParam)
  }
 }
 err = scenario.dbClusters.UpdateParameters(ctx, parameterGroupName, updateParams)
 if err != nil {
```

```
  panic(err)
 }
 log.Println("You can get a list of parameters you've set by specifying a source of
 'user'.")
 userParameters, err := scenario.dbClusters.GetParameters(ctx, parameterGroupName,
 "user")
 if err != nil {
  panic(err)
 }
 log.Println("Here are the parameters you've set:")
 for _, param := range userParameters {
  log.Printf("\t%v: %v\n", *param.ParameterName, *param.ParameterValue)
 }
 log.Println(strings.Repeat("-", 88))
}

// CreateCluster shows how to create an Aurora DB cluster that contains a database
// of a specified type. The database is also configured to use a custom DB cluster
// parameter group.
func (scenario GetStartedClusters) CreateCluster(ctx context.Context, clusterName
 string, dbEngine string,
 dbName string, parameterGroup *types.DBClusterParameterGroup) *types.DBCluster {

 log.Println("Checking for an existing DB cluster.")
 cluster, err := scenario.dbClusters.GetDbCluster(ctx, clusterName)
 if err != nil {
  panic(err)
 }
 if cluster == nil {
  adminUsername := scenario.questioner.Ask(
   "Enter an administrator user name for the database: ", demotools.NotEmpty{})
  adminPassword := scenario.questioner.Ask(
   "Enter a password for the administrator (at least 8 characters): ",
 demotools.NotEmpty{})
  engineVersions, err := scenario.dbClusters.GetEngineVersions(ctx, dbEngine,
 *parameterGroup.DBParameterGroupFamily)
  if err != nil {
   panic(err)
  }
  var engineChoices []string
  for _, engine := range engineVersions {
   engineChoices = append(engineChoices, *engine.EngineVersion)
  }
  log.Println("The available engines for your parameter group are:")
```

```
  engineIndex := scenario.questioner.AskChoice("Which engine do you want to use?\n",
 engineChoices)
  log.Printf("Creating DB cluster %v and database %v.\n", clusterName, dbName)
  log.Printf("The DB cluster is configured to use\nyour custom parameter group %v
\n",
   *parameterGroup.DBClusterParameterGroupName)
  log.Printf("and selected engine %v.\n", engineChoices[engineIndex])
  log.Println("This typically takes several minutes.")
  cluster, err = scenario.dbClusters.CreateDbCluster(
   ctx, clusterName, *parameterGroup.DBClusterParameterGroupName, dbName, dbEngine,
   engineChoices[engineIndex], adminUsername, adminPassword)
  if err != nil {
   panic(err)
  }
  for *cluster.Status != "available" {
   scenario.helper.Pause(30)
   cluster, err = scenario.dbClusters.GetDbCluster(ctx, clusterName)
   if err != nil {
    panic(err)
   }
   log.Println("Cluster created and available.")
  }
 }
 log.Println("Cluster data:")
 log.Printf("\tDBClusterIdentifier: %v\n", *cluster.DBClusterIdentifier)
 log.Printf("\tARN: %v\n", *cluster.DBClusterArn)
 log.Printf("\tStatus: %v\n", *cluster.Status)
 log.Printf("\tEngine: %v\n", *cluster.Engine)
 log.Printf("\tEngine version: %v\n", *cluster.EngineVersion)
 log.Printf("\tDBClusterParameterGroup: %v\n", *cluster.DBClusterParameterGroup)
 log.Printf("\tEngineMode: %v\n", *cluster.EngineMode)
 log.Println(strings.Repeat("-", 88))
 return cluster
}

// CreateInstance shows how to create a DB instance in an existing Aurora DB
 cluster.
// A new DB cluster contains no DB instances, so you must add one. The first DB
 instance
// that is added to a DB cluster defaults to a read-write DB instance.
func (scenario GetStartedClusters) CreateInstance(ctx context.Context, cluster
 *types.DBCluster) *types.DBInstance {
 log.Println("Checking for an existing database instance.")
```

```
dbInstance, err := scenario.dbClusters.GetInstance(ctx,
*cluster.DBClusterIdentifier)
if err != nil {
 panic(err)
}
if dbInstance == nil {
 log.Println("Let's create a database instance in your DB cluster.")
 log.Println("First, choose a DB instance type:")
 instOpts, err := scenario.dbClusters.GetOrderableInstances(
  ctx, *cluster.Engine, *cluster.EngineVersion)
 if err != nil {
  panic(err)
 }
 var instChoices []string
 for _, opt := range instOpts {
  instChoices = append(instChoices, *opt.DBInstanceClass)
 }
 slices.Sort(instChoices)
 instChoices = slices.Compact(instChoices)
 instIndex := scenario.questioner.AskChoice(
  "Which DB instance class do you want to use?\n", instChoices)
 log.Println("Creating a database instance. This typically takes several minutes.")
 dbInstance, err = scenario.dbClusters.CreateInstanceInCluster(
  ctx, *cluster.DBClusterIdentifier, *cluster.DBClusterIdentifier, *cluster.Engine,
  instChoices[instIndex])
 if err != nil {
  panic(err)
 }
 for *dbInstance.DBInstanceStatus != "available" {
  scenario.helper.Pause(30)
  dbInstance, err = scenario.dbClusters.GetInstance(ctx,
*cluster.DBClusterIdentifier)
  if err != nil {
   panic(err)
  }
 }
}
log.Println("Instance data:")
log.Printf("\tDBInstanceIdentifier: %v\n", *dbInstance.DBInstanceIdentifier)
log.Printf("\tARN: %v\n", *dbInstance.DBInstanceArn)
log.Printf("\tStatus: %v\n", *dbInstance.DBInstanceStatus)
log.Printf("\tEngine: %v\n", *dbInstance.Engine)
log.Printf("\tEngine version: %v\n", *dbInstance.EngineVersion)
log.Println(strings.Repeat("-", 88))
```

```
 return dbInstance
}

// DisplayConnection displays connection information about an Aurora DB cluster and
 tips
// on how to connect to it.
func (scenario GetStartedClusters) DisplayConnection(cluster *types.DBCluster) {
 log.Println(
  "You can now connect to your database using your favorite MySql client.\n" +
   "One way to connect is by using the 'mysql' shell on an Amazon EC2 instance\n" +
   "that is running in the same VPC as your database cluster. Pass the endpoint,\n"
 +
   "port, and administrator user name to 'mysql' and enter your password\n" +
   "when prompted:")
 log.Printf("\n\tmysql -h %v -P %v -u %v -p\n",
  *cluster.Endpoint, *cluster.Port, *cluster.MasterUsername)
 log.Println("For more information, see the User Guide for Aurora:\n" +
  "\thttps://docs.aws.amazon.com/AmazonRDS/latest/AuroraUserGuide/
CHAP_GettingStartedAurora.CreatingConnecting.Aurora.html#CHAP_GettingStartedAurora.Aurora.Co
 log.Println(strings.Repeat("-", 88))
}

// CreateSnapshot shows how to create a DB cluster snapshot and wait until it's
 available.
func (scenario GetStartedClusters) CreateSnapshot(ctx context.Context, clusterName
 string) {
 if scenario.questioner.AskBool(
  "Do you want to create a snapshot of your DB cluster (y/n)? ", "y") {
  snapshotId := fmt.Sprintf("%v-%v", clusterName, scenario.helper.UniqueId())
  log.Printf("Creating a snapshot named %v. This typically takes a few minutes.\n",
 snapshotId)
  snapshot, err := scenario.dbClusters.CreateClusterSnapshot(ctx, clusterName,
 snapshotId)
  if err != nil {
   panic(err)
  }
  for *snapshot.Status != "available" {
   scenario.helper.Pause(30)
   snapshot, err = scenario.dbClusters.GetClusterSnapshot(ctx, snapshotId)
   if err != nil {
    panic(err)
   }
  }
  log.Println("Snapshot data:")
```

```
  log.Printf("\tDBClusterSnapshotIdentifier: %v\n",
 *snapshot.DBClusterSnapshotIdentifier)
  log.Printf("\tARN: %v\n", *snapshot.DBClusterSnapshotArn)
  log.Printf("\tStatus: %v\n", *snapshot.Status)
  log.Printf("\tEngine: %v\n", *snapshot.Engine)
  log.Printf("\tEngine version: %v\n", *snapshot.EngineVersion)
  log.Printf("\tDBClusterIdentifier: %v\n", *snapshot.DBClusterIdentifier)
  log.Printf("\tSnapshotCreateTime: %v\n", *snapshot.SnapshotCreateTime)
  log.Println(strings.Repeat("-", 88))
 }
}

// Cleanup shows how to clean up a DB instance, DB cluster, and DB cluster parameter
 group.
// Before the DB cluster parameter group can be deleted, all associated DB instances
 and
// DB clusters must first be deleted.
func (scenario GetStartedClusters) Cleanup(ctx context.Context, dbInstance
 *types.DBInstance, cluster *types.DBCluster,
 parameterGroup *types.DBClusterParameterGroup) {

 if scenario.questioner.AskBool(
  "\nDo you want to delete the database instance, DB cluster, and parameter group
 (y/n)? ", "y") {
  log.Printf("Deleting database instance %v.\n", *dbInstance.DBInstanceIdentifier)
  err := scenario.dbClusters.DeleteInstance(ctx, *dbInstance.DBInstanceIdentifier)
  if err != nil {
   panic(err)
  }
  log.Printf("Deleting database cluster %v.\n", *cluster.DBClusterIdentifier)
  err = scenario.dbClusters.DeleteDbCluster(ctx, *cluster.DBClusterIdentifier)
  if err != nil {
   panic(err)
  }
  log.Println(
   "Waiting for the DB instance and DB cluster to delete. This typically takes
 several minutes.")
  for dbInstance != nil || cluster != nil {
   scenario.helper.Pause(30)
   if dbInstance != nil {
    dbInstance, err = scenario.dbClusters.GetInstance(ctx,
 *dbInstance.DBInstanceIdentifier)
    if err != nil {
     panic(err)
```

```
    }
   }
   if cluster != nil {
    cluster, err = scenario.dbClusters.GetDbCluster(ctx,
 *cluster.DBClusterIdentifier)
    if err != nil {
     panic(err)
    }
   }
  }
  log.Printf("Deleting parameter group %v.",
 *parameterGroup.DBClusterParameterGroupName)
  err = scenario.dbClusters.DeleteParameterGroup(ctx,
 *parameterGroup.DBClusterParameterGroupName)
  if err != nil {
   panic(err)
  }
 }
}

// IScenarioHelper abstracts the function from a scenario so that it
// can be mocked for unit testing.
type IScenarioHelper interface {
 Pause(secs int)
 UniqueId() string
}
type ScenarioHelper struct{}

// Pause waits for the specified number of seconds.
func (helper ScenarioHelper) Pause(secs int) {
 time.Sleep(time.Duration(secs) * time.Second)
}

// UniqueId returns a new UUID.
func (helper ScenarioHelper) UniqueId() string {
 return uuid.New().String()
}
```

定義案例所呼叫的函數以管理 Amazon 動作。

```
import (
 "context"
 "errors"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/rds"
 "github.com/aws/aws-sdk-go-v2/service/rds/types"
)

type DbClusters struct {
 AuroraClient *rds.Client
}


// GetParameterGroup gets a DB cluster parameter group by name.
func (clusters *DbClusters) GetParameterGroup(ctx context.Context,
 parameterGroupName string) (
 *types.DBClusterParameterGroup, error) {
 output, err := clusters.AuroraClient.DescribeDBClusterParameterGroups(
  ctx, &rds.DescribeDBClusterParameterGroupsInput{
   DBClusterParameterGroupName: aws.String(parameterGroupName),
  })
 if err != nil {
  var notFoundError *types.DBParameterGroupNotFoundFault
  if errors.As(err, &notFoundError) {
   log.Printf("Parameter group %v does not exist.\n", parameterGroupName)
   err = nil
  } else {
   log.Printf("Error getting parameter group %v: %v\n", parameterGroupName, err)
  }
  return nil, err
 } else {
  return &output.DBClusterParameterGroups[0], err
 }
}


// CreateParameterGroup creates a DB cluster parameter group that is based on the
 specified
// parameter group family.
func (clusters *DbClusters) CreateParameterGroup(
 ctx context.Context, parameterGroupName string, parameterGroupFamily string,
 description string) (
```

```
 *types.DBClusterParameterGroup, error) {

 output, err := clusters.AuroraClient.CreateDBClusterParameterGroup(ctx,
  &rds.CreateDBClusterParameterGroupInput{
   DBClusterParameterGroupName: aws.String(parameterGroupName),
   DBParameterGroupFamily:      aws.String(parameterGroupFamily),
   Description:                 aws.String(description),
  })
 if err != nil {
  log.Printf("Couldn't create parameter group %v: %v\n", parameterGroupName, err)
  return nil, err
 } else {
  return output.DBClusterParameterGroup, err
 }
}



// DeleteParameterGroup deletes the named DB cluster parameter group.
func (clusters *DbClusters) DeleteParameterGroup(ctx context.Context,
 parameterGroupName string) error {
 _, err := clusters.AuroraClient.DeleteDBClusterParameterGroup(ctx,
  &rds.DeleteDBClusterParameterGroupInput{
   DBClusterParameterGroupName: aws.String(parameterGroupName),
  })
 if err != nil {
  log.Printf("Couldn't delete parameter group %v: %v\n", parameterGroupName, err)
  return err
 } else {
  return nil
 }
}



// GetParameters gets the parameters that are contained in a DB cluster parameter
 group.
func (clusters *DbClusters) GetParameters(ctx context.Context, parameterGroupName
 string, source string) (
 []types.Parameter, error) {

 var output *rds.DescribeDBClusterParametersOutput
 var params []types.Parameter
 var err error
```

```
 parameterPaginator :=
 rds.NewDescribeDBClusterParametersPaginator(clusters.AuroraClient,
  &rds.DescribeDBClusterParametersInput{
   DBClusterParameterGroupName: aws.String(parameterGroupName),
   Source:                      aws.String(source),
  })
 for parameterPaginator.HasMorePages() {
  output, err = parameterPaginator.NextPage(ctx)
  if err != nil {
   log.Printf("Couldn't get paramaeters for %v: %v\n", parameterGroupName, err)
   break
  } else {
   params = append(params, output.Parameters...)
  }
 }
 return params, err
}



// UpdateParameters updates parameters in a named DB cluster parameter group.
func (clusters *DbClusters) UpdateParameters(ctx context.Context, parameterGroupName
 string, params []types.Parameter) error {
 _, err := clusters.AuroraClient.ModifyDBClusterParameterGroup(ctx,
  &rds.ModifyDBClusterParameterGroupInput{
   DBClusterParameterGroupName: aws.String(parameterGroupName),
   Parameters:                  params,
  })
 if err != nil {
  log.Printf("Couldn't update parameters in %v: %v\n", parameterGroupName, err)
  return err
 } else {
  return nil
 }
}



// GetDbCluster gets data about an Aurora DB cluster.
func (clusters *DbClusters) GetDbCluster(ctx context.Context, clusterName string)
 (*types.DBCluster, error) {
 output, err := clusters.AuroraClient.DescribeDBClusters(ctx,
  &rds.DescribeDBClustersInput{
   DBClusterIdentifier: aws.String(clusterName),
```

```
  })
 if err != nil {
  var notFoundError *types.DBClusterNotFoundFault
  if errors.As(err, &notFoundError) {
   log.Printf("DB cluster %v does not exist.\n", clusterName)
   err = nil
  } else {
   log.Printf("Couldn't get DB cluster %v: %v\n", clusterName, err)
  }
  return nil, err
 } else {
  return &output.DBClusters[0], err
 }
}



// CreateDbCluster creates a DB cluster that is configured to use the specified
 parameter group.
// The newly created DB cluster contains a database that uses the specified engine
 and
// engine version.
func (clusters *DbClusters) CreateDbCluster(ctx context.Context, clusterName string,
 parameterGroupName string,
 dbName string, dbEngine string, dbEngineVersion string, adminName string,
 adminPassword string) (
 *types.DBCluster, error) {

 output, err := clusters.AuroraClient.CreateDBCluster(ctx,
 &rds.CreateDBClusterInput{
  DBClusterIdentifier:         aws.String(clusterName),
  Engine:                      aws.String(dbEngine),
  DBClusterParameterGroupName: aws.String(parameterGroupName),
  DatabaseName:                aws.String(dbName),
  EngineVersion:               aws.String(dbEngineVersion),
  MasterUserPassword:          aws.String(adminPassword),
  MasterUsername:              aws.String(adminName),
 })
 if err != nil {
  log.Printf("Couldn't create DB cluster %v: %v\n", clusterName, err)
  return nil, err
 } else {
  return output.DBCluster, err
 }
```

```
}



// DeleteDbCluster deletes a DB cluster without keeping a final snapshot.
func (clusters *DbClusters) DeleteDbCluster(ctx context.Context, clusterName string)
 error {
 _, err := clusters.AuroraClient.DeleteDBCluster(ctx, &rds.DeleteDBClusterInput{
  DBClusterIdentifier: aws.String(clusterName),
  SkipFinalSnapshot:   aws.Bool(true),
 })
 if err != nil {
  log.Printf("Couldn't delete DB cluster %v: %v\n", clusterName, err)
  return err
 } else {
  return nil
 }
}



// CreateClusterSnapshot creates a snapshot of a DB cluster.
func (clusters *DbClusters) CreateClusterSnapshot(ctx context.Context, clusterName
 string, snapshotName string) (
 *types.DBClusterSnapshot, error) {
 output, err := clusters.AuroraClient.CreateDBClusterSnapshot(ctx,
 &rds.CreateDBClusterSnapshotInput{
  DBClusterIdentifier:         aws.String(clusterName),
  DBClusterSnapshotIdentifier: aws.String(snapshotName),
 })
 if err != nil {
  log.Printf("Couldn't create snapshot %v: %v\n", snapshotName, err)
  return nil, err
 } else {
  return output.DBClusterSnapshot, nil
 }
}



// GetClusterSnapshot gets a DB cluster snapshot.
func (clusters *DbClusters) GetClusterSnapshot(ctx context.Context, snapshotName
 string) (*types.DBClusterSnapshot, error) {
 output, err := clusters.AuroraClient.DescribeDBClusterSnapshots(ctx,
```

```
  &rds.DescribeDBClusterSnapshotsInput{
   DBClusterSnapshotIdentifier: aws.String(snapshotName),
  })
 if err != nil {
  log.Printf("Couldn't get snapshot %v: %v\n", snapshotName, err)
  return nil, err
 } else {
  return &output.DBClusterSnapshots[0], nil
 }
}



// CreateInstanceInCluster creates a database instance in an existing DB cluster.
 The first database that is
// created defaults to a read-write DB instance.
func (clusters *DbClusters) CreateInstanceInCluster(ctx context.Context, clusterName
 string, instanceName string,
 dbEngine string, dbInstanceClass string) (*types.DBInstance, error) {
 output, err := clusters.AuroraClient.CreateDBInstance(ctx,
 &rds.CreateDBInstanceInput{
  DBInstanceIdentifier: aws.String(instanceName),
  DBClusterIdentifier:  aws.String(clusterName),
  Engine:               aws.String(dbEngine),
  DBInstanceClass:      aws.String(dbInstanceClass),
 })
 if err != nil {
  log.Printf("Couldn't create instance %v: %v\n", instanceName, err)
  return nil, err
 } else {
  return output.DBInstance, nil
 }
}



// GetInstance gets data about a DB instance.
func (clusters *DbClusters) GetInstance(ctx context.Context, instanceName string) (
 *types.DBInstance, error) {
 output, err := clusters.AuroraClient.DescribeDBInstances(ctx,
  &rds.DescribeDBInstancesInput{
   DBInstanceIdentifier: aws.String(instanceName),
  })
 if err != nil {
```

```
  var notFoundError *types.DBInstanceNotFoundFault
  if errors.As(err, &notFoundError) {
   log.Printf("DB instance %v does not exist.\n", instanceName)
   err = nil
  } else {
   log.Printf("Couldn't get instance %v: %v\n", instanceName, err)
  }
  return nil, err
 } else {
  return &output.DBInstances[0], nil
 }
}



// DeleteInstance deletes a DB instance.
func (clusters *DbClusters) DeleteInstance(ctx context.Context, instanceName string)
 error {
 _, err := clusters.AuroraClient.DeleteDBInstance(ctx, &rds.DeleteDBInstanceInput{
  DBInstanceIdentifier:   aws.String(instanceName),
  SkipFinalSnapshot:      aws.Bool(true),
  DeleteAutomatedBackups: aws.Bool(true),
 })
 if err != nil {
  log.Printf("Couldn't delete instance %v: %v\n", instanceName, err)
  return err
 } else {
  return nil
 }
}



// GetEngineVersions gets database engine versions that are available for the
 specified engine
// and parameter group family.
func (clusters *DbClusters) GetEngineVersions(ctx context.Context, engine string,
 parameterGroupFamily string) (
 []types.DBEngineVersion, error) {
 output, err := clusters.AuroraClient.DescribeDBEngineVersions(ctx,
  &rds.DescribeDBEngineVersionsInput{
   Engine:                 aws.String(engine),
   DBParameterGroupFamily: aws.String(parameterGroupFamily),
  })
```

```
 if err != nil {
  log.Printf("Couldn't get engine versions for %v: %v\n", engine, err)
  return nil, err
 } else {
  return output.DBEngineVersions, nil
 }
}



// GetOrderableInstances uses a paginator to get DB instance options that can be
 used to create DB instances that are
// compatible with a set of specifications.
func (clusters *DbClusters) GetOrderableInstances(ctx context.Context, engine
 string, engineVersion string) (
 []types.OrderableDBInstanceOption, error) {

 var output *rds.DescribeOrderableDBInstanceOptionsOutput
 var instances []types.OrderableDBInstanceOption
 var err error
 orderablePaginator :=
 rds.NewDescribeOrderableDBInstanceOptionsPaginator(clusters.AuroraClient,
  &rds.DescribeOrderableDBInstanceOptionsInput{
   Engine:        aws.String(engine),
   EngineVersion: aws.String(engineVersion),
  })
 for orderablePaginator.HasMorePages() {
  output, err = orderablePaginator.NextPage(ctx)
  if err != nil {
   log.Printf("Couldn't get orderable DB instances: %v\n", err)
   break
  } else {
   instances = append(instances, output.OrderableDBInstanceOptions...)
  }
 }
 return instances, err
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的下列主題。
  - CreateDBCluster
  - CreateDBClusterParameterGroup

- CreateDBClusterSnapshot
- CreateDBInstance
- DeleteDBCluster
- DeleteDBClusterParameterGroup
- DeleteDBInstance
- DescribeDBClusterParameterGroups
- DescribeDBClusterParameters
- DescribeDBClusterSnapshots
- DescribeDBClusters
- DescribeDBEngineVersions
- DescribeDBInstances
- DescribeOrderableDBInstanceOptions
- ModifyDBClusterParameterGroup

## 動作

### `CreateDBCluster`

以下程式碼範例顯示如何使用 `CreateDBCluster`。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "context"
 "errors"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/rds"
```

```
 "github.com/aws/aws-sdk-go-v2/service/rds/types"
)

type DbClusters struct {
 AuroraClient *rds.Client
}



// CreateDbCluster creates a DB cluster that is configured to use the specified
 parameter group.
// The newly created DB cluster contains a database that uses the specified engine
 and
// engine version.
func (clusters *DbClusters) CreateDbCluster(ctx context.Context, clusterName string,
 parameterGroupName string,
 dbName string, dbEngine string, dbEngineVersion string, adminName string,
 adminPassword string) (
 *types.DBCluster, error) {

 output, err := clusters.AuroraClient.CreateDBCluster(ctx,
 &rds.CreateDBClusterInput{
  DBClusterIdentifier:         aws.String(clusterName),
  Engine:                      aws.String(dbEngine),
  DBClusterParameterGroupName: aws.String(parameterGroupName),
  DatabaseName:                aws.String(dbName),
  EngineVersion:               aws.String(dbEngineVersion),
  MasterUserPassword:          aws.String(adminPassword),
  MasterUsername:              aws.String(adminName),
 })
 if err != nil {
  log.Printf("Couldn't create DB cluster %v: %v\n", clusterName, err)
  return nil, err
 } else {
  return output.DBCluster, err
 }
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的 CreateDBCluster。

### `CreateDBClusterParameterGroup`

以下程式碼範例顯示如何使用 `CreateDBClusterParameterGroup`。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "context"
 "errors"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/rds"
 "github.com/aws/aws-sdk-go-v2/service/rds/types"
)

type DbClusters struct {
 AuroraClient *rds.Client
}



// CreateParameterGroup creates a DB cluster parameter group that is based on the
 specified
// parameter group family.
func (clusters *DbClusters) CreateParameterGroup(
 ctx context.Context, parameterGroupName string, parameterGroupFamily string,
 description string) (
 *types.DBClusterParameterGroup, error) {

 output, err := clusters.AuroraClient.CreateDBClusterParameterGroup(ctx,
  &rds.CreateDBClusterParameterGroupInput{
   DBClusterParameterGroupName: aws.String(parameterGroupName),
   DBParameterGroupFamily:      aws.String(parameterGroupFamily),
   Description:                 aws.String(description),
  })
```

```
 if err != nil {
  log.Printf("Couldn't create parameter group %v: %v\n", parameterGroupName, err)
  return nil, err
 } else {
  return output.DBClusterParameterGroup, err
 }
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的 CreateDBClusterParameterGroup。

### `CreateDBClusterSnapshot`

以下程式碼範例顯示如何使用 `CreateDBClusterSnapshot`。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "context"
 "errors"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/rds"
 "github.com/aws/aws-sdk-go-v2/service/rds/types"
)

type DbClusters struct {
 AuroraClient *rds.Client
}
```

```
// CreateClusterSnapshot creates a snapshot of a DB cluster.
func (clusters *DbClusters) CreateClusterSnapshot(ctx context.Context, clusterName
 string, snapshotName string) (
 *types.DBClusterSnapshot, error) {
 output, err := clusters.AuroraClient.CreateDBClusterSnapshot(ctx,
 &rds.CreateDBClusterSnapshotInput{
  DBClusterIdentifier:         aws.String(clusterName),
  DBClusterSnapshotIdentifier: aws.String(snapshotName),
 })
 if err != nil {
  log.Printf("Couldn't create snapshot %v: %v\n", snapshotName, err)
  return nil, err
 } else {
  return output.DBClusterSnapshot, nil
 }
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的 CreateDBClusterSnapshot。

### `CreateDBInstance`

以下程式碼範例顯示如何使用 `CreateDBInstance`。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "context"
 "errors"
 "log"
```

```
 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/rds"
 "github.com/aws/aws-sdk-go-v2/service/rds/types"
)

type DbClusters struct {
 AuroraClient *rds.Client
}



// CreateInstanceInCluster creates a database instance in an existing DB cluster.
 The first database that is
// created defaults to a read-write DB instance.
func (clusters *DbClusters) CreateInstanceInCluster(ctx context.Context, clusterName
 string, instanceName string,
 dbEngine string, dbInstanceClass string) (*types.DBInstance, error) {
 output, err := clusters.AuroraClient.CreateDBInstance(ctx,
 &rds.CreateDBInstanceInput{
  DBInstanceIdentifier: aws.String(instanceName),
  DBClusterIdentifier:  aws.String(clusterName),
  Engine:               aws.String(dbEngine),
  DBInstanceClass:      aws.String(dbInstanceClass),
 })
 if err != nil {
  log.Printf("Couldn't create instance %v: %v\n", instanceName, err)
  return nil, err
 } else {
  return output.DBInstance, nil
 }
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的 CreateDBInstance。

### DeleteDBCluster

以下程式碼範例顯示如何使用 DeleteDBCluster。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "context"
 "errors"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/rds"
 "github.com/aws/aws-sdk-go-v2/service/rds/types"
)

type DbClusters struct {
 AuroraClient *rds.Client
}



// DeleteDbCluster deletes a DB cluster without keeping a final snapshot.
func (clusters *DbClusters) DeleteDbCluster(ctx context.Context, clusterName string)
 error {
 _, err := clusters.AuroraClient.DeleteDBCluster(ctx, &rds.DeleteDBClusterInput{
  DBClusterIdentifier: aws.String(clusterName),
  SkipFinalSnapshot:   aws.Bool(true),
 })
 if err != nil {
  log.Printf("Couldn't delete DB cluster %v: %v\n", clusterName, err)
  return err
 } else {
  return nil
 }
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的 DeleteDBCluster。

### `DeleteDBClusterParameterGroup`

以下程式碼範例顯示如何使用 `DeleteDBClusterParameterGroup`。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "context"
 "errors"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/rds"
 "github.com/aws/aws-sdk-go-v2/service/rds/types"
)

type DbClusters struct {
 AuroraClient *rds.Client
}



// DeleteParameterGroup deletes the named DB cluster parameter group.
func (clusters *DbClusters) DeleteParameterGroup(ctx context.Context,
 parameterGroupName string) error {
 _, err := clusters.AuroraClient.DeleteDBClusterParameterGroup(ctx,
  &rds.DeleteDBClusterParameterGroupInput{
   DBClusterParameterGroupName: aws.String(parameterGroupName),
  })
 if err != nil {
  log.Printf("Couldn't delete parameter group %v: %v\n", parameterGroupName, err)
  return err
 } else {
```

```
  return nil
 }
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的 DeleteDBClusterParameterGroup。

### `DeleteDBInstance`

以下程式碼範例顯示如何使用 `DeleteDBInstance`。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "context"
 "errors"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/rds"
 "github.com/aws/aws-sdk-go-v2/service/rds/types"
)

type DbClusters struct {
 AuroraClient *rds.Client
}



// DeleteInstance deletes a DB instance.
func (clusters *DbClusters) DeleteInstance(ctx context.Context, instanceName string)
 error {
```

```
 _, err := clusters.AuroraClient.DeleteDBInstance(ctx, &rds.DeleteDBInstanceInput{
  DBInstanceIdentifier:   aws.String(instanceName),
  SkipFinalSnapshot:      aws.Bool(true),
  DeleteAutomatedBackups: aws.Bool(true),
 })
 if err != nil {
  log.Printf("Couldn't delete instance %v: %v\n", instanceName, err)
  return err
 } else {
  return nil
 }
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的 DeleteDBInstance。

### `DescribeDBClusterParameterGroups`

以下程式碼範例顯示如何使用 `DescribeDBClusterParameterGroups`。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "context"
 "errors"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/rds"
 "github.com/aws/aws-sdk-go-v2/service/rds/types"
)

type DbClusters struct {
 AuroraClient *rds.Client
```

```
}



// GetParameterGroup gets a DB cluster parameter group by name.
func (clusters *DbClusters) GetParameterGroup(ctx context.Context,
 parameterGroupName string) (
 *types.DBClusterParameterGroup, error) {
 output, err := clusters.AuroraClient.DescribeDBClusterParameterGroups(
  ctx, &rds.DescribeDBClusterParameterGroupsInput{
   DBClusterParameterGroupName: aws.String(parameterGroupName),
  })
 if err != nil {
  var notFoundError *types.DBParameterGroupNotFoundFault
  if errors.As(err, &notFoundError) {
   log.Printf("Parameter group %v does not exist.\n", parameterGroupName)
   err = nil
  } else {
   log.Printf("Error getting parameter group %v: %v\n", parameterGroupName, err)
  }
  return nil, err
 } else {
  return &output.DBClusterParameterGroups[0], err
 }
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的 DescribeDBClusterParameterGroups。

### `DescribeDBClusterParameters`

以下程式碼範例顯示如何使用 `DescribeDBClusterParameters`。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "context"
 "errors"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/rds"
 "github.com/aws/aws-sdk-go-v2/service/rds/types"
)

type DbClusters struct {
 AuroraClient *rds.Client
}



// GetParameters gets the parameters that are contained in a DB cluster parameter
 group.
func (clusters *DbClusters) GetParameters(ctx context.Context, parameterGroupName
 string, source string) (
 []types.Parameter, error) {

 var output *rds.DescribeDBClusterParametersOutput
 var params []types.Parameter
 var err error
 parameterPaginator :=
 rds.NewDescribeDBClusterParametersPaginator(clusters.AuroraClient,
  &rds.DescribeDBClusterParametersInput{
   DBClusterParameterGroupName: aws.String(parameterGroupName),
   Source:                      aws.String(source),
  })
 for parameterPaginator.HasMorePages() {
  output, err = parameterPaginator.NextPage(ctx)
  if err != nil {
   log.Printf("Couldn't get paramaeters for %v: %v\n", parameterGroupName, err)
   break
  } else {
   params = append(params, output.Parameters...)
  }
 }
 return params, err
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的 DescribeDBClusterParameters。

### `DescribeDBClusterSnapshots`

以下程式碼範例顯示如何使用 `DescribeDBClusterSnapshots`。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "context"
 "errors"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/rds"
 "github.com/aws/aws-sdk-go-v2/service/rds/types"
)

type DbClusters struct {
 AuroraClient *rds.Client
}



// GetClusterSnapshot gets a DB cluster snapshot.
func (clusters *DbClusters) GetClusterSnapshot(ctx context.Context, snapshotName
 string) (*types.DBClusterSnapshot, error) {
 output, err := clusters.AuroraClient.DescribeDBClusterSnapshots(ctx,
  &rds.DescribeDBClusterSnapshotsInput{
   DBClusterSnapshotIdentifier: aws.String(snapshotName),
```

```
  })
 if err != nil {
  log.Printf("Couldn't get snapshot %v: %v\n", snapshotName, err)
  return nil, err
 } else {
  return &output.DBClusterSnapshots[0], nil
 }
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的 DescribeDBClusterSnapshots。

### `DescribeDBClusters`

以下程式碼範例顯示如何使用 `DescribeDBClusters`。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "context"
 "errors"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/rds"
 "github.com/aws/aws-sdk-go-v2/service/rds/types"
)

type DbClusters struct {
 AuroraClient *rds.Client
}
```

```
// GetDbCluster gets data about an Aurora DB cluster.
func (clusters *DbClusters) GetDbCluster(ctx context.Context, clusterName string)
 (*types.DBCluster, error) {
 output, err := clusters.AuroraClient.DescribeDBClusters(ctx,
  &rds.DescribeDBClustersInput{
   DBClusterIdentifier: aws.String(clusterName),
  })
 if err != nil {
  var notFoundError *types.DBClusterNotFoundFault
  if errors.As(err, &notFoundError) {
   log.Printf("DB cluster %v does not exist.\n", clusterName)
   err = nil
  } else {
   log.Printf("Couldn't get DB cluster %v: %v\n", clusterName, err)
  }
  return nil, err
 } else {
  return &output.DBClusters[0], err
 }
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的 DescribeDBClusters。

### `DescribeDBEngineVersions`

以下程式碼範例顯示如何使用 `DescribeDBEngineVersions`。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
```

```
 "context"
 "errors"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/rds"
 "github.com/aws/aws-sdk-go-v2/service/rds/types"
)

type DbClusters struct {
 AuroraClient *rds.Client
}



// GetEngineVersions gets database engine versions that are available for the
 specified engine
// and parameter group family.
func (clusters *DbClusters) GetEngineVersions(ctx context.Context, engine string,
 parameterGroupFamily string) (
 []types.DBEngineVersion, error) {
 output, err := clusters.AuroraClient.DescribeDBEngineVersions(ctx,
  &rds.DescribeDBEngineVersionsInput{
   Engine:                 aws.String(engine),
   DBParameterGroupFamily: aws.String(parameterGroupFamily),
  })
 if err != nil {
  log.Printf("Couldn't get engine versions for %v: %v\n", engine, err)
  return nil, err
 } else {
  return output.DBEngineVersions, nil
 }
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的 DescribeDBEngineVersions。

### DescribeDBInstances

以下程式碼範例顯示如何使用 DescribeDBInstances。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "context"
 "errors"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/rds"
 "github.com/aws/aws-sdk-go-v2/service/rds/types"
)

type DbClusters struct {
 AuroraClient *rds.Client
}



// GetInstance gets data about a DB instance.
func (clusters *DbClusters) GetInstance(ctx context.Context, instanceName string) (
 *types.DBInstance, error) {
 output, err := clusters.AuroraClient.DescribeDBInstances(ctx,
  &rds.DescribeDBInstancesInput{
   DBInstanceIdentifier: aws.String(instanceName),
  })
 if err != nil {
  var notFoundError *types.DBInstanceNotFoundFault
  if errors.As(err, &notFoundError) {
   log.Printf("DB instance %v does not exist.\n", instanceName)
   err = nil
  } else {
   log.Printf("Couldn't get instance %v: %v\n", instanceName, err)
  }
  return nil, err
 } else {
```

```
  return &output.DBInstances[0], nil
 }
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的 DescribeDBInstances。

### `DescribeOrderableDBInstanceOptions`

以下程式碼範例顯示如何使用 `DescribeOrderableDBInstanceOptions`。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "context"
 "errors"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/rds"
 "github.com/aws/aws-sdk-go-v2/service/rds/types"
)

type DbClusters struct {
 AuroraClient *rds.Client
}



// GetOrderableInstances uses a paginator to get DB instance options that can be
 used to create DB instances that are
// compatible with a set of specifications.
func (clusters *DbClusters) GetOrderableInstances(ctx context.Context, engine
 string, engineVersion string) (
```

```
 []types.OrderableDBInstanceOption, error) {

 var output *rds.DescribeOrderableDBInstanceOptionsOutput
 var instances []types.OrderableDBInstanceOption
 var err error
 orderablePaginator :=
 rds.NewDescribeOrderableDBInstanceOptionsPaginator(clusters.AuroraClient,
  &rds.DescribeOrderableDBInstanceOptionsInput{
   Engine:        aws.String(engine),
   EngineVersion: aws.String(engineVersion),
  })
 for orderablePaginator.HasMorePages() {
  output, err = orderablePaginator.NextPage(ctx)
  if err != nil {
   log.Printf("Couldn't get orderable DB instances: %v\n", err)
   break
  } else {
   instances = append(instances, output.OrderableDBInstanceOptions...)
  }
 }
 return instances, err
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的 DescribeOrderableDBInstanceOptions。

### `ModifyDBClusterParameterGroup`

以下程式碼範例顯示如何使用 `ModifyDBClusterParameterGroup`。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "context"
 "errors"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/rds"
 "github.com/aws/aws-sdk-go-v2/service/rds/types"
)

type DbClusters struct {
 AuroraClient *rds.Client
}



// UpdateParameters updates parameters in a named DB cluster parameter group.
func (clusters *DbClusters) UpdateParameters(ctx context.Context, parameterGroupName
 string, params []types.Parameter) error {
 _, err := clusters.AuroraClient.ModifyDBClusterParameterGroup(ctx,
  &rds.ModifyDBClusterParameterGroupInput{
   DBClusterParameterGroupName: aws.String(parameterGroupName),
   Parameters:                  params,
  })
 if err != nil {
  log.Printf("Couldn't update parameters in %v: %v\n", parameterGroupName, err)
  return err
 } else {
  return nil
 }
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的 ModifyDBClusterParameterGroup。

# 使用適用於 Go V2 的 SDK 的 Amazon Bedrock 範例

下列程式碼範例示範如何使用 適用於 Go 的 AWS SDK V2 搭配 Amazon Bedrock 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 Amazon Bedrock

下列程式碼範例示範如何開始使用 Amazon Bedrock。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
package main

import (
 "context"
 "fmt"

 "github.com/aws/aws-sdk-go-v2/config"
 "github.com/aws/aws-sdk-go-v2/service/bedrock"
)

const region = "us-east-1"

// main uses the AWS SDK for Go (v2) to create an Amazon Bedrock client and
// list the available foundation models in your account and the chosen region.
// This example uses the default settings specified in your shared credentials
// and config files.
func main() {
```

```
 ctx := context.Background()
 sdkConfig, err := config.LoadDefaultConfig(ctx, config.WithRegion(region))
 if err != nil {
  fmt.Println("Couldn't load default configuration. Have you set up your AWS
 account?")
  fmt.Println(err)
  return
 }
 bedrockClient := bedrock.NewFromConfig(sdkConfig)
 result, err := bedrockClient.ListFoundationModels(ctx,
 &bedrock.ListFoundationModelsInput{})
 if err != nil {
  fmt.Printf("Couldn't list foundation models. Here's why: %v\n", err)
  return
 }
 if len(result.ModelSummaries) == 0 {
  fmt.Println("There are no foundation models.")
 }
 for _, modelSummary := range result.ModelSummaries {
  fmt.Println(*modelSummary.ModelId)
 }
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的 ListFoundationModels。

## 動作

### `ListFoundationModels`

以下程式碼範例顯示如何使用 `ListFoundationModels`。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

列出可用的 Bedrock 基礎模型。

```
import (
 "context"
 "log"

 "github.com/aws/aws-sdk-go-v2/service/bedrock"
 "github.com/aws/aws-sdk-go-v2/service/bedrock/types"
)

// FoundationModelWrapper encapsulates Amazon Bedrock actions used in the examples.
// It contains a Bedrock service client that is used to perform foundation model
 actions.
type FoundationModelWrapper struct {
 BedrockClient *bedrock.Client
}



// ListPolicies lists Bedrock foundation models that you can use.
func (wrapper FoundationModelWrapper) ListFoundationModels(ctx context.Context)
 ([]types.FoundationModelSummary, error) {

 var models []types.FoundationModelSummary

 result, err := wrapper.BedrockClient.ListFoundationModels(ctx,
 &bedrock.ListFoundationModelsInput{})

 if err != nil {
  log.Printf("Couldn't list foundation models. Here's why: %v\n", err)
 } else {
  models = result.ModelSummaries
 }
 return models, err
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的 ListFoundationModels。

# 使用適用於 Go V2 的 SDK 的 Amazon Bedrock 執行時期範例

下列程式碼範例示範如何使用 適用於 Go 的 AWS SDK V2 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


- 開始使用
- 案例
- Amazon Titan 圖像生成器
- Anthropic Claude


## 開始使用

Hello Amazon Bedrock

下列程式碼範例示範如何開始使用 Amazon Bedrock。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
package main

import (
 "context"
 "encoding/json"
 "flag"
 "fmt"
 "log"
 "os"
```

```
 "strings"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/config"
 "github.com/aws/aws-sdk-go-v2/service/bedrockruntime"
)

// Each model provider defines their own individual request and response formats.
// For the format, ranges, and default values for the different models, refer to:
// https://docs.aws.amazon.com/bedrock/latest/userguide/model-parameters.html

type ClaudeRequest struct {
 Prompt            string `json:"prompt"`
 MaxTokensToSample int    `json:"max_tokens_to_sample"`
 // Omitting optional request parameters
}

type ClaudeResponse struct {
 Completion string `json:"completion"`
}

// main uses the AWS SDK for Go (v2) to create an Amazon Bedrock Runtime client
// and invokes Anthropic Claude 2 inside your account and the chosen region.
// This example uses the default settings specified in your shared credentials
// and config files.
func main() {

 region := flag.String("region", "us-east-1", "The AWS region")
 flag.Parse()

 fmt.Printf("Using AWS region: %s\n", *region)

 ctx := context.Background()
 sdkConfig, err := config.LoadDefaultConfig(ctx, config.WithRegion(*region))
 if err != nil {
  fmt.Println("Couldn't load default configuration. Have you set up your AWS
 account?")
  fmt.Println(err)
  return
 }

 client := bedrockruntime.NewFromConfig(sdkConfig)

 modelId := "anthropic.claude-v2"
```

```
 prompt := "Hello, how are you today?"

 // Anthropic Claude requires you to enclose the prompt as follows:
 prefix := "Human: "
 postfix := "\n\nAssistant:"
 wrappedPrompt := prefix + prompt + postfix

 request := ClaudeRequest{
  Prompt:            wrappedPrompt,
  MaxTokensToSample: 200,
 }

 body, err := json.Marshal(request)
 if err != nil {
  log.Panicln("Couldn't marshal the request: ", err)
 }

 result, err := client.InvokeModel(ctx, &bedrockruntime.InvokeModelInput{
  ModelId:     aws.String(modelId),
  ContentType: aws.String("application/json"),
  Body:        body,
 })

 if err != nil {
  errMsg := err.Error()
  if strings.Contains(errMsg, "no such host") {
   fmt.Printf("Error: The Bedrock service is not available in the selected
 region. Please double-check the service availability for your region at https://
aws.amazon.com/about-aws/global-infrastructure/regional-product-services/.\n")
  } else if strings.Contains(errMsg, "Could not resolve the foundation model") {
   fmt.Printf("Error: Could not resolve the foundation model from model identifier:
 \"%v\". Please verify that the requested model exists and is accessible within the
 specified region.\n", modelId)
  } else {
   fmt.Printf("Error: Couldn't invoke Anthropic Claude. Here's why: %v\n", err)
  }
  os.Exit(1)
 }

 var response ClaudeResponse

 err = json.Unmarshal(result.Body, &response)
```

```
 if err != nil {
  log.Fatal("failed to unmarshal", err)
 }
 fmt.Println("Prompt:\n", prompt)
 fmt.Println("Response from Anthropic Claude:\n", response.Completion)
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的 InvokeModel。

## 案例

在 Amazon Bedrock 上調用多個基礎模型

下列程式碼範例示範如何在 Amazon Bedrock 上準備並傳送提示至各種大型語言模型 (LLM)

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

在 Amazon Bedrock 上調用多個基礎模型。

```
import (
 "context"
 "encoding/base64"
 "fmt"
 "log"
 "math/rand"
 "os"
 "path/filepath"
 "strings"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/bedrockruntime"
 "github.com/awsdocs/aws-doc-sdk-examples/gov2/bedrock-runtime/actions"
 "github.com/awsdocs/aws-doc-sdk-examples/gov2/demotools"
```

```
)

// InvokeModelsScenario demonstrates how to use the Amazon Bedrock Runtime client
// to invoke various foundation models for text and image generation
//
// 1. Generate text with Anthropic Claude 2
// 2. Generate text with Meta Llama 2 Chat
// 3. Generate text and asynchronously process the response stream with Anthropic
 Claude 2
// 4. Generate an image with the Amazon Titan image generation model
type InvokeModelsScenario struct {
 sdkConfig             aws.Config
 invokeModelWrapper    actions.InvokeModelWrapper
 responseStreamWrapper actions.InvokeModelWithResponseStreamWrapper
 questioner            demotools.IQuestioner
}

// NewInvokeModelsScenario constructs an InvokeModelsScenario instance from a
 configuration.
// It uses the specified config to get a Bedrock Runtime client and create wrappers
 for the
// actions used in the scenario.
func NewInvokeModelsScenario(sdkConfig aws.Config, questioner demotools.IQuestioner)
 InvokeModelsScenario {
 client := bedrockruntime.NewFromConfig(sdkConfig)
 return InvokeModelsScenario{
  sdkConfig:             sdkConfig,
  invokeModelWrapper:    actions.InvokeModelWrapper{BedrockRuntimeClient: client},
  responseStreamWrapper:
 actions.InvokeModelWithResponseStreamWrapper{BedrockRuntimeClient: client},
  questioner:            questioner,
 }
}

// Runs the interactive scenario.
func (scenario InvokeModelsScenario) Run(ctx context.Context) {
 defer func() {
  if r := recover(); r != nil {
   log.Printf("Something went wrong with the demo: %v\n", r)
  }
 }()

 log.Println(strings.Repeat("=", 77))
 log.Println("Welcome to the Amazon Bedrock Runtime model invocation demo.")
```

```
 log.Println(strings.Repeat("=", 77))

 log.Printf("First, let's invoke a few large-language models using the synchronous
 client:\n\n")

 text2textPrompt := "In one paragraph, who are you?"

 log.Println(strings.Repeat("-", 77))
 log.Printf("Invoking Claude with prompt: %v\n", text2textPrompt)
 scenario.InvokeClaude(ctx, text2textPrompt)

 log.Println(strings.Repeat("=", 77))
 log.Printf("Now, let's invoke Claude with the asynchronous client and process the
 response stream:\n\n")

 log.Println(strings.Repeat("-", 77))
 log.Printf("Invoking Claude with prompt: %v\n", text2textPrompt)
 scenario.InvokeWithResponseStream(ctx, text2textPrompt)

 log.Println(strings.Repeat("=", 77))
 log.Printf("Now, let's create an image with the Amazon Titan image generation
 model:\n\n")

 text2ImagePrompt := "stylized picture of a cute old steampunk robot"
 seed := rand.Int63n(2147483648)

 log.Println(strings.Repeat("-", 77))
 log.Printf("Invoking Amazon Titan with prompt: %v\n", text2ImagePrompt)
 scenario.InvokeTitanImage(ctx, text2ImagePrompt, seed)

 log.Println(strings.Repeat("=", 77))
 log.Println("Thanks for watching!")
 log.Println(strings.Repeat("=", 77))
}

func (scenario InvokeModelsScenario) InvokeClaude(ctx context.Context, prompt
 string) {
 completion, err := scenario.invokeModelWrapper.InvokeClaude(ctx, prompt)
 if err != nil {
  panic(err)
 }
 log.Printf("\nClaude     : %v\n", strings.TrimSpace(completion))
}
```

```
func (scenario InvokeModelsScenario) InvokeWithResponseStream(ctx context.Context,
 prompt string) {
 log.Println("\nClaude with response stream:")
 _, err := scenario.responseStreamWrapper.InvokeModelWithResponseStream(ctx, prompt)
 if err != nil {
  panic(err)
 }
 log.Println()
}

func (scenario InvokeModelsScenario) InvokeTitanImage(ctx context.Context, prompt
 string, seed int64) {
 base64ImageData, err := scenario.invokeModelWrapper.InvokeTitanImage(ctx, prompt,
 seed)
 if err != nil {
  panic(err)
 }
 imagePath := saveImage(base64ImageData, "amazon.titan-image-generator-v2")
 fmt.Printf("The generated image has been saved to %s\n", imagePath)
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的下列主題。
  - InvokeModel
  - InvokeModelWithResponseStream

## Amazon Titan 圖像生成器

### InvokeModel

下列程式碼範例示範如何在 Amazon Bedrock 上調用 Amazon Titan Image 來產生映像。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

使用 Amazon Titan 圖像生成器建立影像。

```
import (
 "context"
 "encoding/json"
 "log"
 "strings"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/bedrockruntime"
)

// InvokeModelWrapper encapsulates Amazon Bedrock actions used in the examples.
// It contains a Bedrock Runtime client that is used to invoke foundation models.
type InvokeModelWrapper struct {
 BedrockRuntimeClient *bedrockruntime.Client
}



type TitanImageRequest struct {
 TaskType              string                `json:"taskType"`
 TextToImageParams     TextToImageParams     `json:"textToImageParams"`
 ImageGenerationConfig ImageGenerationConfig `json:"imageGenerationConfig"`
}
type TextToImageParams struct {
 Text string `json:"text"`
}
type ImageGenerationConfig struct {
 NumberOfImages int     `json:"numberOfImages"`
 Quality        string  `json:"quality"`
 CfgScale       float64 `json:"cfgScale"`
 Height         int     `json:"height"`
 Width          int     `json:"width"`
 Seed           int64   `json:"seed"`
}

type TitanImageResponse struct {
 Images []string `json:"images"`
}

// Invokes the Titan Image model to create an image using the input provided
// in the request body.
```

```
func (wrapper InvokeModelWrapper) InvokeTitanImage(ctx context.Context, prompt
 string, seed int64) (string, error) {
 modelId := "amazon.titan-image-generator-v2:0"

 body, err := json.Marshal(TitanImageRequest{
  TaskType: "TEXT_IMAGE",
  TextToImageParams: TextToImageParams{
   Text: prompt,
  },
  ImageGenerationConfig: ImageGenerationConfig{
   NumberOfImages: 1,
   Quality:        "standard",
   CfgScale:       8.0,
   Height:         512,
   Width:          512,
   Seed:           seed,
  },
 })

 if err != nil {
  log.Fatal("failed to marshal", err)
 }

 output, err := wrapper.BedrockRuntimeClient.InvokeModel(ctx,
 &bedrockruntime.InvokeModelInput{
  ModelId:     aws.String(modelId),
  ContentType: aws.String("application/json"),
  Body:        body,
 })

 if err != nil {
  ProcessError(err, modelId)
 }

 var response TitanImageResponse
 if err := json.Unmarshal(output.Body, &response); err != nil {
  log.Fatal("failed to unmarshal", err)
 }

 base64ImageData := response.Images[0]

 return base64ImageData, nil

}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的 InvokeModel。

## Anthropic Claude

### 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 Anthropic Claude。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，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 Anthropic Claude。

```
import (
 "context"
 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/bedrockruntime"
 "github.com/aws/aws-sdk-go-v2/service/bedrockruntime/types"
)

// ConverseWrapper encapsulates Amazon Bedrock actions used in the examples.
// It contains a Bedrock Runtime client that is used to invoke Bedrock.
type ConverseWrapper struct {
 BedrockRuntimeClient *bedrockruntime.Client
}



func (wrapper ConverseWrapper) ConverseClaude(ctx context.Context, prompt string)
 (string, error) {
 var content = types.ContentBlockMemberText{
  Value: prompt,
 }
```

```
 var message = types.Message{
  Content: []types.ContentBlock{&content},
  Role:    "user",
 }
 modelId := "anthropic.claude-3-haiku-20240307-v1:0"
 var converseInput = bedrockruntime.ConverseInput{
  ModelId:  aws.String(modelId),
  Messages: []types.Message{message},
 }
 response, err := wrapper.BedrockRuntimeClient.Converse(ctx, &converseInput)
 if err != nil {
  ProcessError(err, modelId)
 }

 responseText, _ := response.Output.(*types.ConverseOutputMemberMessage)
 responseContentBlock := responseText.Value.Content[0]
 text, _ := responseContentBlock.(*types.ContentBlockMemberText)
 return text.Value, nil

}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的 Converse。

### 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 Anthropic Claude。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

調用 Anthropic Claude 2 基礎模型以產生文字。

```
import (
 "context"
```

```
 "encoding/json"
 "log"
 "strings"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/bedrockruntime"
)

// InvokeModelWrapper encapsulates Amazon Bedrock actions used in the examples.
// It contains a Bedrock Runtime client that is used to invoke foundation models.
type InvokeModelWrapper struct {
 BedrockRuntimeClient *bedrockruntime.Client
}



// Each model provider has their own individual request and response formats.
// For the format, ranges, and default values for Anthropic Claude, refer to:
// https://docs.aws.amazon.com/bedrock/latest/userguide/model-parameters-claude.html

type ClaudeRequest struct {
 Prompt            string   `json:"prompt"`
 MaxTokensToSample int      `json:"max_tokens_to_sample"`
 Temperature       float64  `json:"temperature,omitempty"`
 StopSequences     []string `json:"stop_sequences,omitempty"`
}

type ClaudeResponse struct {
 Completion string `json:"completion"`
}

// Invokes Anthropic Claude on Amazon Bedrock to run an inference using the input
// provided in the request body.
func (wrapper InvokeModelWrapper) InvokeClaude(ctx context.Context, prompt string)
 (string, error) {
 modelId := "anthropic.claude-v2"

 // Anthropic Claude requires enclosing the prompt as follows:
 enclosedPrompt := "Human: " + prompt + "\n\nAssistant:"

 body, err := json.Marshal(ClaudeRequest{
  Prompt:            enclosedPrompt,
  MaxTokensToSample: 200,
  Temperature:       0.5,
```

```
 StopSequences:     []string{"\n\nHuman:"},
})

if err != nil {
 log.Fatal("failed to marshal", err)
}

output, err := wrapper.BedrockRuntimeClient.InvokeModel(ctx,
&bedrockruntime.InvokeModelInput{
 ModelId:     aws.String(modelId),
 ContentType: aws.String("application/json"),
 Body:        body,
})

if err != nil {
 ProcessError(err, modelId)
}

var response ClaudeResponse
if err := json.Unmarshal(output.Body, &response); err != nil {
 log.Fatal("failed to unmarshal", err)
}

return response.Completion, nil
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 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 Anthropic Claude 模型，並列印回應串流。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，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。

```
import (
 "bytes"
 "context"
 "encoding/json"
 "fmt"
 "log"
 "strings"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/bedrockruntime"
 "github.com/aws/aws-sdk-go-v2/service/bedrockruntime/types"
)

// InvokeModelWithResponseStreamWrapper encapsulates Amazon Bedrock actions used in
 the examples.
// It contains a Bedrock Runtime client that is used to invoke foundation models.
type InvokeModelWithResponseStreamWrapper struct {
 BedrockRuntimeClient *bedrockruntime.Client
}



// Each model provider defines their own individual request and response formats.
// For the format, ranges, and default values for the different models, refer to:
// https://docs.aws.amazon.com/bedrock/latest/userguide/model-parameters.html

type Request struct {
 Prompt            string  `json:"prompt"`
 MaxTokensToSample int     `json:"max_tokens_to_sample"`
 Temperature       float64 `json:"temperature,omitempty"`
}

type Response struct {
 Completion string `json:"completion"`
}

// Invokes Anthropic Claude on Amazon Bedrock to run an inference and asynchronously
// process the response stream.

func (wrapper InvokeModelWithResponseStreamWrapper)
 InvokeModelWithResponseStream(ctx context.Context, prompt string) (string, error) {
```

```
 modelId := "anthropic.claude-v2"

 // Anthropic Claude requires you to enclose the prompt as follows:
 prefix := "Human: "
 postfix := "\n\nAssistant:"
 prompt = prefix + prompt + postfix

 request := ClaudeRequest{
  Prompt:            prompt,
  MaxTokensToSample: 200,
  Temperature:       0.5,
  StopSequences:     []string{"\n\nHuman:"},
 }

 body, err := json.Marshal(request)
 if err != nil {
  log.Panicln("Couldn't marshal the request: ", err)
 }

 output, err := wrapper.BedrockRuntimeClient.InvokeModelWithResponseStream(ctx,
 &bedrockruntime.InvokeModelWithResponseStreamInput{
  Body:        body,
  ModelId:     aws.String(modelId),
  ContentType: aws.String("application/json"),
 })

 if err != nil {
  errMsg := err.Error()
  if strings.Contains(errMsg, "no such host") {
   log.Printf("The Bedrock service is not available in the selected region. Please
 double-check the service availability for your region at https://aws.amazon.com/
about-aws/global-infrastructure/regional-product-services/.\n")
  } else if strings.Contains(errMsg, "Could not resolve the foundation model") {
   log.Printf("Could not resolve the foundation model from model identifier: \"%v
\". Please verify that the requested model exists and is accessible within the
 specified region.\n", modelId)
  } else {
   log.Printf("Couldn't invoke Anthropic Claude. Here's why: %v\n", err)
  }
 }

 resp, err := processStreamingOutput(ctx, output, func(ctx context.Context, part
 []byte) error {
```

```
  fmt.Print(string(part))
  return nil
 })

 if err != nil {
  log.Fatal("streaming output processing error: ", err)
 }

 return resp.Completion, nil

}

type StreamingOutputHandler func(ctx context.Context, part []byte) error

func processStreamingOutput(ctx context.Context, output
 *bedrockruntime.InvokeModelWithResponseStreamOutput, handler
 StreamingOutputHandler) (Response, error) {

 var combinedResult string
 resp := Response{}

 for event := range output.GetStream().Events() {
  switch v := event.(type) {
  case *types.ResponseStreamMemberChunk:

   //fmt.Println("payload", string(v.Value.Bytes))

   var resp Response
   err := json.NewDecoder(bytes.NewReader(v.Value.Bytes)).Decode(&resp)
   if err != nil {
    return resp, err
   }

   err = handler(ctx, []byte(resp.Completion))
   if err != nil {
    return resp, err
   }

   combinedResult += resp.Completion

  case *types.UnknownUnionMember:
   fmt.Println("unknown tag:", v.Tag)

  default:
```

```
    fmt.Println("union is nil or unknown type")
   }
  }

  resp.Completion = combinedResult

  return resp, nil
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的 InvokeModelWithResponseStream。

# CloudFormation 使用 SDK for Go V2 的範例

下列程式碼範例示範如何使用 適用於 Go 的 AWS SDK V2 搭配 來執行動作和實作常見案例 CloudFormation。

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

### `DescribeStacks`

以下程式碼範例顯示如何使用 `DescribeStacks`。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "context"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/cloudformation"
)

// StackOutputs defines a map of outputs from a specific stack.
type StackOutputs map[string]string

type CloudFormationActions struct {
 CfnClient *cloudformation.Client
}

// GetOutputs gets the outputs from a CloudFormation stack and puts them into a
 structured format.
func (actor CloudFormationActions) GetOutputs(ctx context.Context, stackName string)
 StackOutputs {
 output, err := actor.CfnClient.DescribeStacks(ctx,
 &cloudformation.DescribeStacksInput{
  StackName: aws.String(stackName),
 })
 if err != nil || len(output.Stacks) == 0 {
  log.Panicf("Couldn't find a CloudFormation stack named %v. Here's why: %v\n",
 stackName, err)
 }
 stackOutputs := StackOutputs{}
 for _, out := range output.Stacks[0].Outputs {
  stackOutputs[*out.OutputKey] = *out.OutputValue
 }
 return stackOutputs
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的 DescribeStacks。

# 使用適用於 Go V2 的 SDK 的 CloudWatch Logs 範例

下列程式碼範例示範如何使用 適用於 Go 的 AWS SDK V2 搭配 CloudWatch Logs 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

### `StartLiveTail`

以下程式碼範例顯示如何使用 `StartLiveTail`。

SDK for Go V2

包括必需的檔案。

```
import (
 "context"
 "log"
 "time"

 "github.com/aws/aws-sdk-go-v2/config"
 "github.com/aws/aws-sdk-go-v2/service/cloudwatchlogs"
 "github.com/aws/aws-sdk-go-v2/service/cloudwatchlogs/types"
)
```

處理 Live Tail 工作階段的事件。

```
func handleEventStreamAsync(stream *cloudwatchlogs.StartLiveTailEventStream) {
 eventsChan := stream.Events()
 for {
  event := <-eventsChan
```

```
  switch e := event.(type) {
  case *types.StartLiveTailResponseStreamMemberSessionStart:
   log.Println("Received SessionStart event")
  case *types.StartLiveTailResponseStreamMemberSessionUpdate:
   for _, logEvent := range e.Value.SessionResults {
    log.Println(*logEvent.Message)
   }
  default:
   // Handle on-stream exceptions
   if err := stream.Err(); err != nil {
    log.Fatalf("Error occured during streaming: %v", err)
   } else if event == nil {
    log.Println("Stream is Closed")
    return
   } else {
    log.Fatalf("Unknown event type: %T", e)
   }
  }
 }
}
```

開始 Live Tail 工作階段。

```
cfg, err := config.LoadDefaultConfig(context.TODO())
if err != nil {
 panic("configuration error, " + err.Error())
}
client := cloudwatchlogs.NewFromConfig(cfg)

request := &cloudwatchlogs.StartLiveTailInput{
 LogGroupIdentifiers:   logGroupIdentifiers,
 LogStreamNames:        logStreamNames,
 LogEventFilterPattern: logEventFilterPattern,
}

response, err := client.StartLiveTail(context.TODO(), request)
// Handle pre-stream Exceptions
if err != nil {
 log.Fatalf("Failed to start streaming: %v", err)
}

// Start a Goroutine to handle events over stream
```

```
stream := response.GetStream()
go handleEventStreamAsync(stream)
```

在經過一段時間後停止 Live Tail 工作階段。

```
// Close the stream (which ends the session) after a timeout
time.Sleep(10 * time.Second)
stream.Close()
log.Println("Event stream closed")
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的 StartLiveTail。

# 使用適用於 Go V2 的 SDK 的 Amazon Cognito 身分提供者範例

下列程式碼範例示範如何使用 適用於 Go 的 AWS SDK V2 搭配 Amazon Cognito Identity Provider 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 Amazon Cognito

下列程式碼範例顯示如何開始使用 Amazon Cognito。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
package main

import (
 "context"
 "fmt"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/config"
 "github.com/aws/aws-sdk-go-v2/service/cognitoidentityprovider"
 "github.com/aws/aws-sdk-go-v2/service/cognitoidentityprovider/types"
)

// main uses the AWS SDK for Go V2 to create an Amazon Simple Notification Service
// (Amazon SNS) client and list the topics in your account.
// This example uses the default settings specified in your shared credentials
// and config files.
func main() {
 ctx := context.Background()
 sdkConfig, err := config.LoadDefaultConfig(ctx)
 if err != nil {
  fmt.Println("Couldn't load default configuration. Have you set up your AWS
 account?")
  fmt.Println(err)
  return
 }
 cognitoClient := cognitoidentityprovider.NewFromConfig(sdkConfig)
 fmt.Println("Let's list the user pools for your account.")
 var pools []types.UserPoolDescriptionType
 paginator := cognitoidentityprovider.NewListUserPoolsPaginator(
  cognitoClient, &cognitoidentityprovider.ListUserPoolsInput{MaxResults:
 aws.Int32(10)})
 for paginator.HasMorePages() {
```

```
  output, err := paginator.NextPage(ctx)
  if err != nil {
   log.Printf("Couldn't get user pools. Here's why: %v\n", err)
  } else {
   pools = append(pools, output.UserPools...)
  }
 }
 if len(pools) == 0 {
  fmt.Println("You don't have any user pools!")
 } else {
  for _, pool := range pools {
   fmt.Printf("\t%v: %v\n", *pool.Name, *pool.Id)
  }
 }
}
```

- 如需 API 詳細資訊，請參閱 適用於 Go 的 AWS SDK API 參考中的 ListUserPools。

## 動作

### `AdminCreateUser`

以下程式碼範例顯示如何使用 `AdminCreateUser`。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "context"
 "errors"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
```

```
 "github.com/aws/aws-sdk-go-v2/service/cognitoidentityprovider"
 "github.com/aws/aws-sdk-go-v2/service/cognitoidentityprovider/types"
)

type CognitoActions struct {
 CognitoClient *cognitoidentityprovider.Client
}



// AdminCreateUser uses administrator credentials to add a user to a user pool. This
 method leaves the user
// in a state that requires they enter a new password next time they sign in.
func (actor CognitoActions) AdminCreateUser(ctx context.Context, userPoolId string,
 userName string, userEmail string) error {
 _, err := actor.CognitoClient.AdminCreateUser(ctx,
 &cognitoidentityprovider.AdminCreateUserInput{
  UserPoolId:     aws.String(userPoolId),
  Username:       aws.String(userName),
  MessageAction:  types.MessageActionTypeSuppress,
  UserAttributes: []types.AttributeType{{Name: aws.String("email"), Value:
 aws.String(userEmail)}},
 })
 if err != nil {
  var userExists *types.UsernameExistsException
  if errors.As(err, &userExists) {
   log.Printf("User %v already exists in the user pool.", userName)
   err = nil
  } else {
   log.Printf("Couldn't create user %v. Here's why: %v\n", userName, err)
  }
 }
 return err
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的 AdminCreateUser。

### AdminSetUserPassword

以下程式碼範例顯示如何使用 AdminSetUserPassword。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "context"
 "errors"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/cognitoidentityprovider"
 "github.com/aws/aws-sdk-go-v2/service/cognitoidentityprovider/types"
)

type CognitoActions struct {
 CognitoClient *cognitoidentityprovider.Client
}



// AdminSetUserPassword uses administrator credentials to set a password for a user
 without requiring a
// temporary password.
func (actor CognitoActions) AdminSetUserPassword(ctx context.Context, userPoolId
 string, userName string, password string) error {
 _, err := actor.CognitoClient.AdminSetUserPassword(ctx,
 &cognitoidentityprovider.AdminSetUserPasswordInput{
  Password:   aws.String(password),
  UserPoolId: aws.String(userPoolId),
  Username:   aws.String(userName),
  Permanent:  true,
 })
 if err != nil {
  var invalidPassword *types.InvalidPasswordException
  if errors.As(err, &invalidPassword) {
   log.Println(*invalidPassword.Message)
  } else {
```

```
   log.Printf("Couldn't set password for user %v. Here's why: %v\n", userName, err)
  }
 }
 return err
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的 AdminSetUserPassword。

### `ConfirmForgotPassword`

以下程式碼範例顯示如何使用 `ConfirmForgotPassword`。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "context"
 "errors"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/cognitoidentityprovider"
 "github.com/aws/aws-sdk-go-v2/service/cognitoidentityprovider/types"
)

type CognitoActions struct {
 CognitoClient *cognitoidentityprovider.Client
}
```

```
// ConfirmForgotPassword confirms a user with a confirmation code and a new
 password.
func (actor CognitoActions) ConfirmForgotPassword(ctx context.Context, clientId
 string, code string, userName string, password string) error {
 _, err := actor.CognitoClient.ConfirmForgotPassword(ctx,
 &cognitoidentityprovider.ConfirmForgotPasswordInput{
  ClientId:         aws.String(clientId),
  ConfirmationCode: aws.String(code),
  Password:         aws.String(password),
  Username:         aws.String(userName),
 })
 if err != nil {
  var invalidPassword *types.InvalidPasswordException
  if errors.As(err, &invalidPassword) {
   log.Println(*invalidPassword.Message)
  } else {
   log.Printf("Couldn't confirm user %v. Here's why: %v", userName, err)
  }
 }
 return err
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的 ConfirmForgotPassword。

### `DeleteUser`

以下程式碼範例顯示如何使用 `DeleteUser`。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
```

```
 "context"
 "errors"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/cognitoidentityprovider"
 "github.com/aws/aws-sdk-go-v2/service/cognitoidentityprovider/types"
)

type CognitoActions struct {
 CognitoClient *cognitoidentityprovider.Client
}



// DeleteUser removes a user from the user pool.
func (actor CognitoActions) DeleteUser(ctx context.Context, userAccessToken string)
 error {
 _, err := actor.CognitoClient.DeleteUser(ctx,
 &cognitoidentityprovider.DeleteUserInput{
  AccessToken: aws.String(userAccessToken),
 })
 if err != nil {
  log.Printf("Couldn't delete user. Here's why: %v\n", err)
 }
 return err
}
```

- 如需 API 詳細資訊，請參閱 適用於 Go 的 AWS SDK API Reference 中的 DeleteUser。

### `ForgotPassword`

以下程式碼範例顯示如何使用 `ForgotPassword`。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "context"
 "errors"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/cognitoidentityprovider"
 "github.com/aws/aws-sdk-go-v2/service/cognitoidentityprovider/types"
)

type CognitoActions struct {
 CognitoClient *cognitoidentityprovider.Client
}



// ForgotPassword starts a password recovery flow for a user. This flow typically
 sends a confirmation code
// to the user's configured notification destination, such as email.
func (actor CognitoActions) ForgotPassword(ctx context.Context, clientId string,
 userName string) (*types.CodeDeliveryDetailsType, error) {
 output, err := actor.CognitoClient.ForgotPassword(ctx,
 &cognitoidentityprovider.ForgotPasswordInput{
  ClientId: aws.String(clientId),
  Username: aws.String(userName),
 })
 if err != nil {
  log.Printf("Couldn't start password reset for user '%v'. Here;s why: %v\n",
 userName, err)
 }
 return output.CodeDeliveryDetails, err
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的 ForgotPassword。

### InitiateAuth

以下程式碼範例顯示如何使用 InitiateAuth。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "context"
 "errors"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/cognitoidentityprovider"
 "github.com/aws/aws-sdk-go-v2/service/cognitoidentityprovider/types"
)

type CognitoActions struct {
 CognitoClient *cognitoidentityprovider.Client
}



// SignIn signs in a user to Amazon Cognito using a username and password
 authentication flow.
func (actor CognitoActions) SignIn(ctx context.Context, clientId string, userName
 string, password string) (*types.AuthenticationResultType, error) {
 var authResult *types.AuthenticationResultType
 output, err := actor.CognitoClient.InitiateAuth(ctx,
 &cognitoidentityprovider.InitiateAuthInput{
  AuthFlow:       "USER_PASSWORD_AUTH",
  ClientId:       aws.String(clientId),
  AuthParameters: map[string]string{"USERNAME": userName, "PASSWORD": password},
 })
 if err != nil {
  var resetRequired *types.PasswordResetRequiredException
  if errors.As(err, &resetRequired) {
   log.Println(*resetRequired.Message)
  } else {
   log.Printf("Couldn't sign in user %v. Here's why: %v\n", userName, err)
```

```
  }
 } else {
  authResult = output.AuthenticationResult
 }
 return authResult, err
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的 InitiateAuth。

### `ListUserPools`

以下程式碼範例顯示如何使用 `ListUserPools`。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
package main

import (
 "context"
 "fmt"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/config"
 "github.com/aws/aws-sdk-go-v2/service/cognitoidentityprovider"
 "github.com/aws/aws-sdk-go-v2/service/cognitoidentityprovider/types"
)

// main uses the AWS SDK for Go V2 to create an Amazon Simple Notification Service
// (Amazon SNS) client and list the topics in your account.
// This example uses the default settings specified in your shared credentials
// and config files.
```

```
func main() {
 ctx := context.Background()
 sdkConfig, err := config.LoadDefaultConfig(ctx)
 if err != nil {
  fmt.Println("Couldn't load default configuration. Have you set up your AWS
 account?")
  fmt.Println(err)
  return
 }
 cognitoClient := cognitoidentityprovider.NewFromConfig(sdkConfig)
 fmt.Println("Let's list the user pools for your account.")
 var pools []types.UserPoolDescriptionType
 paginator := cognitoidentityprovider.NewListUserPoolsPaginator(
  cognitoClient, &cognitoidentityprovider.ListUserPoolsInput{MaxResults:
 aws.Int32(10)})
 for paginator.HasMorePages() {
  output, err := paginator.NextPage(ctx)
  if err != nil {
   log.Printf("Couldn't get user pools. Here's why: %v\n", err)
  } else {
   pools = append(pools, output.UserPools...)
  }
 }
 if len(pools) == 0 {
  fmt.Println("You don't have any user pools!")
 } else {
  for _, pool := range pools {
   fmt.Printf("\t%v: %v\n", *pool.Name, *pool.Id)
  }
 }
}
```

- 如需 API 詳細資訊，請參閱 適用於 Go 的 AWS SDK API 參考中的 ListUserPools。

### SignUp

以下程式碼範例顯示如何使用 SignUp。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "context"
 "errors"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/cognitoidentityprovider"
 "github.com/aws/aws-sdk-go-v2/service/cognitoidentityprovider/types"
)

type CognitoActions struct {
 CognitoClient *cognitoidentityprovider.Client
}



// SignUp signs up a user with Amazon Cognito.
func (actor CognitoActions) SignUp(ctx context.Context, clientId string, userName
 string, password string, userEmail string) (bool, error) {
 confirmed := false
 output, err := actor.CognitoClient.SignUp(ctx,
 &cognitoidentityprovider.SignUpInput{
  ClientId: aws.String(clientId),
  Password: aws.String(password),
  Username: aws.String(userName),
  UserAttributes: []types.AttributeType{
   {Name: aws.String("email"), Value: aws.String(userEmail)},
  },
 })
 if err != nil {
  var invalidPassword *types.InvalidPasswordException
  if errors.As(err, &invalidPassword) {
   log.Println(*invalidPassword.Message)
```

```
  } else {
   log.Printf("Couldn't sign up user %v. Here's why: %v\n", userName, err)
  }
 } else {
  confirmed = output.UserConfirmed
 }
 return confirmed, err
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的 SignUp。

### `UpdateUserPool`

以下程式碼範例顯示如何使用 `UpdateUserPool`。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "context"
 "errors"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/cognitoidentityprovider"
 "github.com/aws/aws-sdk-go-v2/service/cognitoidentityprovider/types"
)

type CognitoActions struct {
 CognitoClient *cognitoidentityprovider.Client
}
```

```
// Trigger and TriggerInfo define typed data for updating an Amazon Cognito trigger.
type Trigger int

const (
 PreSignUp Trigger = iota
 UserMigration
 PostAuthentication
)

type TriggerInfo struct {
 Trigger    Trigger
 HandlerArn *string
}

// UpdateTriggers adds or removes Lambda triggers for a user pool. When a trigger is
 specified with a `nil` value,
// it is removed from the user pool.
func (actor CognitoActions) UpdateTriggers(ctx context.Context, userPoolId string,
 triggers ...TriggerInfo) error {
 output, err := actor.CognitoClient.DescribeUserPool(ctx,
 &cognitoidentityprovider.DescribeUserPoolInput{
  UserPoolId: aws.String(userPoolId),
 })
 if err != nil {
  log.Printf("Couldn't get info about user pool %v. Here's why: %v\n", userPoolId,
 err)
  return err
 }
 lambdaConfig := output.UserPool.LambdaConfig
 for _, trigger := range triggers {
  switch trigger.Trigger {
  case PreSignUp:
   lambdaConfig.PreSignUp = trigger.HandlerArn
  case UserMigration:
   lambdaConfig.UserMigration = trigger.HandlerArn
  case PostAuthentication:
   lambdaConfig.PostAuthentication = trigger.HandlerArn
  }
 }
 _, err = actor.CognitoClient.UpdateUserPool(ctx,
 &cognitoidentityprovider.UpdateUserPoolInput{
  UserPoolId:   aws.String(userPoolId),
  LambdaConfig: lambdaConfig,
 })
```

```
 if err != nil {
  log.Printf("Couldn't update user pool %v. Here's why: %v\n", userPoolId, err)
 }
 return err
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的 UpdateUserPool。

## 案例

使用 Lambda 函數自動確認已知使用者

下列程式碼範例示範如何使用 Lambda 函式自動確認已知的 Amazon Cognito 使用者。

- 設定使用者集區以呼叫 PreSignUp 觸發條件的 Lambda 函數。
- 使用 Amazon Cognito 註冊使用者。
- Lambda 函數會掃描 DynamoDB 資料表，並自動確認已知使用者。
- 以新使用者身分登入，然後清除資源。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，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。

```
import (
 "context"
 "errors"
 "log"
 "strings"
 "user_pools_and_lambda_triggers/actions"

 "github.com/aws/aws-sdk-go-v2/aws"
```

```
 "github.com/aws/aws-sdk-go-v2/service/cognitoidentityprovider"
 "github.com/aws/aws-sdk-go-v2/service/cognitoidentityprovider/types"
 "github.com/awsdocs/aws-doc-sdk-examples/gov2/demotools"
)

// AutoConfirm separates the steps of this scenario into individual functions so
 that
// they are simpler to read and understand.
type AutoConfirm struct {
 helper       IScenarioHelper
 questioner   demotools.IQuestioner
 resources    Resources
 cognitoActor *actions.CognitoActions
}

// NewAutoConfirm constructs a new auto confirm runner.
func NewAutoConfirm(sdkConfig aws.Config, questioner demotools.IQuestioner, helper
 IScenarioHelper) AutoConfirm {
 scenario := AutoConfirm{
  helper:       helper,
  questioner:   questioner,
  resources:    Resources{},
  cognitoActor: &actions.CognitoActions{CognitoClient:
 cognitoidentityprovider.NewFromConfig(sdkConfig)},
 }
 scenario.resources.init(scenario.cognitoActor, questioner)
 return scenario
}

// AddPreSignUpTrigger adds a Lambda handler as an invocation target for the
 PreSignUp trigger.
func (runner *AutoConfirm) AddPreSignUpTrigger(ctx context.Context, userPoolId
 string, functionArn string) {
 log.Printf("Let's add a Lambda function to handle the PreSignUp trigger from
 Cognito.\n" +
  "This trigger happens when a user signs up, and lets your function take action
 before the main Cognito\n" +
  "sign up processing occurs.\n")
 err := runner.cognitoActor.UpdateTriggers(
  ctx, userPoolId,
  actions.TriggerInfo{Trigger: actions.PreSignUp, HandlerArn:
 aws.String(functionArn)})
 if err != nil {
  panic(err)
```

```
 }
 log.Printf("Lambda function %v added to user pool %v to handle the PreSignUp
 trigger.\n",
  functionArn, userPoolId)
}

// SignUpUser signs up a user from the known user table with a password you specify.
func (runner *AutoConfirm) SignUpUser(ctx context.Context, clientId string,
 usersTable string) (string, string) {
 log.Println("Let's sign up a user to your Cognito user pool. When the user's email
 matches an email in the\n" +
  "DynamoDB known users table, it is automatically verified and the user is
 confirmed.")

 knownUsers, err := runner.helper.GetKnownUsers(ctx, usersTable)
 if err != nil {
  panic(err)
 }
 userChoice := runner.questioner.AskChoice("Which user do you want to use?\n",
 knownUsers.UserNameList())
 user := knownUsers.Users[userChoice]

 var signedUp bool
 var userConfirmed bool
 password := runner.questioner.AskPassword("Enter a password that has at least eight
 characters, uppercase, lowercase, numbers and symbols.\n"+
  "(the password will not display as you type):", 8)
 for !signedUp {
  log.Printf("Signing up user '%v' with email '%v' to Cognito.\n", user.UserName,
 user.UserEmail)
  userConfirmed, err = runner.cognitoActor.SignUp(ctx, clientId, user.UserName,
 password, user.UserEmail)
  if err != nil {
   var invalidPassword *types.InvalidPasswordException
   if errors.As(err, &invalidPassword) {
    password = runner.questioner.AskPassword("Enter another password:", 8)
   } else {
    panic(err)
   }
  } else {
   signedUp = true
  }
 }
 log.Printf("User %v signed up, confirmed = %v.\n", user.UserName, userConfirmed)
```

```
 log.Println(strings.Repeat("-", 88))

 return user.UserName, password
}

// SignInUser signs in a user.
func (runner *AutoConfirm) SignInUser(ctx context.Context, clientId string, userName
 string, password string) string {
 runner.questioner.Ask("Press Enter when you're ready to continue.")
 log.Printf("Let's sign in as %v...\n", userName)
 authResult, err := runner.cognitoActor.SignIn(ctx, clientId, userName, password)
 if err != nil {
  panic(err)
 }
 log.Printf("Successfully signed in. Your access token starts with: %v...\n",
 (*authResult.AccessToken)[:10])
 log.Println(strings.Repeat("-", 88))
 return *authResult.AccessToken
}

// Run runs the scenario.
func (runner *AutoConfirm) Run(ctx context.Context, stackName string) {
 defer func() {
  if r := recover(); r != nil {
   log.Println("Something went wrong with the demo.")
   runner.resources.Cleanup(ctx)
  }
 }()

 log.Println(strings.Repeat("-", 88))
 log.Printf("Welcome\n")

 log.Println(strings.Repeat("-", 88))

 stackOutputs, err := runner.helper.GetStackOutputs(ctx, stackName)
 if err != nil {
  panic(err)
 }
 runner.resources.userPoolId = stackOutputs["UserPoolId"]
 runner.helper.PopulateUserTable(ctx, stackOutputs["TableName"])

 runner.AddPreSignUpTrigger(ctx, stackOutputs["UserPoolId"],
 stackOutputs["AutoConfirmFunctionArn"])
```

```
 runner.resources.triggers = append(runner.resources.triggers, actions.PreSignUp)
 userName, password := runner.SignUpUser(ctx, stackOutputs["UserPoolClientId"],
 stackOutputs["TableName"])
 runner.helper.ListRecentLogEvents(ctx, stackOutputs["AutoConfirmFunction"])
 runner.resources.userAccessTokens = append(runner.resources.userAccessTokens,
  runner.SignInUser(ctx, stackOutputs["UserPoolClientId"], userName, password))

 runner.resources.Cleanup(ctx)

 log.Println(strings.Repeat("-", 88))
 log.Println("Thanks for watching!")
 log.Println(strings.Repeat("-", 88))
}
```

使用 Lambda 函數來處理 PreSignUp 觸發條件。

```
import (
 "context"
 "log"
 "os"

 "github.com/aws/aws-lambda-go/events"
 "github.com/aws/aws-lambda-go/lambda"
 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/config"
 "github.com/aws/aws-sdk-go-v2/feature/dynamodb/attributevalue"
 "github.com/aws/aws-sdk-go-v2/service/dynamodb"
 dynamodbtypes "github.com/aws/aws-sdk-go-v2/service/dynamodb/types"
)

const TABLE_NAME = "TABLE_NAME"

// UserInfo defines structured user data that can be marshalled to a DynamoDB
 format.
type UserInfo struct {
 UserName  string `dynamodbav:"UserName"`
 UserEmail string `dynamodbav:"UserEmail"`
}

// GetKey marshals the user email value to a DynamoDB key format.
```

```
func (user UserInfo) GetKey() map[string]dynamodbtypes.AttributeValue {
 userEmail, err := attributevalue.Marshal(user.UserEmail)
 if err != nil {
  panic(err)
 }
 return map[string]dynamodbtypes.AttributeValue{"UserEmail": userEmail}
}

type handler struct {
 dynamoClient *dynamodb.Client
}

// HandleRequest handles the PreSignUp event by looking up a user in an Amazon
 DynamoDB table and
// specifying whether they should be confirmed and verified.
func (h *handler) HandleRequest(ctx context.Context, event
 events.CognitoEventUserPoolsPreSignup) (events.CognitoEventUserPoolsPreSignup,
 error) {
 log.Printf("Received presignup from %v for user '%v'", event.TriggerSource,
 event.UserName)
 if event.TriggerSource != "PreSignUp_SignUp" {
  // Other trigger sources, such as PreSignUp_AdminInitiateAuth, ignore the response
 from this handler.
  return event, nil
 }
 tableName := os.Getenv(TABLE_NAME)
 user := UserInfo{
  UserEmail: event.Request.UserAttributes["email"],
 }
 log.Printf("Looking up email %v in table %v.\n", user.UserEmail, tableName)
 output, err := h.dynamoClient.GetItem(ctx, &dynamodb.GetItemInput{
  Key:       user.GetKey(),
  TableName: aws.String(tableName),
 })
 if err != nil {
  log.Printf("Error looking up email %v.\n", user.UserEmail)
  return event, err
 }
 if output.Item == nil {
  log.Printf("Email %v not found. Email verification is required.\n",
 user.UserEmail)
  return event, err
 }
```

```
 err = attributevalue.UnmarshalMap(output.Item, &user)
 if err != nil {
  log.Printf("Couldn't unmarshal DynamoDB item. Here's why: %v\n", err)
  return event, err
 }

 if user.UserName != event.UserName {
  log.Printf("UserEmail %v found, but stored UserName '%v' does not match supplied
 UserName '%v'. Verification is required.\n",
   user.UserEmail, user.UserName, event.UserName)
 } else {
  log.Printf("UserEmail %v found with matching UserName %v. User is confirmed.\n",
 user.UserEmail, user.UserName)
  event.Response.AutoConfirmUser = true
  event.Response.AutoVerifyEmail = true
 }

 return event, err
}

func main() {
 ctx := context.Background()
 sdkConfig, err := config.LoadDefaultConfig(ctx)
 if err != nil {
  log.Panicln(err)
 }
 h := handler{
  dynamoClient: dynamodb.NewFromConfig(sdkConfig),
 }
 lambda.Start(h.HandleRequest)
}
```

建立執行一般任務的 struct。

```
import (
 "context"
 "log"
 "strings"
 "time"
 "user_pools_and_lambda_triggers/actions"
```

```
 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/cloudformation"
 "github.com/aws/aws-sdk-go-v2/service/cloudwatchlogs"
 "github.com/aws/aws-sdk-go-v2/service/dynamodb"
 "github.com/awsdocs/aws-doc-sdk-examples/gov2/demotools"
)

// IScenarioHelper defines common functions used by the workflows in this example.
type IScenarioHelper interface {
 Pause(secs int)
 GetStackOutputs(ctx context.Context, stackName string) (actions.StackOutputs,
 error)
 PopulateUserTable(ctx context.Context, tableName string)
 GetKnownUsers(ctx context.Context, tableName string) (actions.UserList, error)
 AddKnownUser(ctx context.Context, tableName string, user actions.User)
 ListRecentLogEvents(ctx context.Context, functionName string)
}

// ScenarioHelper contains AWS wrapper structs used by the workflows in this
 example.
type ScenarioHelper struct {
 questioner  demotools.IQuestioner
 dynamoActor *actions.DynamoActions
 cfnActor    *actions.CloudFormationActions
 cwlActor    *actions.CloudWatchLogsActions
 isTestRun   bool
}

// NewScenarioHelper constructs a new scenario helper.
func NewScenarioHelper(sdkConfig aws.Config, questioner demotools.IQuestioner)
 ScenarioHelper {
 scenario := ScenarioHelper{
  questioner:  questioner,
  dynamoActor: &actions.DynamoActions{DynamoClient:
 dynamodb.NewFromConfig(sdkConfig)},
  cfnActor:    &actions.CloudFormationActions{CfnClient:
 cloudformation.NewFromConfig(sdkConfig)},
  cwlActor:    &actions.CloudWatchLogsActions{CwlClient:
 cloudwatchlogs.NewFromConfig(sdkConfig)},
 }
 return scenario
}
```

```
// Pause waits for the specified number of seconds.
func (helper ScenarioHelper) Pause(secs int) {
 if !helper.isTestRun {
  time.Sleep(time.Duration(secs) * time.Second)
 }
}

// GetStackOutputs gets the outputs from the specified CloudFormation stack in a
 structured format.
func (helper ScenarioHelper) GetStackOutputs(ctx context.Context, stackName string)
 (actions.StackOutputs, error) {
 return helper.cfnActor.GetOutputs(ctx, stackName), nil
}

// PopulateUserTable fills the known user table with example data.
func (helper ScenarioHelper) PopulateUserTable(ctx context.Context, tableName
 string) {
 log.Printf("First, let's add some users to the DynamoDB %v table we'll use for this
 example.\n", tableName)
 err := helper.dynamoActor.PopulateTable(ctx, tableName)
 if err != nil {
  panic(err)
 }
}

// GetKnownUsers gets the users from the known users table in a structured format.
func (helper ScenarioHelper) GetKnownUsers(ctx context.Context, tableName string)
 (actions.UserList, error) {
 knownUsers, err := helper.dynamoActor.Scan(ctx, tableName)
 if err != nil {
  log.Printf("Couldn't get known users from table %v. Here's why: %v\n", tableName,
 err)
 }
 return knownUsers, err
}

// AddKnownUser adds a user to the known users table.
func (helper ScenarioHelper) AddKnownUser(ctx context.Context, tableName string,
 user actions.User) {
 log.Printf("Adding user '%v' with email '%v' to the DynamoDB known users table...
\n",
  user.UserName, user.UserEmail)
 err := helper.dynamoActor.AddUser(ctx, tableName, user)
 if err != nil {
```

```
  panic(err)
 }
}

// ListRecentLogEvents gets the most recent log stream and events for the specified
 Lambda function and displays them.
func (helper ScenarioHelper) ListRecentLogEvents(ctx context.Context, functionName
 string) {
 log.Println("Waiting a few seconds to let Lambda write to CloudWatch Logs...")
 helper.Pause(10)
 log.Println("Okay, let's check the logs to find what's happened recently with your
 Lambda function.")
 logStream, err := helper.cwlActor.GetLatestLogStream(ctx, functionName)
 if err != nil {
  panic(err)
 }
 log.Printf("Getting some recent events from log stream %v\n",
 *logStream.LogStreamName)
 events, err := helper.cwlActor.GetLogEvents(ctx, functionName,
 *logStream.LogStreamName, 10)
 if err != nil {
  panic(err)
 }
 for _, event := range events {
  log.Printf("\t%v", *event.Message)
 }
 log.Println(strings.Repeat("-", 88))
}
```

建立包裝 Amazon Cognito 動作的 struct。

```
import (
 "context"
 "errors"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/cognitoidentityprovider"
 "github.com/aws/aws-sdk-go-v2/service/cognitoidentityprovider/types"
)
```

```
type CognitoActions struct {
 CognitoClient *cognitoidentityprovider.Client
}



// Trigger and TriggerInfo define typed data for updating an Amazon Cognito trigger.
type Trigger int

const (
 PreSignUp Trigger = iota
 UserMigration
 PostAuthentication
)

type TriggerInfo struct {
 Trigger    Trigger
 HandlerArn *string
}

// UpdateTriggers adds or removes Lambda triggers for a user pool. When a trigger is
 specified with a `nil` value,
// it is removed from the user pool.
func (actor CognitoActions) UpdateTriggers(ctx context.Context, userPoolId string,
 triggers ...TriggerInfo) error {
 output, err := actor.CognitoClient.DescribeUserPool(ctx,
 &cognitoidentityprovider.DescribeUserPoolInput{
  UserPoolId: aws.String(userPoolId),
 })
 if err != nil {
  log.Printf("Couldn't get info about user pool %v. Here's why: %v\n", userPoolId,
 err)
  return err
 }
 lambdaConfig := output.UserPool.LambdaConfig
 for _, trigger := range triggers {
  switch trigger.Trigger {
  case PreSignUp:
   lambdaConfig.PreSignUp = trigger.HandlerArn
  case UserMigration:
   lambdaConfig.UserMigration = trigger.HandlerArn
  case PostAuthentication:
   lambdaConfig.PostAuthentication = trigger.HandlerArn
```

```
  }
 }
 _, err = actor.CognitoClient.UpdateUserPool(ctx,
 &cognitoidentityprovider.UpdateUserPoolInput{
  UserPoolId:   aws.String(userPoolId),
  LambdaConfig: lambdaConfig,
 })
 if err != nil {
  log.Printf("Couldn't update user pool %v. Here's why: %v\n", userPoolId, err)
 }
 return err
}



// SignUp signs up a user with Amazon Cognito.
func (actor CognitoActions) SignUp(ctx context.Context, clientId string, userName
 string, password string, userEmail string) (bool, error) {
 confirmed := false
 output, err := actor.CognitoClient.SignUp(ctx,
 &cognitoidentityprovider.SignUpInput{
  ClientId: aws.String(clientId),
  Password: aws.String(password),
  Username: aws.String(userName),
  UserAttributes: []types.AttributeType{
   {Name: aws.String("email"), Value: aws.String(userEmail)},
  },
 })
 if err != nil {
  var invalidPassword *types.InvalidPasswordException
  if errors.As(err, &invalidPassword) {
   log.Println(*invalidPassword.Message)
  } else {
   log.Printf("Couldn't sign up user %v. Here's why: %v\n", userName, err)
  }
 } else {
  confirmed = output.UserConfirmed
 }
 return confirmed, err
}
```

```
// SignIn signs in a user to Amazon Cognito using a username and password
 authentication flow.
func (actor CognitoActions) SignIn(ctx context.Context, clientId string, userName
 string, password string) (*types.AuthenticationResultType, error) {
 var authResult *types.AuthenticationResultType
 output, err := actor.CognitoClient.InitiateAuth(ctx,
 &cognitoidentityprovider.InitiateAuthInput{
  AuthFlow:       "USER_PASSWORD_AUTH",
  ClientId:       aws.String(clientId),
  AuthParameters: map[string]string{"USERNAME": userName, "PASSWORD": password},
 })
 if err != nil {
  var resetRequired *types.PasswordResetRequiredException
  if errors.As(err, &resetRequired) {
   log.Println(*resetRequired.Message)
  } else {
   log.Printf("Couldn't sign in user %v. Here's why: %v\n", userName, err)
  }
 } else {
  authResult = output.AuthenticationResult
 }
 return authResult, err
}



// ForgotPassword starts a password recovery flow for a user. This flow typically
 sends a confirmation code
// to the user's configured notification destination, such as email.
func (actor CognitoActions) ForgotPassword(ctx context.Context, clientId string,
 userName string) (*types.CodeDeliveryDetailsType, error) {
 output, err := actor.CognitoClient.ForgotPassword(ctx,
 &cognitoidentityprovider.ForgotPasswordInput{
  ClientId: aws.String(clientId),
  Username: aws.String(userName),
 })
 if err != nil {
  log.Printf("Couldn't start password reset for user '%v'. Here;s why: %v\n",
 userName, err)
 }
 return output.CodeDeliveryDetails, err
}
```

```
// ConfirmForgotPassword confirms a user with a confirmation code and a new
 password.
func (actor CognitoActions) ConfirmForgotPassword(ctx context.Context, clientId
 string, code string, userName string, password string) error {
 _, err := actor.CognitoClient.ConfirmForgotPassword(ctx,
 &cognitoidentityprovider.ConfirmForgotPasswordInput{
  ClientId:         aws.String(clientId),
  ConfirmationCode: aws.String(code),
  Password:         aws.String(password),
  Username:         aws.String(userName),
 })
 if err != nil {
  var invalidPassword *types.InvalidPasswordException
  if errors.As(err, &invalidPassword) {
   log.Println(*invalidPassword.Message)
  } else {
   log.Printf("Couldn't confirm user %v. Here's why: %v", userName, err)
  }
 }
 return err
}



// DeleteUser removes a user from the user pool.
func (actor CognitoActions) DeleteUser(ctx context.Context, userAccessToken string)
 error {
 _, err := actor.CognitoClient.DeleteUser(ctx,
 &cognitoidentityprovider.DeleteUserInput{
  AccessToken: aws.String(userAccessToken),
 })
 if err != nil {
  log.Printf("Couldn't delete user. Here's why: %v\n", err)
 }
 return err
}



// AdminCreateUser uses administrator credentials to add a user to a user pool. This
 method leaves the user
// in a state that requires they enter a new password next time they sign in.
```

```
func (actor CognitoActions) AdminCreateUser(ctx context.Context, userPoolId string,
 userName string, userEmail string) error {
 _, err := actor.CognitoClient.AdminCreateUser(ctx,
 &cognitoidentityprovider.AdminCreateUserInput{
  UserPoolId:     aws.String(userPoolId),
  Username:       aws.String(userName),
  MessageAction:  types.MessageActionTypeSuppress,
  UserAttributes: []types.AttributeType{{Name: aws.String("email"), Value:
 aws.String(userEmail)}},
 })
 if err != nil {
  var userExists *types.UsernameExistsException
  if errors.As(err, &userExists) {
   log.Printf("User %v already exists in the user pool.", userName)
   err = nil
  } else {
   log.Printf("Couldn't create user %v. Here's why: %v\n", userName, err)
  }
 }
 return err
}



// AdminSetUserPassword uses administrator credentials to set a password for a user
 without requiring a
// temporary password.
func (actor CognitoActions) AdminSetUserPassword(ctx context.Context, userPoolId
 string, userName string, password string) error {
 _, err := actor.CognitoClient.AdminSetUserPassword(ctx,
 &cognitoidentityprovider.AdminSetUserPasswordInput{
  Password:   aws.String(password),
  UserPoolId: aws.String(userPoolId),
  Username:   aws.String(userName),
  Permanent:  true,
 })
 if err != nil {
  var invalidPassword *types.InvalidPasswordException
  if errors.As(err, &invalidPassword) {
   log.Println(*invalidPassword.Message)
  } else {
   log.Printf("Couldn't set password for user %v. Here's why: %v\n", userName, err)
  }
 }
```

```
 return err
}
```

建立包裝 DynamoDB 動作的 struct。

```
import (
 "context"
 "fmt"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/feature/dynamodb/attributevalue"
 "github.com/aws/aws-sdk-go-v2/service/dynamodb"
 "github.com/aws/aws-sdk-go-v2/service/dynamodb/types"
)

// DynamoActions encapsulates the Amazon Simple Notification Service (Amazon SNS)
 actions
// used in the examples.
type DynamoActions struct {
 DynamoClient *dynamodb.Client
}

// User defines structured user data.
type User struct {
 UserName  string
 UserEmail string
 LastLogin *LoginInfo `dynamodbav:",omitempty"`
}

// LoginInfo defines structured custom login data.
type LoginInfo struct {
 UserPoolId string
 ClientId   string
 Time       string
}

// UserList defines a list of users.
type UserList struct {
 Users []User
```

```
}

// UserNameList returns the usernames contained in a UserList as a list of strings.
func (users *UserList) UserNameList() []string {
 names := make([]string, len(users.Users))
 for i := 0; i < len(users.Users); i++ {
  names[i] = users.Users[i].UserName
 }
 return names
}

// PopulateTable adds a set of test users to the table.
func (actor DynamoActions) PopulateTable(ctx context.Context, tableName string)
 error {
 var err error
 var item map[string]types.AttributeValue
 var writeReqs []types.WriteRequest
 for i := 1; i < 4; i++ {
  item, err = attributevalue.MarshalMap(User{UserName: fmt.Sprintf("test_user_%v",
 i), UserEmail: fmt.Sprintf("test_email_%v@example.com", i)})
  if err != nil {
   log.Printf("Couldn't marshall user into DynamoDB format. Here's why: %v\n", err)
   return err
  }
  writeReqs = append(writeReqs, types.WriteRequest{PutRequest:
 &types.PutRequest{Item: item}})
 }
 _, err = actor.DynamoClient.BatchWriteItem(ctx, &dynamodb.BatchWriteItemInput{
  RequestItems: map[string][]types.WriteRequest{tableName: writeReqs},
 })
 if err != nil {
  log.Printf("Couldn't populate table %v with users. Here's why: %v\n", tableName,
 err)
 }
 return err
}

// Scan scans the table for all items.
func (actor DynamoActions) Scan(ctx context.Context, tableName string) (UserList,
 error) {
 var userList UserList
 output, err := actor.DynamoClient.Scan(ctx, &dynamodb.ScanInput{
  TableName: aws.String(tableName),
 })
```

```
 if err != nil {
  log.Printf("Couldn't scan table %v for items. Here's why: %v\n", tableName, err)
 } else {
  err = attributevalue.UnmarshalListOfMaps(output.Items, &userList.Users)
  if err != nil {
   log.Printf("Couldn't unmarshal items into users. Here's why: %v\n", err)
  }
 }
 return userList, err
}

// AddUser adds a user item to a table.
func (actor DynamoActions) AddUser(ctx context.Context, tableName string, user User)
 error {
 userItem, err := attributevalue.MarshalMap(user)
 if err != nil {
  log.Printf("Couldn't marshall user to item. Here's why: %v\n", err)
 }
 _, err = actor.DynamoClient.PutItem(ctx, &dynamodb.PutItemInput{
  Item:      userItem,
  TableName: aws.String(tableName),
 })
 if err != nil {
  log.Printf("Couldn't put item in table %v. Here's why: %v", tableName, err)
 }
 return err
}
```

建立包裝 CloudWatch Logs 動作的 struct。

```
import (
 "context"
 "fmt"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/cloudwatchlogs"
 "github.com/aws/aws-sdk-go-v2/service/cloudwatchlogs/types"
)
```

```
type CloudWatchLogsActions struct {
 CwlClient *cloudwatchlogs.Client
}

// GetLatestLogStream gets the most recent log stream for a Lambda function.
func (actor CloudWatchLogsActions) GetLatestLogStream(ctx context.Context,
 functionName string) (types.LogStream, error) {
 var logStream types.LogStream
 logGroupName := fmt.Sprintf("/aws/lambda/%s", functionName)
 output, err := actor.CwlClient.DescribeLogStreams(ctx,
 &cloudwatchlogs.DescribeLogStreamsInput{
  Descending:   aws.Bool(true),
  Limit:        aws.Int32(1),
  LogGroupName: aws.String(logGroupName),
  OrderBy:      types.OrderByLastEventTime,
 })
 if err != nil {
  log.Printf("Couldn't get log streams for log group %v. Here's why: %v\n",
 logGroupName, err)
 } else {
  logStream = output.LogStreams[0]
 }
 return logStream, err
}

// GetLogEvents gets the most recent eventCount events from the specified log
 stream.
func (actor CloudWatchLogsActions) GetLogEvents(ctx context.Context, functionName
 string, logStreamName string, eventCount int32) (
 []types.OutputLogEvent, error) {
 var events []types.OutputLogEvent
 logGroupName := fmt.Sprintf("/aws/lambda/%s", functionName)
 output, err := actor.CwlClient.GetLogEvents(ctx, &cloudwatchlogs.GetLogEventsInput{
  LogStreamName: aws.String(logStreamName),
  Limit:         aws.Int32(eventCount),
  LogGroupName:  aws.String(logGroupName),
 })
 if err != nil {
  log.Printf("Couldn't get log event for log stream %v. Here's why: %v\n",
 logStreamName, err)
 } else {
  events = output.Events
 }
 return events, err
```

```
}
```

建立包裝 CloudFormation 動作的結構。

```
import (
 "context"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/cloudformation"
)

// StackOutputs defines a map of outputs from a specific stack.
type StackOutputs map[string]string

type CloudFormationActions struct {
 CfnClient *cloudformation.Client
}

// GetOutputs gets the outputs from a CloudFormation stack and puts them into a
 structured format.
func (actor CloudFormationActions) GetOutputs(ctx context.Context, stackName string)
 StackOutputs {
 output, err := actor.CfnClient.DescribeStacks(ctx,
 &cloudformation.DescribeStacksInput{
  StackName: aws.String(stackName),
 })
 if err != nil || len(output.Stacks) == 0 {
  log.Panicf("Couldn't find a CloudFormation stack named %v. Here's why: %v\n",
 stackName, err)
 }
 stackOutputs := StackOutputs{}
 for _, out := range output.Stacks[0].Outputs {
  stackOutputs[*out.OutputKey] = *out.OutputValue
 }
 return stackOutputs
}
```

清除資源。

```
import (
 "context"
 "log"
 "user_pools_and_lambda_triggers/actions"

 "github.com/awsdocs/aws-doc-sdk-examples/gov2/demotools"
)

// Resources keeps track of AWS resources created during an example and handles
// cleanup when the example finishes.
type Resources struct {
 userPoolId       string
 userAccessTokens []string
 triggers         []actions.Trigger

 cognitoActor *actions.CognitoActions
 questioner   demotools.IQuestioner
}

func (resources *Resources) init(cognitoActor *actions.CognitoActions, questioner
 demotools.IQuestioner) {
 resources.userAccessTokens = []string{}
 resources.triggers = []actions.Trigger{}
 resources.cognitoActor = cognitoActor
 resources.questioner = questioner
}

// Cleanup deletes all AWS resources created during an example.
func (resources *Resources) Cleanup(ctx context.Context) {
 defer func() {
  if r := recover(); r != nil {
   log.Printf("Something went wrong during cleanup.\n%v\n", r)
   log.Println("Use the AWS Management Console to remove any remaining resources \n"
 +
    "that were created for this scenario.")
  }
 }()

 wantDelete := resources.questioner.AskBool("Do you want to remove all of the AWS
 resources that were created "+
  "during this demo (y/n)?", "y")
```

```
 if wantDelete {
  for _, accessToken := range resources.userAccessTokens {
   err := resources.cognitoActor.DeleteUser(ctx, accessToken)
   if err != nil {
    log.Println("Couldn't delete user during cleanup.")
    panic(err)
   }
   log.Println("Deleted user.")
  }
  triggerList := make([]actions.TriggerInfo, len(resources.triggers))
  for i := 0; i < len(resources.triggers); i++ {
   triggerList[i] = actions.TriggerInfo{Trigger: resources.triggers[i], HandlerArn:
 nil}
  }
  err := resources.cognitoActor.UpdateTriggers(ctx, resources.userPoolId,
 triggerList...)
  if err != nil {
   log.Println("Couldn't update Cognito triggers during cleanup.")
   panic(err)
  }
  log.Println("Removed Cognito triggers from user pool.")
 } else {
  log.Println("Be sure to remove resources when you're done with them to avoid
 unexpected charges!")
 }
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的下列主題。
  - DeleteUser
  - InitiateAuth
  - SignUp
  - UpdateUserPool

使用 Lambda 函數自動遷移已知使用者

下列程式碼範例示範如何使用 Lambda 函數自動遷移已知的 Amazon Cognito 使用者。

- 設定使用者集區以呼叫 `MigrateUser` 觸發條件的 Lambda 函數。
- 使用不在使用者集區中的使用者名稱和電子郵件登入 Amazon Cognito。

- Lambda 函數會掃描 DynamoDB 資料表，並自動將已知使用者遷移至使用者集區。
- 執行忘記密碼流程，重設已遷移使用者的密碼。
- 以新使用者身分登入，然後清除資源。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，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。

```
import (
 "context"
 "errors"
 "fmt"
 "log"
 "strings"
 "user_pools_and_lambda_triggers/actions"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/cognitoidentityprovider"
 "github.com/aws/aws-sdk-go-v2/service/cognitoidentityprovider/types"
 "github.com/awsdocs/aws-doc-sdk-examples/gov2/demotools"
)

// MigrateUser separates the steps of this scenario into individual functions so
 that
// they are simpler to read and understand.
type MigrateUser struct {
 helper       IScenarioHelper
 questioner   demotools.IQuestioner
 resources    Resources
 cognitoActor *actions.CognitoActions
}

// NewMigrateUser constructs a new migrate user runner.
```

```
func NewMigrateUser(sdkConfig aws.Config, questioner demotools.IQuestioner, helper
 IScenarioHelper) MigrateUser {
 scenario := MigrateUser{
  helper:       helper,
  questioner:   questioner,
  resources:    Resources{},
  cognitoActor: &actions.CognitoActions{CognitoClient:
 cognitoidentityprovider.NewFromConfig(sdkConfig)},
 }
 scenario.resources.init(scenario.cognitoActor, questioner)
 return scenario
}

// AddMigrateUserTrigger adds a Lambda handler as an invocation target for the
 MigrateUser trigger.
func (runner *MigrateUser) AddMigrateUserTrigger(ctx context.Context, userPoolId
 string, functionArn string) {
 log.Printf("Let's add a Lambda function to handle the MigrateUser trigger from
 Cognito.\n" +
  "This trigger happens when an unknown user signs in, and lets your function take
 action before Cognito\n" +
  "rejects the user.\n\n")
 err := runner.cognitoActor.UpdateTriggers(
  ctx, userPoolId,
  actions.TriggerInfo{Trigger: actions.UserMigration, HandlerArn:
 aws.String(functionArn)})
 if err != nil {
  panic(err)
 }
 log.Printf("Lambda function %v added to user pool %v to handle the MigrateUser
 trigger.\n",
  functionArn, userPoolId)

 log.Println(strings.Repeat("-", 88))
}

// SignInUser adds a new user to the known users table and signs that user in to
 Amazon Cognito.
func (runner *MigrateUser) SignInUser(ctx context.Context, usersTable string,
 clientId string) (bool, actions.User) {
 log.Println("Let's sign in a user to your Cognito user pool. When the username and
 email matches an entry in the\n" +
  "DynamoDB known users table, the email is automatically verified and the user is
 migrated to the Cognito user pool.")
```

```
 user := actions.User{}
 user.UserName = runner.questioner.Ask("\nEnter a username:")
 user.UserEmail = runner.questioner.Ask("\nEnter an email that you own. This email
 will be used to confirm user migration\n" +
  "during this example:")

 runner.helper.AddKnownUser(ctx, usersTable, user)

 var err error
 var resetRequired *types.PasswordResetRequiredException
 var authResult *types.AuthenticationResultType
 signedIn := false
 for !signedIn && resetRequired == nil {
  log.Printf("Signing in to Cognito as user '%v'. The expected result is a
 PasswordResetRequiredException.\n\n", user.UserName)
  authResult, err = runner.cognitoActor.SignIn(ctx, clientId, user.UserName, "_")
  if err != nil {
   if errors.As(err, &resetRequired) {
    log.Printf("\nUser '%v' is not in the Cognito user pool but was found in the
 DynamoDB known users table.\n"+
     "User migration is started and a password reset is required.", user.UserName)
   } else {
    panic(err)
   }
  } else {
   log.Printf("User '%v' successfully signed in. This is unexpected and probably
 means you have not\n"+
    "cleaned up a previous run of this scenario, so the user exist in the Cognito
 user pool.\n"+
    "You can continue this example and select to clean up resources, or manually
 remove\n"+
    "the user from your user pool and try again.", user.UserName)
   runner.resources.userAccessTokens = append(runner.resources.userAccessTokens,
 *authResult.AccessToken)
   signedIn = true
  }
 }

 log.Println(strings.Repeat("-", 88))
 return resetRequired != nil, user
}

// ResetPassword starts a password recovery flow.
```

```
func (runner *MigrateUser) ResetPassword(ctx context.Context, clientId string, user
 actions.User) {
 wantCode := runner.questioner.AskBool(fmt.Sprintf("In order to migrate the user to
 Cognito, you must be able to receive a confirmation\n"+
  "code by email at %v. Do you want to send a code (y/n)?", user.UserEmail), "y")
 if !wantCode {
  log.Println("To complete this example and successfully migrate a user to Cognito,
 you must enter an email\n" +
   "you own that can receive a confirmation code.")
  return
 }
 codeDelivery, err := runner.cognitoActor.ForgotPassword(ctx, clientId,
 user.UserName)
 if err != nil {
  panic(err)
 }
 log.Printf("\nA confirmation code has been sent to %v.", *codeDelivery.Destination)
 code := runner.questioner.Ask("Check your email and enter it here:")

 confirmed := false
 password := runner.questioner.AskPassword("\nEnter a password that has at least
 eight characters, uppercase, lowercase, numbers and symbols.\n"+
  "(the password will not display as you type):", 8)
 for !confirmed {
  log.Printf("\nConfirming password reset for user '%v'.\n", user.UserName)
  err = runner.cognitoActor.ConfirmForgotPassword(ctx, clientId, code,
 user.UserName, password)
  if err != nil {
   var invalidPassword *types.InvalidPasswordException
   if errors.As(err, &invalidPassword) {
    password = runner.questioner.AskPassword("\nEnter another password:", 8)
   } else {
    panic(err)
   }
  } else {
   confirmed = true
  }
 }
 log.Printf("User '%v' successfully confirmed and migrated.\n", user.UserName)
 log.Println("Signing in with your username and password...")
 authResult, err := runner.cognitoActor.SignIn(ctx, clientId, user.UserName,
 password)
 if err != nil {
  panic(err)
```

```
 }
 log.Printf("Successfully signed in. Your access token starts with: %v...\n",
 (*authResult.AccessToken)[:10])
 runner.resources.userAccessTokens = append(runner.resources.userAccessTokens,
 *authResult.AccessToken)

 log.Println(strings.Repeat("-", 88))
}

// Run runs the scenario.
func (runner *MigrateUser) Run(ctx context.Context, stackName string) {
 defer func() {
  if r := recover(); r != nil {
   log.Println("Something went wrong with the demo.")
   runner.resources.Cleanup(ctx)
  }
 }()

 log.Println(strings.Repeat("-", 88))
 log.Printf("Welcome\n")

 log.Println(strings.Repeat("-", 88))

 stackOutputs, err := runner.helper.GetStackOutputs(ctx, stackName)
 if err != nil {
  panic(err)
 }
 runner.resources.userPoolId = stackOutputs["UserPoolId"]

 runner.AddMigrateUserTrigger(ctx, stackOutputs["UserPoolId"],
 stackOutputs["MigrateUserFunctionArn"])
 runner.resources.triggers = append(runner.resources.triggers,
 actions.UserMigration)
 resetNeeded, user := runner.SignInUser(ctx, stackOutputs["TableName"],
 stackOutputs["UserPoolClientId"])
 if resetNeeded {
  runner.helper.ListRecentLogEvents(ctx, stackOutputs["MigrateUserFunction"])
  runner.ResetPassword(ctx, stackOutputs["UserPoolClientId"], user)
 }

 runner.resources.Cleanup(ctx)

 log.Println(strings.Repeat("-", 88))
 log.Println("Thanks for watching!")
```

```
 log.Println(strings.Repeat("-", 88))
}
```

使用 Lambda 函數來處理 MigrateUser 觸發條件。

```
import (
 "context"
 "log"
 "os"

 "github.com/aws/aws-lambda-go/events"
 "github.com/aws/aws-lambda-go/lambda"
 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/config"
 "github.com/aws/aws-sdk-go-v2/feature/dynamodb/attributevalue"
 "github.com/aws/aws-sdk-go-v2/feature/dynamodb/expression"
 "github.com/aws/aws-sdk-go-v2/service/dynamodb"
)

const TABLE_NAME = "TABLE_NAME"

// UserInfo defines structured user data that can be marshalled to a DynamoDB
 format.
type UserInfo struct {
 UserName  string `dynamodbav:"UserName"`
 UserEmail string `dynamodbav:"UserEmail"`
}

type handler struct {
 dynamoClient *dynamodb.Client
}

// HandleRequest handles the MigrateUser event by looking up a user in an Amazon
 DynamoDB table and
// specifying whether they should be migrated to the user pool.
func (h *handler) HandleRequest(ctx context.Context, event
 events.CognitoEventUserPoolsMigrateUser) (events.CognitoEventUserPoolsMigrateUser,
 error) {
 log.Printf("Received migrate trigger from %v for user '%v'", event.TriggerSource,
 event.UserName)
```

```
if event.TriggerSource != "UserMigration_Authentication" {
 return event, nil
}
tableName := os.Getenv(TABLE_NAME)
user := UserInfo{
 UserName: event.UserName,
}
log.Printf("Looking up user '%v' in table %v.\n", user.UserName, tableName)
filterEx := expression.Name("UserName").Equal(expression.Value(user.UserName))
expr, err := expression.NewBuilder().WithFilter(filterEx).Build()
if err != nil {
 log.Printf("Error building expression to query for user '%v'.\n", user.UserName)
 return event, err
}
output, err := h.dynamoClient.Scan(ctx, &dynamodb.ScanInput{
 TableName:                 aws.String(tableName),
 FilterExpression:          expr.Filter(),
 ExpressionAttributeNames:  expr.Names(),
 ExpressionAttributeValues: expr.Values(),
})
if err != nil {
 log.Printf("Error looking up user '%v'.\n", user.UserName)
 return event, err
}
if len(output.Items) == 0 {
 log.Printf("User '%v' not found, not migrating user.\n", user.UserName)
 return event, err
}

var users []UserInfo
err = attributevalue.UnmarshalListOfMaps(output.Items, &users)
if err != nil {
 log.Printf("Couldn't unmarshal DynamoDB items. Here's why: %v\n", err)
 return event, err
}

user = users[0]
log.Printf("UserName '%v' found with email %v. User is migrated and must reset
password.\n", user.UserName, user.UserEmail)
event.CognitoEventUserPoolsMigrateUserResponse.UserAttributes = map[string]string{
 "email":          user.UserEmail,
 "email_verified": "true", // email_verified is required for the forgot password
flow.
}
```

```
 event.CognitoEventUserPoolsMigrateUserResponse.FinalUserStatus = "RESET_REQUIRED"
 event.CognitoEventUserPoolsMigrateUserResponse.MessageAction = "SUPPRESS"

 return event, err
}

func main() {
 ctx := context.Background()
 sdkConfig, err := config.LoadDefaultConfig(ctx)
 if err != nil {
  log.Panicln(err)
 }
 h := handler{
  dynamoClient: dynamodb.NewFromConfig(sdkConfig),
 }
 lambda.Start(h.HandleRequest)
}
```

建立執行一般任務的 struct。

```
import (
 "context"
 "log"
 "strings"
 "time"
 "user_pools_and_lambda_triggers/actions"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/cloudformation"
 "github.com/aws/aws-sdk-go-v2/service/cloudwatchlogs"
 "github.com/aws/aws-sdk-go-v2/service/dynamodb"
 "github.com/awsdocs/aws-doc-sdk-examples/gov2/demotools"
)

// IScenarioHelper defines common functions used by the workflows in this example.
type IScenarioHelper interface {
 Pause(secs int)
 GetStackOutputs(ctx context.Context, stackName string) (actions.StackOutputs,
 error)
 PopulateUserTable(ctx context.Context, tableName string)
```

```
 GetKnownUsers(ctx context.Context, tableName string) (actions.UserList, error)
 AddKnownUser(ctx context.Context, tableName string, user actions.User)
 ListRecentLogEvents(ctx context.Context, functionName string)
}

// ScenarioHelper contains AWS wrapper structs used by the workflows in this
 example.
type ScenarioHelper struct {
 questioner  demotools.IQuestioner
 dynamoActor *actions.DynamoActions
 cfnActor    *actions.CloudFormationActions
 cwlActor    *actions.CloudWatchLogsActions
 isTestRun   bool
}

// NewScenarioHelper constructs a new scenario helper.
func NewScenarioHelper(sdkConfig aws.Config, questioner demotools.IQuestioner)
 ScenarioHelper {
 scenario := ScenarioHelper{
  questioner:  questioner,
  dynamoActor: &actions.DynamoActions{DynamoClient:
 dynamodb.NewFromConfig(sdkConfig)},
  cfnActor:    &actions.CloudFormationActions{CfnClient:
 cloudformation.NewFromConfig(sdkConfig)},
  cwlActor:    &actions.CloudWatchLogsActions{CwlClient:
 cloudwatchlogs.NewFromConfig(sdkConfig)},
 }
 return scenario
}

// Pause waits for the specified number of seconds.
func (helper ScenarioHelper) Pause(secs int) {
 if !helper.isTestRun {
  time.Sleep(time.Duration(secs) * time.Second)
 }
}

// GetStackOutputs gets the outputs from the specified CloudFormation stack in a
 structured format.
func (helper ScenarioHelper) GetStackOutputs(ctx context.Context, stackName string)
 (actions.StackOutputs, error) {
 return helper.cfnActor.GetOutputs(ctx, stackName), nil
}
```

```
// PopulateUserTable fills the known user table with example data.
func (helper ScenarioHelper) PopulateUserTable(ctx context.Context, tableName
 string) {
 log.Printf("First, let's add some users to the DynamoDB %v table we'll use for this
 example.\n", tableName)
 err := helper.dynamoActor.PopulateTable(ctx, tableName)
 if err != nil {
  panic(err)
 }
}

// GetKnownUsers gets the users from the known users table in a structured format.
func (helper ScenarioHelper) GetKnownUsers(ctx context.Context, tableName string)
 (actions.UserList, error) {
 knownUsers, err := helper.dynamoActor.Scan(ctx, tableName)
 if err != nil {
  log.Printf("Couldn't get known users from table %v. Here's why: %v\n", tableName,
 err)
 }
 return knownUsers, err
}

// AddKnownUser adds a user to the known users table.
func (helper ScenarioHelper) AddKnownUser(ctx context.Context, tableName string,
 user actions.User) {
 log.Printf("Adding user '%v' with email '%v' to the DynamoDB known users table...
\n",
  user.UserName, user.UserEmail)
 err := helper.dynamoActor.AddUser(ctx, tableName, user)
 if err != nil {
  panic(err)
 }
}

// ListRecentLogEvents gets the most recent log stream and events for the specified
 Lambda function and displays them.
func (helper ScenarioHelper) ListRecentLogEvents(ctx context.Context, functionName
 string) {
 log.Println("Waiting a few seconds to let Lambda write to CloudWatch Logs...")
 helper.Pause(10)
 log.Println("Okay, let's check the logs to find what's happened recently with your
 Lambda function.")
 logStream, err := helper.cwlActor.GetLatestLogStream(ctx, functionName)
 if err != nil {
```

```
  panic(err)
 }
 log.Printf("Getting some recent events from log stream %v\n",
 *logStream.LogStreamName)
 events, err := helper.cwlActor.GetLogEvents(ctx, functionName,
 *logStream.LogStreamName, 10)
 if err != nil {
  panic(err)
 }
 for _, event := range events {
  log.Printf("\t%v", *event.Message)
 }
 log.Println(strings.Repeat("-", 88))
}
```

建立包裝 Amazon Cognito 動作的 struct。

```
import (
 "context"
 "errors"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/cognitoidentityprovider"
 "github.com/aws/aws-sdk-go-v2/service/cognitoidentityprovider/types"
)

type CognitoActions struct {
 CognitoClient *cognitoidentityprovider.Client
}



// Trigger and TriggerInfo define typed data for updating an Amazon Cognito trigger.
type Trigger int

const (
 PreSignUp Trigger = iota
 UserMigration
 PostAuthentication
```

```
)

type TriggerInfo struct {
 Trigger    Trigger
 HandlerArn *string
}

// UpdateTriggers adds or removes Lambda triggers for a user pool. When a trigger is
 specified with a `nil` value,
// it is removed from the user pool.
func (actor CognitoActions) UpdateTriggers(ctx context.Context, userPoolId string,
 triggers ...TriggerInfo) error {
 output, err := actor.CognitoClient.DescribeUserPool(ctx,
 &cognitoidentityprovider.DescribeUserPoolInput{
  UserPoolId: aws.String(userPoolId),
 })
 if err != nil {
  log.Printf("Couldn't get info about user pool %v. Here's why: %v\n", userPoolId,
 err)
  return err
 }
 lambdaConfig := output.UserPool.LambdaConfig
 for _, trigger := range triggers {
  switch trigger.Trigger {
  case PreSignUp:
   lambdaConfig.PreSignUp = trigger.HandlerArn
  case UserMigration:
   lambdaConfig.UserMigration = trigger.HandlerArn
  case PostAuthentication:
   lambdaConfig.PostAuthentication = trigger.HandlerArn
  }
 }
 _, err = actor.CognitoClient.UpdateUserPool(ctx,
 &cognitoidentityprovider.UpdateUserPoolInput{
  UserPoolId:   aws.String(userPoolId),
  LambdaConfig: lambdaConfig,
 })
 if err != nil {
  log.Printf("Couldn't update user pool %v. Here's why: %v\n", userPoolId, err)
 }
 return err
}
```

```
// SignUp signs up a user with Amazon Cognito.
func (actor CognitoActions) SignUp(ctx context.Context, clientId string, userName
 string, password string, userEmail string) (bool, error) {
 confirmed := false
 output, err := actor.CognitoClient.SignUp(ctx,
 &cognitoidentityprovider.SignUpInput{
  ClientId: aws.String(clientId),
  Password: aws.String(password),
  Username: aws.String(userName),
  UserAttributes: []types.AttributeType{
   {Name: aws.String("email"), Value: aws.String(userEmail)},
  },
 })
 if err != nil {
  var invalidPassword *types.InvalidPasswordException
  if errors.As(err, &invalidPassword) {
   log.Println(*invalidPassword.Message)
  } else {
   log.Printf("Couldn't sign up user %v. Here's why: %v\n", userName, err)
  }
 } else {
  confirmed = output.UserConfirmed
 }
 return confirmed, err
}



// SignIn signs in a user to Amazon Cognito using a username and password
 authentication flow.
func (actor CognitoActions) SignIn(ctx context.Context, clientId string, userName
 string, password string) (*types.AuthenticationResultType, error) {
 var authResult *types.AuthenticationResultType
 output, err := actor.CognitoClient.InitiateAuth(ctx,
 &cognitoidentityprovider.InitiateAuthInput{
  AuthFlow:       "USER_PASSWORD_AUTH",
  ClientId:       aws.String(clientId),
  AuthParameters: map[string]string{"USERNAME": userName, "PASSWORD": password},
 })
 if err != nil {
  var resetRequired *types.PasswordResetRequiredException
  if errors.As(err, &resetRequired) {
   log.Println(*resetRequired.Message)
```

```
  } else {
   log.Printf("Couldn't sign in user %v. Here's why: %v\n", userName, err)
  }
 } else {
  authResult = output.AuthenticationResult
 }
 return authResult, err
}



// ForgotPassword starts a password recovery flow for a user. This flow typically
 sends a confirmation code
// to the user's configured notification destination, such as email.
func (actor CognitoActions) ForgotPassword(ctx context.Context, clientId string,
 userName string) (*types.CodeDeliveryDetailsType, error) {
 output, err := actor.CognitoClient.ForgotPassword(ctx,
 &cognitoidentityprovider.ForgotPasswordInput{
  ClientId: aws.String(clientId),
  Username: aws.String(userName),
 })
 if err != nil {
  log.Printf("Couldn't start password reset for user '%v'. Here;s why: %v\n",
 userName, err)
 }
 return output.CodeDeliveryDetails, err
}



// ConfirmForgotPassword confirms a user with a confirmation code and a new
 password.
func (actor CognitoActions) ConfirmForgotPassword(ctx context.Context, clientId
 string, code string, userName string, password string) error {
 _, err := actor.CognitoClient.ConfirmForgotPassword(ctx,
 &cognitoidentityprovider.ConfirmForgotPasswordInput{
  ClientId:         aws.String(clientId),
  ConfirmationCode: aws.String(code),
  Password:         aws.String(password),
  Username:         aws.String(userName),
 })
 if err != nil {
  var invalidPassword *types.InvalidPasswordException
  if errors.As(err, &invalidPassword) {
```

```
   log.Println(*invalidPassword.Message)
  } else {
   log.Printf("Couldn't confirm user %v. Here's why: %v", userName, err)
  }
 }
 return err
}



// DeleteUser removes a user from the user pool.
func (actor CognitoActions) DeleteUser(ctx context.Context, userAccessToken string)
 error {
 _, err := actor.CognitoClient.DeleteUser(ctx,
 &cognitoidentityprovider.DeleteUserInput{
  AccessToken: aws.String(userAccessToken),
 })
 if err != nil {
  log.Printf("Couldn't delete user. Here's why: %v\n", err)
 }
 return err
}



// AdminCreateUser uses administrator credentials to add a user to a user pool. This
 method leaves the user
// in a state that requires they enter a new password next time they sign in.
func (actor CognitoActions) AdminCreateUser(ctx context.Context, userPoolId string,
 userName string, userEmail string) error {
 _, err := actor.CognitoClient.AdminCreateUser(ctx,
 &cognitoidentityprovider.AdminCreateUserInput{
  UserPoolId:     aws.String(userPoolId),
  Username:       aws.String(userName),
  MessageAction:  types.MessageActionTypeSuppress,
  UserAttributes: []types.AttributeType{{Name: aws.String("email"), Value:
 aws.String(userEmail)}},
 })
 if err != nil {
  var userExists *types.UsernameExistsException
  if errors.As(err, &userExists) {
   log.Printf("User %v already exists in the user pool.", userName)
   err = nil
  } else {
```

```
   log.Printf("Couldn't create user %v. Here's why: %v\n", userName, err)
  }
 }
 return err
}



// AdminSetUserPassword uses administrator credentials to set a password for a user
 without requiring a
// temporary password.
func (actor CognitoActions) AdminSetUserPassword(ctx context.Context, userPoolId
 string, userName string, password string) error {
 _, err := actor.CognitoClient.AdminSetUserPassword(ctx,
 &cognitoidentityprovider.AdminSetUserPasswordInput{
  Password:   aws.String(password),
  UserPoolId: aws.String(userPoolId),
  Username:   aws.String(userName),
  Permanent:  true,
 })
 if err != nil {
  var invalidPassword *types.InvalidPasswordException
  if errors.As(err, &invalidPassword) {
   log.Println(*invalidPassword.Message)
  } else {
   log.Printf("Couldn't set password for user %v. Here's why: %v\n", userName, err)
  }
 }
 return err
}
```

建立包裝 DynamoDB 動作的 struct。

```
import (
 "context"
 "fmt"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/feature/dynamodb/attributevalue"
```

```
 "github.com/aws/aws-sdk-go-v2/service/dynamodb"
 "github.com/aws/aws-sdk-go-v2/service/dynamodb/types"
)

// DynamoActions encapsulates the Amazon Simple Notification Service (Amazon SNS)
 actions
// used in the examples.
type DynamoActions struct {
 DynamoClient *dynamodb.Client
}

// User defines structured user data.
type User struct {
 UserName  string
 UserEmail string
 LastLogin *LoginInfo `dynamodbav:",omitempty"`
}

// LoginInfo defines structured custom login data.
type LoginInfo struct {
 UserPoolId string
 ClientId   string
 Time       string
}

// UserList defines a list of users.
type UserList struct {
 Users []User
}

// UserNameList returns the usernames contained in a UserList as a list of strings.
func (users *UserList) UserNameList() []string {
 names := make([]string, len(users.Users))
 for i := 0; i < len(users.Users); i++ {
  names[i] = users.Users[i].UserName
 }
 return names
}

// PopulateTable adds a set of test users to the table.
func (actor DynamoActions) PopulateTable(ctx context.Context, tableName string)
 error {
 var err error
 var item map[string]types.AttributeValue
```

```
 var writeReqs []types.WriteRequest
 for i := 1; i < 4; i++ {
  item, err = attributevalue.MarshalMap(User{UserName: fmt.Sprintf("test_user_%v",
 i), UserEmail: fmt.Sprintf("test_email_%v@example.com", i)})
  if err != nil {
   log.Printf("Couldn't marshall user into DynamoDB format. Here's why: %v\n", err)
   return err
  }
  writeReqs = append(writeReqs, types.WriteRequest{PutRequest:
 &types.PutRequest{Item: item}})
 }
 _, err = actor.DynamoClient.BatchWriteItem(ctx, &dynamodb.BatchWriteItemInput{
  RequestItems: map[string][]types.WriteRequest{tableName: writeReqs},
 })
 if err != nil {
  log.Printf("Couldn't populate table %v with users. Here's why: %v\n", tableName,
 err)
 }
 return err
}

// Scan scans the table for all items.
func (actor DynamoActions) Scan(ctx context.Context, tableName string) (UserList,
 error) {
 var userList UserList
 output, err := actor.DynamoClient.Scan(ctx, &dynamodb.ScanInput{
  TableName: aws.String(tableName),
 })
 if err != nil {
  log.Printf("Couldn't scan table %v for items. Here's why: %v\n", tableName, err)
 } else {
  err = attributevalue.UnmarshalListOfMaps(output.Items, &userList.Users)
  if err != nil {
   log.Printf("Couldn't unmarshal items into users. Here's why: %v\n", err)
  }
 }
 return userList, err
}

// AddUser adds a user item to a table.
func (actor DynamoActions) AddUser(ctx context.Context, tableName string, user User)
 error {
 userItem, err := attributevalue.MarshalMap(user)
 if err != nil {
```

```
  log.Printf("Couldn't marshall user to item. Here's why: %v\n", err)
 }
 _, err = actor.DynamoClient.PutItem(ctx, &dynamodb.PutItemInput{
  Item:      userItem,
  TableName: aws.String(tableName),
 })
 if err != nil {
  log.Printf("Couldn't put item in table %v. Here's why: %v", tableName, err)
 }
 return err
}
```

建立包裝 CloudWatch Logs 動作的 struct。

```
import (
 "context"
 "fmt"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/cloudwatchlogs"
 "github.com/aws/aws-sdk-go-v2/service/cloudwatchlogs/types"
)

type CloudWatchLogsActions struct {
 CwlClient *cloudwatchlogs.Client
}

// GetLatestLogStream gets the most recent log stream for a Lambda function.
func (actor CloudWatchLogsActions) GetLatestLogStream(ctx context.Context,
 functionName string) (types.LogStream, error) {
 var logStream types.LogStream
 logGroupName := fmt.Sprintf("/aws/lambda/%s", functionName)
 output, err := actor.CwlClient.DescribeLogStreams(ctx,
 &cloudwatchlogs.DescribeLogStreamsInput{
  Descending:   aws.Bool(true),
  Limit:        aws.Int32(1),
  LogGroupName: aws.String(logGroupName),
  OrderBy:      types.OrderByLastEventTime,
 })
```

```
 if err != nil {
  log.Printf("Couldn't get log streams for log group %v. Here's why: %v\n",
 logGroupName, err)
 } else {
  logStream = output.LogStreams[0]
 }
 return logStream, err
}

// GetLogEvents gets the most recent eventCount events from the specified log
 stream.
func (actor CloudWatchLogsActions) GetLogEvents(ctx context.Context, functionName
 string, logStreamName string, eventCount int32) (
 []types.OutputLogEvent, error) {
 var events []types.OutputLogEvent
 logGroupName := fmt.Sprintf("/aws/lambda/%s", functionName)
 output, err := actor.CwlClient.GetLogEvents(ctx, &cloudwatchlogs.GetLogEventsInput{
  LogStreamName: aws.String(logStreamName),
  Limit:         aws.Int32(eventCount),
  LogGroupName:  aws.String(logGroupName),
 })
 if err != nil {
  log.Printf("Couldn't get log event for log stream %v. Here's why: %v\n",
 logStreamName, err)
 } else {
  events = output.Events
 }
 return events, err
}
```

建立包裝 CloudFormation 動作的結構。

```
import (
 "context"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/cloudformation"
)
```

```
// StackOutputs defines a map of outputs from a specific stack.
type StackOutputs map[string]string

type CloudFormationActions struct {
 CfnClient *cloudformation.Client
}

// GetOutputs gets the outputs from a CloudFormation stack and puts them into a
 structured format.
func (actor CloudFormationActions) GetOutputs(ctx context.Context, stackName string)
 StackOutputs {
 output, err := actor.CfnClient.DescribeStacks(ctx,
 &cloudformation.DescribeStacksInput{
  StackName: aws.String(stackName),
 })
 if err != nil || len(output.Stacks) == 0 {
  log.Panicf("Couldn't find a CloudFormation stack named %v. Here's why: %v\n",
 stackName, err)
 }
 stackOutputs := StackOutputs{}
 for _, out := range output.Stacks[0].Outputs {
  stackOutputs[*out.OutputKey] = *out.OutputValue
 }
 return stackOutputs
}
```

清除資源。

```
import (
 "context"
 "log"
 "user_pools_and_lambda_triggers/actions"

 "github.com/awsdocs/aws-doc-sdk-examples/gov2/demotools"
)

// Resources keeps track of AWS resources created during an example and handles
// cleanup when the example finishes.
type Resources struct {
 userPoolId       string
```

```
 userAccessTokens []string
 triggers         []actions.Trigger

 cognitoActor *actions.CognitoActions
 questioner   demotools.IQuestioner
}

func (resources *Resources) init(cognitoActor *actions.CognitoActions, questioner
 demotools.IQuestioner) {
 resources.userAccessTokens = []string{}
 resources.triggers = []actions.Trigger{}
 resources.cognitoActor = cognitoActor
 resources.questioner = questioner
}

// Cleanup deletes all AWS resources created during an example.
func (resources *Resources) Cleanup(ctx context.Context) {
 defer func() {
  if r := recover(); r != nil {
   log.Printf("Something went wrong during cleanup.\n%v\n", r)
   log.Println("Use the AWS Management Console to remove any remaining resources \n"
 +
    "that were created for this scenario.")
  }
 }()

 wantDelete := resources.questioner.AskBool("Do you want to remove all of the AWS
 resources that were created "+
  "during this demo (y/n)?", "y")
 if wantDelete {
  for _, accessToken := range resources.userAccessTokens {
   err := resources.cognitoActor.DeleteUser(ctx, accessToken)
   if err != nil {
    log.Println("Couldn't delete user during cleanup.")
    panic(err)
   }
   log.Println("Deleted user.")
  }
  triggerList := make([]actions.TriggerInfo, len(resources.triggers))
  for i := 0; i < len(resources.triggers); i++ {
   triggerList[i] = actions.TriggerInfo{Trigger: resources.triggers[i], HandlerArn:
 nil}
  }
```

```
  err := resources.cognitoActor.UpdateTriggers(ctx, resources.userPoolId,
 triggerList...)
  if err != nil {
   log.Println("Couldn't update Cognito triggers during cleanup.")
   panic(err)
  }
  log.Println("Removed Cognito triggers from user pool.")
 } else {
  log.Println("Be sure to remove resources when you're done with them to avoid
 unexpected charges!")
 }
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的下列主題。
  - ConfirmForgotPassword
  - DeleteUser
  - ForgotPassword
  - InitiateAuth
  - SignUp
  - UpdateUserPool

進行 Amazon Cognito 使用者身分驗證後，可使用 Lambda 函數撰寫自訂活動資料

下列程式碼範例示範如何在 Amazon Cognito 使用者身分驗證之後，使用 Lambda 函數撰寫自訂活動資料。

- 使用管理員函數將使用者新增至使用者集區。
- 設定使用者集區以呼叫 `PostAuthentication` 觸發條件的 Lambda 函數。
- 將新使用者登入 Amazon Cognito。
- Lambda 函數會將自訂資訊寫入 CloudWatch Logs 和 DynamoDB 資料表。
- 從 DynamoDB 資料表取得並顯示自訂資料，然後清除資源。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，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。

```
import (
 "context"
 "errors"
 "log"
 "strings"
 "user_pools_and_lambda_triggers/actions"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/cognitoidentityprovider"
 "github.com/aws/aws-sdk-go-v2/service/cognitoidentityprovider/types"
 "github.com/awsdocs/aws-doc-sdk-examples/gov2/demotools"
)

// ActivityLog separates the steps of this scenario into individual functions so
 that
// they are simpler to read and understand.
type ActivityLog struct {
 helper       IScenarioHelper
 questioner   demotools.IQuestioner
 resources    Resources
 cognitoActor *actions.CognitoActions
}

// NewActivityLog constructs a new activity log runner.
func NewActivityLog(sdkConfig aws.Config, questioner demotools.IQuestioner, helper
 IScenarioHelper) ActivityLog {
 scenario := ActivityLog{
  helper:       helper,
  questioner:   questioner,
  resources:    Resources{},
  cognitoActor: &actions.CognitoActions{CognitoClient:
 cognitoidentityprovider.NewFromConfig(sdkConfig)},
```

```
 }
 scenario.resources.init(scenario.cognitoActor, questioner)
 return scenario
}

// AddUserToPool selects a user from the known users table and uses administrator
 credentials to add the user to the user pool.
func (runner *ActivityLog) AddUserToPool(ctx context.Context, userPoolId string,
 tableName string) (string, string) {
 log.Println("To facilitate this example, let's add a user to the user pool using
 administrator privileges.")
 users, err := runner.helper.GetKnownUsers(ctx, tableName)
 if err != nil {
  panic(err)
 }
 user := users.Users[0]
 log.Printf("Adding known user %v to the user pool.\n", user.UserName)
 err = runner.cognitoActor.AdminCreateUser(ctx, userPoolId, user.UserName,
 user.UserEmail)
 if err != nil {
  panic(err)
 }
 pwSet := false
 password := runner.questioner.AskPassword("\nEnter a password that has at least
 eight characters, uppercase, lowercase, numbers and symbols.\n"+
  "(the password will not display as you type):", 8)
 for !pwSet {
  log.Printf("\nSetting password for user '%v'.\n", user.UserName)
  err = runner.cognitoActor.AdminSetUserPassword(ctx, userPoolId, user.UserName,
 password)
  if err != nil {
   var invalidPassword *types.InvalidPasswordException
   if errors.As(err, &invalidPassword) {
    password = runner.questioner.AskPassword("\nEnter another password:", 8)
   } else {
    panic(err)
   }
  } else {
   pwSet = true
  }
 }

 log.Println(strings.Repeat("-", 88))
```

```
 return user.UserName, password
}

// AddActivityLogTrigger adds a Lambda handler as an invocation target for the
 PostAuthentication trigger.
func (runner *ActivityLog) AddActivityLogTrigger(ctx context.Context, userPoolId
 string, activityLogArn string) {
 log.Println("Let's add a Lambda function to handle the PostAuthentication trigger
 from Cognito.\n" +
  "This trigger happens after a user is authenticated, and lets your function take
 action, such as logging\n" +
  "the outcome.")
 err := runner.cognitoActor.UpdateTriggers(
  ctx, userPoolId,
  actions.TriggerInfo{Trigger: actions.PostAuthentication, HandlerArn:
 aws.String(activityLogArn)})
 if err != nil {
  panic(err)
 }
 runner.resources.triggers = append(runner.resources.triggers,
 actions.PostAuthentication)
 log.Printf("Lambda function %v added to user pool %v to handle PostAuthentication
 Cognito trigger.\n",
  activityLogArn, userPoolId)

 log.Println(strings.Repeat("-", 88))
}

// SignInUser signs in as the specified user.
func (runner *ActivityLog) SignInUser(ctx context.Context, clientId string, userName
 string, password string) {
 log.Printf("Now we'll sign in user %v and check the results in the logs and the
 DynamoDB table.", userName)
 runner.questioner.Ask("Press Enter when you're ready.")
 authResult, err := runner.cognitoActor.SignIn(ctx, clientId, userName, password)
 if err != nil {
  panic(err)
 }
 log.Println("Sign in successful.",
  "The PostAuthentication Lambda handler writes custom information to CloudWatch
 Logs.")

 runner.resources.userAccessTokens = append(runner.resources.userAccessTokens,
 *authResult.AccessToken)
```

```
}

// GetKnownUserLastLogin gets the login info for a user from the Amazon DynamoDB
 table and displays it.
func (runner *ActivityLog) GetKnownUserLastLogin(ctx context.Context, tableName
 string, userName string) {
 log.Println("The PostAuthentication handler also writes login data to the DynamoDB
 table.")
 runner.questioner.Ask("Press Enter when you're ready to continue.")
 users, err := runner.helper.GetKnownUsers(ctx, tableName)
 if err != nil {
  panic(err)
 }
 for _, user := range users.Users {
  if user.UserName == userName {
   log.Println("The last login info for the user in the known users table is:")
   log.Printf("\t%+v", *user.LastLogin)
  }
 }
 log.Println(strings.Repeat("-", 88))
}

// Run runs the scenario.
func (runner *ActivityLog) Run(ctx context.Context, stackName string) {
 defer func() {
  if r := recover(); r != nil {
   log.Println("Something went wrong with the demo.")
   runner.resources.Cleanup(ctx)
  }
 }()

 log.Println(strings.Repeat("-", 88))
 log.Printf("Welcome\n")

 log.Println(strings.Repeat("-", 88))

 stackOutputs, err := runner.helper.GetStackOutputs(ctx, stackName)
 if err != nil {
  panic(err)
 }
 runner.resources.userPoolId = stackOutputs["UserPoolId"]
 runner.helper.PopulateUserTable(ctx, stackOutputs["TableName"])
 userName, password := runner.AddUserToPool(ctx, stackOutputs["UserPoolId"],
 stackOutputs["TableName"])
```

```
 runner.AddActivityLogTrigger(ctx, stackOutputs["UserPoolId"],
 stackOutputs["ActivityLogFunctionArn"])
 runner.SignInUser(ctx, stackOutputs["UserPoolClientId"], userName, password)
 runner.helper.ListRecentLogEvents(ctx, stackOutputs["ActivityLogFunction"])
 runner.GetKnownUserLastLogin(ctx, stackOutputs["TableName"], userName)

 runner.resources.Cleanup(ctx)

 log.Println(strings.Repeat("-", 88))
 log.Println("Thanks for watching!")
 log.Println(strings.Repeat("-", 88))
}
```

使用 Lambda 函數來處理 PostAuthentication 觸發條件。

```
import (
 "context"
 "fmt"
 "log"
 "os"
 "time"

 "github.com/aws/aws-lambda-go/events"
 "github.com/aws/aws-lambda-go/lambda"
 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/config"
 "github.com/aws/aws-sdk-go-v2/feature/dynamodb/attributevalue"
 "github.com/aws/aws-sdk-go-v2/service/dynamodb"
 dynamodbtypes "github.com/aws/aws-sdk-go-v2/service/dynamodb/types"
)

const TABLE_NAME = "TABLE_NAME"

// LoginInfo defines structured login data that can be marshalled to a DynamoDB
 format.
type LoginInfo struct {
 UserPoolId string `dynamodbav:"UserPoolId"`
 ClientId   string `dynamodbav:"ClientId"`
 Time       string `dynamodbav:"Time"`
```

```
}

// UserInfo defines structured user data that can be marshalled to a DynamoDB
 format.
type UserInfo struct {
 UserName  string    `dynamodbav:"UserName"`
 UserEmail string    `dynamodbav:"UserEmail"`
 LastLogin LoginInfo `dynamodbav:"LastLogin"`
}

// GetKey marshals the user email value to a DynamoDB key format.
func (user UserInfo) GetKey() map[string]dynamodbtypes.AttributeValue {
 userEmail, err := attributevalue.Marshal(user.UserEmail)
 if err != nil {
  panic(err)
 }
 return map[string]dynamodbtypes.AttributeValue{"UserEmail": userEmail}
}

type handler struct {
 dynamoClient *dynamodb.Client
}

// HandleRequest handles the PostAuthentication event by writing custom data to the
 logs and
// to an Amazon DynamoDB table.
func (h *handler) HandleRequest(ctx context.Context,
 event events.CognitoEventUserPoolsPostAuthentication)
 (events.CognitoEventUserPoolsPostAuthentication, error) {
 log.Printf("Received post authentication trigger from %v for user '%v'",
 event.TriggerSource, event.UserName)
 tableName := os.Getenv(TABLE_NAME)
 user := UserInfo{
  UserName:  event.UserName,
  UserEmail: event.Request.UserAttributes["email"],
  LastLogin: LoginInfo{
   UserPoolId: event.UserPoolID,
   ClientId:   event.CallerContext.ClientID,
   Time:       time.Now().Format(time.UnixDate),
  },
 }
 // Write to CloudWatch Logs.
 fmt.Printf("%#v", user)
```

```
 // Also write to an external system. This examples uses DynamoDB to demonstrate.
 userMap, err := attributevalue.MarshalMap(user)
 if err != nil {
  log.Printf("Couldn't marshal to DynamoDB map. Here's why: %v\n", err)
 } else if len(userMap) == 0 {
  log.Printf("User info marshaled to an empty map.")
 } else {
  _, err := h.dynamoClient.PutItem(ctx, &dynamodb.PutItemInput{
   Item:      userMap,
   TableName: aws.String(tableName),
  })
  if err != nil {
   log.Printf("Couldn't write to DynamoDB. Here's why: %v\n", err)
  } else {
   log.Printf("Wrote user info to DynamoDB table %v.\n", tableName)
  }
 }

 return event, nil
}

func main() {
 ctx := context.Background()
 sdkConfig, err := config.LoadDefaultConfig(ctx)
 if err != nil {
  log.Panicln(err)
 }
 h := handler{
  dynamoClient: dynamodb.NewFromConfig(sdkConfig),
 }
 lambda.Start(h.HandleRequest)
}
```

建立執行一般任務的 struct。

```
import (
 "context"
 "log"
 "strings"
 "time"
```

```
 "user_pools_and_lambda_triggers/actions"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/cloudformation"
 "github.com/aws/aws-sdk-go-v2/service/cloudwatchlogs"
 "github.com/aws/aws-sdk-go-v2/service/dynamodb"
 "github.com/awsdocs/aws-doc-sdk-examples/gov2/demotools"
)

// IScenarioHelper defines common functions used by the workflows in this example.
type IScenarioHelper interface {
 Pause(secs int)
 GetStackOutputs(ctx context.Context, stackName string) (actions.StackOutputs,
 error)
 PopulateUserTable(ctx context.Context, tableName string)
 GetKnownUsers(ctx context.Context, tableName string) (actions.UserList, error)
 AddKnownUser(ctx context.Context, tableName string, user actions.User)
 ListRecentLogEvents(ctx context.Context, functionName string)
}

// ScenarioHelper contains AWS wrapper structs used by the workflows in this
 example.
type ScenarioHelper struct {
 questioner  demotools.IQuestioner
 dynamoActor *actions.DynamoActions
 cfnActor    *actions.CloudFormationActions
 cwlActor    *actions.CloudWatchLogsActions
 isTestRun   bool
}

// NewScenarioHelper constructs a new scenario helper.
func NewScenarioHelper(sdkConfig aws.Config, questioner demotools.IQuestioner)
 ScenarioHelper {
 scenario := ScenarioHelper{
  questioner:  questioner,
  dynamoActor: &actions.DynamoActions{DynamoClient:
 dynamodb.NewFromConfig(sdkConfig)},
  cfnActor:    &actions.CloudFormationActions{CfnClient:
 cloudformation.NewFromConfig(sdkConfig)},
  cwlActor:    &actions.CloudWatchLogsActions{CwlClient:
 cloudwatchlogs.NewFromConfig(sdkConfig)},
 }
 return scenario
}
```

```
// Pause waits for the specified number of seconds.
func (helper ScenarioHelper) Pause(secs int) {
 if !helper.isTestRun {
  time.Sleep(time.Duration(secs) * time.Second)
 }
}

// GetStackOutputs gets the outputs from the specified CloudFormation stack in a
 structured format.
func (helper ScenarioHelper) GetStackOutputs(ctx context.Context, stackName string)
 (actions.StackOutputs, error) {
 return helper.cfnActor.GetOutputs(ctx, stackName), nil
}

// PopulateUserTable fills the known user table with example data.
func (helper ScenarioHelper) PopulateUserTable(ctx context.Context, tableName
 string) {
 log.Printf("First, let's add some users to the DynamoDB %v table we'll use for this
 example.\n", tableName)
 err := helper.dynamoActor.PopulateTable(ctx, tableName)
 if err != nil {
  panic(err)
 }
}

// GetKnownUsers gets the users from the known users table in a structured format.
func (helper ScenarioHelper) GetKnownUsers(ctx context.Context, tableName string)
 (actions.UserList, error) {
 knownUsers, err := helper.dynamoActor.Scan(ctx, tableName)
 if err != nil {
  log.Printf("Couldn't get known users from table %v. Here's why: %v\n", tableName,
 err)
 }
 return knownUsers, err
}

// AddKnownUser adds a user to the known users table.
func (helper ScenarioHelper) AddKnownUser(ctx context.Context, tableName string,
 user actions.User) {
 log.Printf("Adding user '%v' with email '%v' to the DynamoDB known users table...
\n",
  user.UserName, user.UserEmail)
 err := helper.dynamoActor.AddUser(ctx, tableName, user)
```

```
 if err != nil {
  panic(err)
 }
}

// ListRecentLogEvents gets the most recent log stream and events for the specified
 Lambda function and displays them.
func (helper ScenarioHelper) ListRecentLogEvents(ctx context.Context, functionName
 string) {
 log.Println("Waiting a few seconds to let Lambda write to CloudWatch Logs...")
 helper.Pause(10)
 log.Println("Okay, let's check the logs to find what's happened recently with your
 Lambda function.")
 logStream, err := helper.cwlActor.GetLatestLogStream(ctx, functionName)
 if err != nil {
  panic(err)
 }
 log.Printf("Getting some recent events from log stream %v\n",
 *logStream.LogStreamName)
 events, err := helper.cwlActor.GetLogEvents(ctx, functionName,
 *logStream.LogStreamName, 10)
 if err != nil {
  panic(err)
 }
 for _, event := range events {
  log.Printf("\t%v", *event.Message)
 }
 log.Println(strings.Repeat("-", 88))
}
```

建立包裝 Amazon Cognito 動作的 struct。

```
import (
 "context"
 "errors"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/cognitoidentityprovider"
 "github.com/aws/aws-sdk-go-v2/service/cognitoidentityprovider/types"
```

```
)

type CognitoActions struct {
 CognitoClient *cognitoidentityprovider.Client
}



// Trigger and TriggerInfo define typed data for updating an Amazon Cognito trigger.
type Trigger int

const (
 PreSignUp Trigger = iota
 UserMigration
 PostAuthentication
)

type TriggerInfo struct {
 Trigger    Trigger
 HandlerArn *string
}

// UpdateTriggers adds or removes Lambda triggers for a user pool. When a trigger is
 specified with a `nil` value,
// it is removed from the user pool.
func (actor CognitoActions) UpdateTriggers(ctx context.Context, userPoolId string,
 triggers ...TriggerInfo) error {
 output, err := actor.CognitoClient.DescribeUserPool(ctx,
 &cognitoidentityprovider.DescribeUserPoolInput{
  UserPoolId: aws.String(userPoolId),
 })
 if err != nil {
  log.Printf("Couldn't get info about user pool %v. Here's why: %v\n", userPoolId,
 err)
  return err
 }
 lambdaConfig := output.UserPool.LambdaConfig
 for _, trigger := range triggers {
  switch trigger.Trigger {
  case PreSignUp:
   lambdaConfig.PreSignUp = trigger.HandlerArn
  case UserMigration:
   lambdaConfig.UserMigration = trigger.HandlerArn
  case PostAuthentication:
```

```
   lambdaConfig.PostAuthentication = trigger.HandlerArn
  }
 }
 _, err = actor.CognitoClient.UpdateUserPool(ctx,
 &cognitoidentityprovider.UpdateUserPoolInput{
  UserPoolId:   aws.String(userPoolId),
  LambdaConfig: lambdaConfig,
 })
 if err != nil {
  log.Printf("Couldn't update user pool %v. Here's why: %v\n", userPoolId, err)
 }
 return err
}



// SignUp signs up a user with Amazon Cognito.
func (actor CognitoActions) SignUp(ctx context.Context, clientId string, userName
 string, password string, userEmail string) (bool, error) {
 confirmed := false
 output, err := actor.CognitoClient.SignUp(ctx,
 &cognitoidentityprovider.SignUpInput{
  ClientId: aws.String(clientId),
  Password: aws.String(password),
  Username: aws.String(userName),
  UserAttributes: []types.AttributeType{
   {Name: aws.String("email"), Value: aws.String(userEmail)},
  },
 })
 if err != nil {
  var invalidPassword *types.InvalidPasswordException
  if errors.As(err, &invalidPassword) {
   log.Println(*invalidPassword.Message)
  } else {
   log.Printf("Couldn't sign up user %v. Here's why: %v\n", userName, err)
  }
 } else {
  confirmed = output.UserConfirmed
 }
 return confirmed, err
}
```

```
// SignIn signs in a user to Amazon Cognito using a username and password
 authentication flow.
func (actor CognitoActions) SignIn(ctx context.Context, clientId string, userName
 string, password string) (*types.AuthenticationResultType, error) {
 var authResult *types.AuthenticationResultType
 output, err := actor.CognitoClient.InitiateAuth(ctx,
 &cognitoidentityprovider.InitiateAuthInput{
  AuthFlow:       "USER_PASSWORD_AUTH",
  ClientId:       aws.String(clientId),
  AuthParameters: map[string]string{"USERNAME": userName, "PASSWORD": password},
 })
 if err != nil {
  var resetRequired *types.PasswordResetRequiredException
  if errors.As(err, &resetRequired) {
   log.Println(*resetRequired.Message)
  } else {
   log.Printf("Couldn't sign in user %v. Here's why: %v\n", userName, err)
  }
 } else {
  authResult = output.AuthenticationResult
 }
 return authResult, err
}



// ForgotPassword starts a password recovery flow for a user. This flow typically
 sends a confirmation code
// to the user's configured notification destination, such as email.
func (actor CognitoActions) ForgotPassword(ctx context.Context, clientId string,
 userName string) (*types.CodeDeliveryDetailsType, error) {
 output, err := actor.CognitoClient.ForgotPassword(ctx,
 &cognitoidentityprovider.ForgotPasswordInput{
  ClientId: aws.String(clientId),
  Username: aws.String(userName),
 })
 if err != nil {
  log.Printf("Couldn't start password reset for user '%v'. Here;s why: %v\n",
 userName, err)
 }
 return output.CodeDeliveryDetails, err
}
```

```
// ConfirmForgotPassword confirms a user with a confirmation code and a new
 password.
func (actor CognitoActions) ConfirmForgotPassword(ctx context.Context, clientId
 string, code string, userName string, password string) error {
 _, err := actor.CognitoClient.ConfirmForgotPassword(ctx,
 &cognitoidentityprovider.ConfirmForgotPasswordInput{
  ClientId:         aws.String(clientId),
  ConfirmationCode: aws.String(code),
  Password:         aws.String(password),
  Username:         aws.String(userName),
 })
 if err != nil {
  var invalidPassword *types.InvalidPasswordException
  if errors.As(err, &invalidPassword) {
   log.Println(*invalidPassword.Message)
  } else {
   log.Printf("Couldn't confirm user %v. Here's why: %v", userName, err)
  }
 }
 return err
}



// DeleteUser removes a user from the user pool.
func (actor CognitoActions) DeleteUser(ctx context.Context, userAccessToken string)
 error {
 _, err := actor.CognitoClient.DeleteUser(ctx,
 &cognitoidentityprovider.DeleteUserInput{
  AccessToken: aws.String(userAccessToken),
 })
 if err != nil {
  log.Printf("Couldn't delete user. Here's why: %v\n", err)
 }
 return err
}



// AdminCreateUser uses administrator credentials to add a user to a user pool. This
 method leaves the user
// in a state that requires they enter a new password next time they sign in.
```

```
func (actor CognitoActions) AdminCreateUser(ctx context.Context, userPoolId string,
 userName string, userEmail string) error {
 _, err := actor.CognitoClient.AdminCreateUser(ctx,
 &cognitoidentityprovider.AdminCreateUserInput{
  UserPoolId:     aws.String(userPoolId),
  Username:       aws.String(userName),
  MessageAction:  types.MessageActionTypeSuppress,
  UserAttributes: []types.AttributeType{{Name: aws.String("email"), Value:
 aws.String(userEmail)}},
 })
 if err != nil {
  var userExists *types.UsernameExistsException
  if errors.As(err, &userExists) {
   log.Printf("User %v already exists in the user pool.", userName)
   err = nil
  } else {
   log.Printf("Couldn't create user %v. Here's why: %v\n", userName, err)
  }
 }
 return err
}



// AdminSetUserPassword uses administrator credentials to set a password for a user
 without requiring a
// temporary password.
func (actor CognitoActions) AdminSetUserPassword(ctx context.Context, userPoolId
 string, userName string, password string) error {
 _, err := actor.CognitoClient.AdminSetUserPassword(ctx,
 &cognitoidentityprovider.AdminSetUserPasswordInput{
  Password:   aws.String(password),
  UserPoolId: aws.String(userPoolId),
  Username:   aws.String(userName),
  Permanent:  true,
 })
 if err != nil {
  var invalidPassword *types.InvalidPasswordException
  if errors.As(err, &invalidPassword) {
   log.Println(*invalidPassword.Message)
  } else {
   log.Printf("Couldn't set password for user %v. Here's why: %v\n", userName, err)
  }
 }
```

```
 return err
}
```

建立包裝 DynamoDB 動作的 struct。

```
import (
 "context"
 "fmt"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/feature/dynamodb/attributevalue"
 "github.com/aws/aws-sdk-go-v2/service/dynamodb"
 "github.com/aws/aws-sdk-go-v2/service/dynamodb/types"
)

// DynamoActions encapsulates the Amazon Simple Notification Service (Amazon SNS)
 actions
// used in the examples.
type DynamoActions struct {
 DynamoClient *dynamodb.Client
}

// User defines structured user data.
type User struct {
 UserName  string
 UserEmail string
 LastLogin *LoginInfo `dynamodbav:",omitempty"`
}

// LoginInfo defines structured custom login data.
type LoginInfo struct {
 UserPoolId string
 ClientId   string
 Time       string
}

// UserList defines a list of users.
type UserList struct {
 Users []User
```

```
}

// UserNameList returns the usernames contained in a UserList as a list of strings.
func (users *UserList) UserNameList() []string {
 names := make([]string, len(users.Users))
 for i := 0; i < len(users.Users); i++ {
  names[i] = users.Users[i].UserName
 }
 return names
}

// PopulateTable adds a set of test users to the table.
func (actor DynamoActions) PopulateTable(ctx context.Context, tableName string)
 error {
 var err error
 var item map[string]types.AttributeValue
 var writeReqs []types.WriteRequest
 for i := 1; i < 4; i++ {
  item, err = attributevalue.MarshalMap(User{UserName: fmt.Sprintf("test_user_%v",
 i), UserEmail: fmt.Sprintf("test_email_%v@example.com", i)})
  if err != nil {
   log.Printf("Couldn't marshall user into DynamoDB format. Here's why: %v\n", err)
   return err
  }
  writeReqs = append(writeReqs, types.WriteRequest{PutRequest:
 &types.PutRequest{Item: item}})
 }
 _, err = actor.DynamoClient.BatchWriteItem(ctx, &dynamodb.BatchWriteItemInput{
  RequestItems: map[string][]types.WriteRequest{tableName: writeReqs},
 })
 if err != nil {
  log.Printf("Couldn't populate table %v with users. Here's why: %v\n", tableName,
 err)
 }
 return err
}

// Scan scans the table for all items.
func (actor DynamoActions) Scan(ctx context.Context, tableName string) (UserList,
 error) {
 var userList UserList
 output, err := actor.DynamoClient.Scan(ctx, &dynamodb.ScanInput{
  TableName: aws.String(tableName),
 })
```

```
 if err != nil {
  log.Printf("Couldn't scan table %v for items. Here's why: %v\n", tableName, err)
 } else {
  err = attributevalue.UnmarshalListOfMaps(output.Items, &userList.Users)
  if err != nil {
   log.Printf("Couldn't unmarshal items into users. Here's why: %v\n", err)
  }
 }
 return userList, err
}

// AddUser adds a user item to a table.
func (actor DynamoActions) AddUser(ctx context.Context, tableName string, user User)
 error {
 userItem, err := attributevalue.MarshalMap(user)
 if err != nil {
  log.Printf("Couldn't marshall user to item. Here's why: %v\n", err)
 }
 _, err = actor.DynamoClient.PutItem(ctx, &dynamodb.PutItemInput{
  Item:      userItem,
  TableName: aws.String(tableName),
 })
 if err != nil {
  log.Printf("Couldn't put item in table %v. Here's why: %v", tableName, err)
 }
 return err
}
```

建立包裝 CloudWatch Logs 動作的 struct。

```
import (
 "context"
 "fmt"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/cloudwatchlogs"
 "github.com/aws/aws-sdk-go-v2/service/cloudwatchlogs/types"
)
```

```
type CloudWatchLogsActions struct {
 CwlClient *cloudwatchlogs.Client
}

// GetLatestLogStream gets the most recent log stream for a Lambda function.
func (actor CloudWatchLogsActions) GetLatestLogStream(ctx context.Context,
 functionName string) (types.LogStream, error) {
 var logStream types.LogStream
 logGroupName := fmt.Sprintf("/aws/lambda/%s", functionName)
 output, err := actor.CwlClient.DescribeLogStreams(ctx,
 &cloudwatchlogs.DescribeLogStreamsInput{
  Descending:   aws.Bool(true),
  Limit:        aws.Int32(1),
  LogGroupName: aws.String(logGroupName),
  OrderBy:      types.OrderByLastEventTime,
 })
 if err != nil {
  log.Printf("Couldn't get log streams for log group %v. Here's why: %v\n",
 logGroupName, err)
 } else {
  logStream = output.LogStreams[0]
 }
 return logStream, err
}

// GetLogEvents gets the most recent eventCount events from the specified log
 stream.
func (actor CloudWatchLogsActions) GetLogEvents(ctx context.Context, functionName
 string, logStreamName string, eventCount int32) (
 []types.OutputLogEvent, error) {
 var events []types.OutputLogEvent
 logGroupName := fmt.Sprintf("/aws/lambda/%s", functionName)
 output, err := actor.CwlClient.GetLogEvents(ctx, &cloudwatchlogs.GetLogEventsInput{
  LogStreamName: aws.String(logStreamName),
  Limit:         aws.Int32(eventCount),
  LogGroupName:  aws.String(logGroupName),
 })
 if err != nil {
  log.Printf("Couldn't get log event for log stream %v. Here's why: %v\n",
 logStreamName, err)
 } else {
  events = output.Events
 }
 return events, err
```

```
}
```

建立包裝 CloudFormation 動作的結構。

```
import (
 "context"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/cloudformation"
)

// StackOutputs defines a map of outputs from a specific stack.
type StackOutputs map[string]string

type CloudFormationActions struct {
 CfnClient *cloudformation.Client
}

// GetOutputs gets the outputs from a CloudFormation stack and puts them into a
 structured format.
func (actor CloudFormationActions) GetOutputs(ctx context.Context, stackName string)
 StackOutputs {
 output, err := actor.CfnClient.DescribeStacks(ctx,
 &cloudformation.DescribeStacksInput{
  StackName: aws.String(stackName),
 })
 if err != nil || len(output.Stacks) == 0 {
  log.Panicf("Couldn't find a CloudFormation stack named %v. Here's why: %v\n",
 stackName, err)
 }
 stackOutputs := StackOutputs{}
 for _, out := range output.Stacks[0].Outputs {
  stackOutputs[*out.OutputKey] = *out.OutputValue
 }
 return stackOutputs
}
```

清除資源。

```
import (
 "context"
 "log"
 "user_pools_and_lambda_triggers/actions"

 "github.com/awsdocs/aws-doc-sdk-examples/gov2/demotools"
)

// Resources keeps track of AWS resources created during an example and handles
// cleanup when the example finishes.
type Resources struct {
 userPoolId       string
 userAccessTokens []string
 triggers         []actions.Trigger

 cognitoActor *actions.CognitoActions
 questioner   demotools.IQuestioner
}

func (resources *Resources) init(cognitoActor *actions.CognitoActions, questioner
 demotools.IQuestioner) {
 resources.userAccessTokens = []string{}
 resources.triggers = []actions.Trigger{}
 resources.cognitoActor = cognitoActor
 resources.questioner = questioner
}

// Cleanup deletes all AWS resources created during an example.
func (resources *Resources) Cleanup(ctx context.Context) {
 defer func() {
  if r := recover(); r != nil {
   log.Printf("Something went wrong during cleanup.\n%v\n", r)
   log.Println("Use the AWS Management Console to remove any remaining resources \n"
 +
    "that were created for this scenario.")
  }
 }()

 wantDelete := resources.questioner.AskBool("Do you want to remove all of the AWS
 resources that were created "+
  "during this demo (y/n)?", "y")
```

```
 if wantDelete {
  for _, accessToken := range resources.userAccessTokens {
   err := resources.cognitoActor.DeleteUser(ctx, accessToken)
   if err != nil {
    log.Println("Couldn't delete user during cleanup.")
    panic(err)
   }
   log.Println("Deleted user.")
  }
  triggerList := make([]actions.TriggerInfo, len(resources.triggers))
  for i := 0; i < len(resources.triggers); i++ {
   triggerList[i] = actions.TriggerInfo{Trigger: resources.triggers[i], HandlerArn:
 nil}
  }
  err := resources.cognitoActor.UpdateTriggers(ctx, resources.userPoolId,
 triggerList...)
  if err != nil {
   log.Println("Couldn't update Cognito triggers during cleanup.")
   panic(err)
  }
  log.Println("Removed Cognito triggers from user pool.")
 } else {
  log.Println("Be sure to remove resources when you're done with them to avoid
 unexpected charges!")
 }
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的下列主題。
  - AdminCreateUser
  - AdminSetUserPassword
  - DeleteUser
  - InitiateAuth
  - UpdateUserPool

# 使用適用於 Go V2 的 SDK 的 Amazon DocumentDB 範例

下列程式碼範例示範如何使用 適用於 Go 的 AWS SDK V2 搭配 Amazon DocumentDB 來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。

SDK for Go V2

> **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 Go 搭配 Lambda 使用 Amazon DocumentDB 事件。

```
package main

import (
 "context"
 "encoding/json"
 "fmt"

 "github.com/aws/aws-lambda-go/lambda"
)

type Event struct {
 Events []Record `json:"events"`
}

type Record struct {
 Event struct {
  OperationType string `json:"operationType"`
```

```
  NS            struct {
   DB   string `json:"db"`
   Coll string `json:"coll"`
  } `json:"ns"`
  FullDocument interface{} `json:"fullDocument"`
 } `json:"event"`
}

func main() {
 lambda.Start(handler)
}

func handler(ctx context.Context, event Event) (string, error) {
 fmt.Println("Loading function")
 for _, record := range event.Events {
  logDocumentDBEvent(record)
 }

 return "OK", nil
}

func logDocumentDBEvent(record Record) {
 fmt.Printf("Operation type: %s\n", record.Event.OperationType)
 fmt.Printf("db: %s\n", record.Event.NS.DB)
 fmt.Printf("collection: %s\n", record.Event.NS.Coll)
 docBytes, _ := json.MarshalIndent(record.Event.FullDocument, "", "  ")
 fmt.Printf("Full document: %s\n", string(docBytes))
}
```

# 使用適用於 Go V2 的 SDK 的 DynamoDB 範例

下列程式碼範例示範如何使用 適用於 Go 的 AWS SDK V2 搭配 DynamoDB 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。

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


- 基本概念
- 動作
- 案例
- 無伺服器範例
- AWS 社群貢獻


# 基本概念

了解基本概念

以下程式碼範例顯示做法：

- 建立可存放電影資料的資料表。
- 放入、取得和更新資料表中的單個電影。
- 將影片資料從範例 JSON 檔案寫入資料表。
- 查詢特定年份發表的電影。
- 掃描某個年份範圍內發表的電影。
- 從資料表刪除電影，然後刪除資料表。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

執行互動式案例以建立資料表並對其執行動作。

```
import (
```

```
 "context"
 "fmt"
 "log"
 "strings"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/dynamodb"
 "github.com/awsdocs/aws-doc-sdk-examples/gov2/demotools"
 "github.com/awsdocs/aws-doc-sdk-examples/gov2/dynamodb/actions"
)

// RunMovieScenario is an interactive example that shows you how to use the AWS SDK
 for Go
// to create and use an Amazon DynamoDB table that stores data about movies.
//
//  1. Create a table that can hold movie data.
//  2. Put, get, and update a single movie in the table.
//  3. Write movie data to the table from a sample JSON file.
//  4. Query for movies that were released in a given year.
//  5. Scan for movies that were released in a range of years.
//  6. Delete a movie from the table.
//  7. Delete the table.
//
// This example creates a DynamoDB service client from the specified sdkConfig so
 that
// you can replace it with a mocked or stubbed config for unit testing.
//
// It uses a questioner from the `demotools` package to get input during the
 example.
// This package can be found in the ..\..\demotools folder of this repo.
//
// The specified movie sampler is used to get sample data from a URL that is loaded
// into the named table.
func RunMovieScenario(
 ctx context.Context, sdkConfig aws.Config, questioner demotools.IQuestioner,
 tableName string,
 movieSampler actions.IMovieSampler) {
 defer func() {
  if r := recover(); r != nil {
   fmt.Printf("Something went wrong with the demo.")
  }
 }()

 log.Println(strings.Repeat("-", 88))
```

```
log.Println("Welcome to the Amazon DynamoDB getting started demo.")
log.Println(strings.Repeat("-", 88))

tableBasics := actions.TableBasics{TableName: tableName,
 DynamoDbClient: dynamodb.NewFromConfig(sdkConfig)}

exists, err := tableBasics.TableExists(ctx)
if err != nil {
 panic(err)
}
if !exists {
 log.Printf("Creating table %v...\n", tableName)
 _, err = tableBasics.CreateMovieTable(ctx)
 if err != nil {
  panic(err)
 } else {
  log.Printf("Created table %v.\n", tableName)
 }
} else {
 log.Printf("Table %v already exists.\n", tableName)
}

var customMovie actions.Movie
customMovie.Title = questioner.Ask("Enter a movie title to add to the table:",
 demotools.NotEmpty{})
customMovie.Year = questioner.AskInt("What year was it released?",
 demotools.NotEmpty{}, demotools.InIntRange{Lower: 1900, Upper: 2030})
customMovie.Info = map[string]interface{}{}
customMovie.Info["rating"] = questioner.AskFloat64(
 "Enter a rating between 1 and 10:",
 demotools.NotEmpty{}, demotools.InFloatRange{Lower: 1, Upper: 10})
customMovie.Info["plot"] = questioner.Ask("What's the plot? ",
 demotools.NotEmpty{})
err = tableBasics.AddMovie(ctx, customMovie)
if err == nil {
 log.Printf("Added %v to the movie table.\n", customMovie.Title)
}
log.Println(strings.Repeat("-", 88))

log.Printf("Let's update your movie. You previously rated it %v.\n",
customMovie.Info["rating"])
customMovie.Info["rating"] = questioner.AskFloat64(
 "What new rating would you give it?",
 demotools.NotEmpty{}, demotools.InFloatRange{Lower: 1, Upper: 10})
```

```
log.Printf("You summarized the plot as '%v'.\n", customMovie.Info["plot"])
customMovie.Info["plot"] = questioner.Ask("What would you say now?",
 demotools.NotEmpty{})
attributes, err := tableBasics.UpdateMovie(ctx, customMovie)
if err == nil {
 log.Printf("Updated %v with new values.\n", customMovie.Title)
 for _, attVal := range attributes {
  for valKey, val := range attVal {
   log.Printf("\t%v: %v\n", valKey, val)
  }
 }
}
log.Println(strings.Repeat("-", 88))

log.Printf("Getting movie data from %v and adding 250 movies to the table...\n",
 movieSampler.GetURL())
movies := movieSampler.GetSampleMovies()
written, err := tableBasics.AddMovieBatch(ctx, movies, 250)
if err != nil {
 panic(err)
} else {
 log.Printf("Added %v movies to the table.\n", written)
}

show := 10
if show > written {
 show = written
}
log.Printf("The first %v movies in the table are:", show)
for index, movie := range movies[:show] {
 log.Printf("\t%v. %v\n", index+1, movie.Title)
}
movieIndex := questioner.AskInt(
 "Enter the number of a movie to get info about it: ",
 demotools.InIntRange{Lower: 1, Upper: show},
)
movie, err := tableBasics.GetMovie(ctx, movies[movieIndex-1].Title,
movies[movieIndex-1].Year)
if err == nil {
 log.Println(movie)
}
log.Println(strings.Repeat("-", 88))

log.Println("Let's get a list of movies released in a given year.")
```

```
releaseYear := questioner.AskInt("Enter a year between 1972 and 2018: ",
 demotools.InIntRange{Lower: 1972, Upper: 2018},
)
releases, err := tableBasics.Query(ctx, releaseYear)
if err == nil {
 if len(releases) == 0 {
  log.Printf("I couldn't find any movies released in %v!\n", releaseYear)
 } else {
  for _, movie = range releases {
   log.Println(movie)
  }
 }
}
log.Println(strings.Repeat("-", 88))

log.Println("Now let's scan for movies released in a range of years.")
startYear := questioner.AskInt("Enter a year: ",
 demotools.InIntRange{Lower: 1972, Upper: 2018})
endYear := questioner.AskInt("Enter another year: ",
 demotools.InIntRange{Lower: 1972, Upper: 2018})
releases, err = tableBasics.Scan(ctx, startYear, endYear)
if err == nil {
 if len(releases) == 0 {
  log.Printf("I couldn't find any movies released between %v and %v!\n", startYear,
endYear)
 } else {
  log.Printf("Found %v movies. In this list, the plot is <nil> because "+
   "we used a projection expression when scanning for items to return only "+
   "the title, year, and rating.\n", len(releases))
  for _, movie = range releases {
   log.Println(movie)
  }
 }
}
log.Println(strings.Repeat("-", 88))

var tables []string
if questioner.AskBool("Do you want to list all of your tables? (y/n) ", "y") {
 tables, err = tableBasics.ListTables(ctx)
 if err == nil {
  log.Printf("Found %v tables:", len(tables))
  for _, table := range tables {
   log.Printf("\t%v", table)
  }
```

```
  }
 }
 log.Println(strings.Repeat("-", 88))

 log.Printf("Let's remove your movie '%v'.\n", customMovie.Title)
 if questioner.AskBool("Do you want to delete it from the table? (y/n) ", "y") {
  err = tableBasics.DeleteMovie(ctx, customMovie)
 }
 if err == nil {
  log.Printf("Deleted %v.\n", customMovie.Title)
 }

 if questioner.AskBool("Delete the table, too? (y/n)", "y") {
  err = tableBasics.DeleteTable(ctx)
 } else {
  log.Println("Don't forget to delete the table when you're done or you might " +
   "incur charges on your account.")
 }
 if err == nil {
  log.Printf("Deleted table %v.\n", tableBasics.TableName)
 }

 log.Println(strings.Repeat("-", 88))
 log.Println("Thanks for watching!")
 log.Println(strings.Repeat("-", 88))
}
```

定義此範例中使用的 Movie 結構。

```
import (
 "archive/zip"
 "bytes"
 "encoding/json"
 "fmt"
 "io"
 "log"
 "net/http"

 "github.com/aws/aws-sdk-go-v2/feature/dynamodb/attributevalue"
 "github.com/aws/aws-sdk-go-v2/service/dynamodb/types"
```

```
)

// Movie encapsulates data about a movie. Title and Year are the composite primary
 key
// of the movie in Amazon DynamoDB. Title is the sort key, Year is the partition
 key,
// and Info is additional data.
type Movie struct {
 Title string                 `dynamodbav:"title"`
 Year  int                    `dynamodbav:"year"`
 Info  map[string]interface{} `dynamodbav:"info"`
}

// GetKey returns the composite primary key of the movie in a format that can be
// sent to DynamoDB.
func (movie Movie) GetKey() map[string]types.AttributeValue {
 title, err := attributevalue.Marshal(movie.Title)
 if err != nil {
  panic(err)
 }
 year, err := attributevalue.Marshal(movie.Year)
 if err != nil {
  panic(err)
 }
 return map[string]types.AttributeValue{"title": title, "year": year}
}

// String returns the title, year, rating, and plot of a movie, formatted for the
 example.
func (movie Movie) String() string {
 return fmt.Sprintf("%v\n\tReleased: %v\n\tRating: %v\n\tPlot: %v\n",
  movie.Title, movie.Year, movie.Info["rating"], movie.Info["plot"])
}
```

建立呼叫 DynamoDB 動作的結構和方法。

```
import (
 "context"
 "errors"
 "log"
```

```
 "time"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/feature/dynamodb/attributevalue"
 "github.com/aws/aws-sdk-go-v2/feature/dynamodb/expression"
 "github.com/aws/aws-sdk-go-v2/service/dynamodb"
 "github.com/aws/aws-sdk-go-v2/service/dynamodb/types"
)

// TableBasics encapsulates the Amazon DynamoDB service actions used in the
 examples.
// It contains a DynamoDB service client that is used to act on the specified table.
type TableBasics struct {
 DynamoDbClient *dynamodb.Client
 TableName      string
}



// TableExists determines whether a DynamoDB table exists.
func (basics TableBasics) TableExists(ctx context.Context) (bool, error) {
 exists := true
 _, err := basics.DynamoDbClient.DescribeTable(
  ctx, &dynamodb.DescribeTableInput{TableName: aws.String(basics.TableName)},
 )
 if err != nil {
  var notFoundEx *types.ResourceNotFoundException
  if errors.As(err, &notFoundEx) {
   log.Printf("Table %v does not exist.\n", basics.TableName)
   err = nil
  } else {
   log.Printf("Couldn't determine existence of table %v. Here's why: %v\n",
 basics.TableName, err)
  }
  exists = false
 }
 return exists, err
}



// CreateMovieTable creates a DynamoDB table with a composite primary key defined as
// a string sort key named `title`, and a numeric partition key named `year`.
// This function uses NewTableExistsWaiter to wait for the table to be created by
```

```
// DynamoDB before it returns.
func (basics TableBasics) CreateMovieTable(ctx context.Context)
 (*types.TableDescription, error) {
 var tableDesc *types.TableDescription
 table, err := basics.DynamoDbClient.CreateTable(ctx, &dynamodb.CreateTableInput{
  AttributeDefinitions: []types.AttributeDefinition{{
   AttributeName: aws.String("year"),
   AttributeType: types.ScalarAttributeTypeN,
  }, {
   AttributeName: aws.String("title"),
   AttributeType: types.ScalarAttributeTypeS,
  }},
  KeySchema: []types.KeySchemaElement{{
   AttributeName: aws.String("year"),
   KeyType:       types.KeyTypeHash,
  }, {
   AttributeName: aws.String("title"),
   KeyType:       types.KeyTypeRange,
  }},
  TableName:   aws.String(basics.TableName),
  BillingMode: types.BillingModePayPerRequest,
 })
 if err != nil {
  log.Printf("Couldn't create table %v. Here's why: %v\n", basics.TableName, err)
 } else {
  waiter := dynamodb.NewTableExistsWaiter(basics.DynamoDbClient)
  err = waiter.Wait(ctx, &dynamodb.DescribeTableInput{
   TableName: aws.String(basics.TableName)}, 5*time.Minute)
  if err != nil {
   log.Printf("Wait for table exists failed. Here's why: %v\n", err)
  }
  tableDesc = table.TableDescription
  log.Printf("Ccreating table test")
 }
 return tableDesc, err
}



// ListTables lists the DynamoDB table names for the current account.
func (basics TableBasics) ListTables(ctx context.Context) ([]string, error) {
 var tableNames []string
 var output *dynamodb.ListTablesOutput
 var err error
```

```
 tablePaginator := dynamodb.NewListTablesPaginator(basics.DynamoDbClient,
 &dynamodb.ListTablesInput{})
 for tablePaginator.HasMorePages() {
  output, err = tablePaginator.NextPage(ctx)
  if err != nil {
   log.Printf("Couldn't list tables. Here's why: %v\n", err)
   break
  } else {
   tableNames = append(tableNames, output.TableNames...)
  }
 }
 return tableNames, err
}



// AddMovie adds a movie the DynamoDB table.
func (basics TableBasics) AddMovie(ctx context.Context, movie Movie) error {
 item, err := attributevalue.MarshalMap(movie)
 if err != nil {
  panic(err)
 }
 _, err = basics.DynamoDbClient.PutItem(ctx, &dynamodb.PutItemInput{
  TableName: aws.String(basics.TableName), Item: item,
 })
 if err != nil {
  log.Printf("Couldn't add item to table. Here's why: %v\n", err)
 }
 return err
}



// UpdateMovie updates the rating and plot of a movie that already exists in the
// DynamoDB table. This function uses the `expression` package to build the update
// expression.
func (basics TableBasics) UpdateMovie(ctx context.Context, movie Movie)
 (map[string]map[string]interface{}, error) {
 var err error
 var response *dynamodb.UpdateItemOutput
 var attributeMap map[string]map[string]interface{}
 update := expression.Set(expression.Name("info.rating"),
 expression.Value(movie.Info["rating"]))
 update.Set(expression.Name("info.plot"), expression.Value(movie.Info["plot"]))
```

```
 expr, err := expression.NewBuilder().WithUpdate(update).Build()
 if err != nil {
  log.Printf("Couldn't build expression for update. Here's why: %v\n", err)
 } else {
  response, err = basics.DynamoDbClient.UpdateItem(ctx, &dynamodb.UpdateItemInput{
   TableName:                 aws.String(basics.TableName),
   Key:                       movie.GetKey(),
   ExpressionAttributeNames:  expr.Names(),
   ExpressionAttributeValues: expr.Values(),
   UpdateExpression:          expr.Update(),
   ReturnValues:              types.ReturnValueUpdatedNew,
  })
  if err != nil {
   log.Printf("Couldn't update movie %v. Here's why: %v\n", movie.Title, err)
  } else {
   err = attributevalue.UnmarshalMap(response.Attributes, &attributeMap)
   if err != nil {
    log.Printf("Couldn't unmarshall update response. Here's why: %v\n", err)
   }
  }
 }
 return attributeMap, err
}



// AddMovieBatch adds a slice of movies to the DynamoDB table. The function sends
// batches of 25 movies to DynamoDB until all movies are added or it reaches the
// specified maximum.
func (basics TableBasics) AddMovieBatch(ctx context.Context, movies []Movie,
 maxMovies int) (int, error) {
 var err error
 var item map[string]types.AttributeValue
 written := 0
 batchSize := 25 // DynamoDB allows a maximum batch size of 25 items.
 start := 0
 end := start + batchSize
 for start < maxMovies && start < len(movies) {
  var writeReqs []types.WriteRequest
  if end > len(movies) {
   end = len(movies)
  }
  for _, movie := range movies[start:end] {
   item, err = attributevalue.MarshalMap(movie)
```

```
   if err != nil {
    log.Printf("Couldn't marshal movie %v for batch writing. Here's why: %v\n",
 movie.Title, err)
   } else {
    writeReqs = append(
     writeReqs,
     types.WriteRequest{PutRequest: &types.PutRequest{Item: item}},
    )
   }
  }
  _, err = basics.DynamoDbClient.BatchWriteItem(ctx, &dynamodb.BatchWriteItemInput{
   RequestItems: map[string][]types.WriteRequest{basics.TableName: writeReqs}})
  if err != nil {
   log.Printf("Couldn't add a batch of movies to %v. Here's why: %v\n",
 basics.TableName, err)
  } else {
   written += len(writeReqs)
  }
  start = end
  end += batchSize
 }

 return written, err
}



// GetMovie gets movie data from the DynamoDB table by using the primary composite
 key
// made of title and year.
func (basics TableBasics) GetMovie(ctx context.Context, title string, year int)
 (Movie, error) {
 movie := Movie{Title: title, Year: year}
 response, err := basics.DynamoDbClient.GetItem(ctx, &dynamodb.GetItemInput{
  Key: movie.GetKey(), TableName: aws.String(basics.TableName),
 })
 if err != nil {
  log.Printf("Couldn't get info about %v. Here's why: %v\n", title, err)
 } else {
  err = attributevalue.UnmarshalMap(response.Item, &movie)
  if err != nil {
   log.Printf("Couldn't unmarshal response. Here's why: %v\n", err)
  }
 }
```

```
 return movie, err
}



// Query gets all movies in the DynamoDB table that were released in the specified
 year.
// The function uses the `expression` package to build the key condition expression
// that is used in the query.
func (basics TableBasics) Query(ctx context.Context, releaseYear int) ([]Movie,
 error) {
 var err error
 var response *dynamodb.QueryOutput
 var movies []Movie
 keyEx := expression.Key("year").Equal(expression.Value(releaseYear))
 expr, err := expression.NewBuilder().WithKeyCondition(keyEx).Build()
 if err != nil {
  log.Printf("Couldn't build expression for query. Here's why: %v\n", err)
 } else {
  queryPaginator := dynamodb.NewQueryPaginator(basics.DynamoDbClient,
 &dynamodb.QueryInput{
   TableName:                 aws.String(basics.TableName),
   ExpressionAttributeNames:  expr.Names(),
   ExpressionAttributeValues: expr.Values(),
   KeyConditionExpression:    expr.KeyCondition(),
  })
  for queryPaginator.HasMorePages() {
   response, err = queryPaginator.NextPage(ctx)
   if err != nil {
    log.Printf("Couldn't query for movies released in %v. Here's why: %v\n",
 releaseYear, err)
    break
   } else {
    var moviePage []Movie
    err = attributevalue.UnmarshalListOfMaps(response.Items, &moviePage)
    if err != nil {
     log.Printf("Couldn't unmarshal query response. Here's why: %v\n", err)
     break
    } else {
     movies = append(movies, moviePage...)
    }
   }
  }
 }
```

```
 return movies, err
}



// Scan gets all movies in the DynamoDB table that were released in a range of years
// and projects them to return a reduced set of fields.
// The function uses the `expression` package to build the filter and projection
// expressions.
func (basics TableBasics) Scan(ctx context.Context, startYear int, endYear int)
 ([]Movie, error) {
 var movies []Movie
 var err error
 var response *dynamodb.ScanOutput
 filtEx := expression.Name("year").Between(expression.Value(startYear),
 expression.Value(endYear))
 projEx := expression.NamesList(
  expression.Name("year"), expression.Name("title"), expression.Name("info.rating"))
 expr, err :=
 expression.NewBuilder().WithFilter(filtEx).WithProjection(projEx).Build()
 if err != nil {
  log.Printf("Couldn't build expressions for scan. Here's why: %v\n", err)
 } else {
  scanPaginator := dynamodb.NewScanPaginator(basics.DynamoDbClient,
 &dynamodb.ScanInput{
   TableName:                 aws.String(basics.TableName),
   ExpressionAttributeNames:  expr.Names(),
   ExpressionAttributeValues: expr.Values(),
   FilterExpression:          expr.Filter(),
   ProjectionExpression:      expr.Projection(),
  })
  for scanPaginator.HasMorePages() {
   response, err = scanPaginator.NextPage(ctx)
   if err != nil {
    log.Printf("Couldn't scan for movies released between %v and %v. Here's why: %v
\n",
     startYear, endYear, err)
    break
   } else {
    var moviePage []Movie
    err = attributevalue.UnmarshalListOfMaps(response.Items, &moviePage)
    if err != nil {
     log.Printf("Couldn't unmarshal query response. Here's why: %v\n", err)
     break
```

```
    } else {
     movies = append(movies, moviePage...)
    }
   }
  }
 }
 return movies, err
}



// DeleteMovie removes a movie from the DynamoDB table.
func (basics TableBasics) DeleteMovie(ctx context.Context, movie Movie) error {
 _, err := basics.DynamoDbClient.DeleteItem(ctx, &dynamodb.DeleteItemInput{
  TableName: aws.String(basics.TableName), Key: movie.GetKey(),
 })
 if err != nil {
  log.Printf("Couldn't delete %v from the table. Here's why: %v\n", movie.Title,
 err)
 }
 return err
}



// DeleteTable deletes the DynamoDB table and all of its data.
func (basics TableBasics) DeleteTable(ctx context.Context) error {
 _, err := basics.DynamoDbClient.DeleteTable(ctx, &dynamodb.DeleteTableInput{
  TableName: aws.String(basics.TableName)})
 if err != nil {
  log.Printf("Couldn't delete table %v. Here's why: %v\n", basics.TableName, err)
 }
 return err
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的下列主題。
  - BatchWriteItem
  - CreateTable
  - DeleteItem
  - DeleteTable

- DescribeTable
- GetItem
- PutItem
- Query
- Scan
- UpdateItem

## 動作

### `BatchExecuteStatement`

以下程式碼範例顯示如何使用 `BatchExecuteStatement`。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

定義範例的函數接收器結構。

```
import (
 "context"
 "fmt"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/feature/dynamodb/attributevalue"
 "github.com/aws/aws-sdk-go-v2/service/dynamodb"
 "github.com/aws/aws-sdk-go-v2/service/dynamodb/types"
)

// PartiQLRunner encapsulates the Amazon DynamoDB service actions used in the
// PartiQL examples. It contains a DynamoDB service client that is used to act on
 the
// specified table.
```

```
type PartiQLRunner struct {
 DynamoDbClient *dynamodb.Client
 TableName      string
}
```

使用多批 INSERT 陳述式新增項目。

```
// AddMovieBatch runs a batch of PartiQL INSERT statements to add multiple movies to
 the
// DynamoDB table.
func (runner PartiQLRunner) AddMovieBatch(ctx context.Context, movies []Movie) error
 {
 statementRequests := make([]types.BatchStatementRequest, len(movies))
 for index, movie := range movies {
  params, err := attributevalue.MarshalList([]interface{}{movie.Title, movie.Year,
 movie.Info})
  if err != nil {
   panic(err)
  }
  statementRequests[index] = types.BatchStatementRequest{
   Statement: aws.String(fmt.Sprintf(
    "INSERT INTO \"%v\" VALUE {'title': ?, 'year': ?, 'info': ?}",
 runner.TableName)),
   Parameters: params,
  }
 }

 _, err := runner.DynamoDbClient.BatchExecuteStatement(ctx,
 &dynamodb.BatchExecuteStatementInput{
  Statements: statementRequests,
 })
 if err != nil {
  log.Printf("Couldn't insert a batch of items with PartiQL. Here's why: %v\n", err)
 }
 return err
}
```

使用多批 SELECT 陳述式取得項目。

```
// GetMovieBatch runs a batch of PartiQL SELECT statements to get multiple movies
 from
// the DynamoDB table by title and year.
func (runner PartiQLRunner) GetMovieBatch(ctx context.Context, movies []Movie)
 ([]Movie, error) {
 statementRequests := make([]types.BatchStatementRequest, len(movies))
 for index, movie := range movies {
  params, err := attributevalue.MarshalList([]interface{}{movie.Title, movie.Year})
  if err != nil {
   panic(err)
  }
  statementRequests[index] = types.BatchStatementRequest{
   Statement: aws.String(
    fmt.Sprintf("SELECT * FROM \"%v\" WHERE title=? AND year=?", runner.TableName)),
   Parameters: params,
  }
 }

 output, err := runner.DynamoDbClient.BatchExecuteStatement(ctx,
 &dynamodb.BatchExecuteStatementInput{
  Statements: statementRequests,
 })
 var outMovies []Movie
 if err != nil {
  log.Printf("Couldn't get a batch of items with PartiQL. Here's why: %v\n", err)
 } else {
  for _, response := range output.Responses {
   var movie Movie
   err = attributevalue.UnmarshalMap(response.Item, &movie)
   if err != nil {
    log.Printf("Couldn't unmarshal response. Here's why: %v\n", err)
   } else {
    outMovies = append(outMovies, movie)
   }
  }
 }
 return outMovies, err
}
```

使用多批 UPDATE 陳述式更新項目。

```
// UpdateMovieBatch runs a batch of PartiQL UPDATE statements to update the rating
 of
// multiple movies that already exist in the DynamoDB table.
func (runner PartiQLRunner) UpdateMovieBatch(ctx context.Context, movies []Movie,
 ratings []float64) error {
 statementRequests := make([]types.BatchStatementRequest, len(movies))
 for index, movie := range movies {
  params, err := attributevalue.MarshalList([]interface{}{ratings[index],
 movie.Title, movie.Year})
  if err != nil {
   panic(err)
  }
  statementRequests[index] = types.BatchStatementRequest{
   Statement: aws.String(
    fmt.Sprintf("UPDATE \"%v\" SET info.rating=? WHERE title=? AND year=?",
 runner.TableName)),
   Parameters: params,
  }
 }

 _, err := runner.DynamoDbClient.BatchExecuteStatement(ctx,
 &dynamodb.BatchExecuteStatementInput{
  Statements: statementRequests,
 })
 if err != nil {
  log.Printf("Couldn't update the batch of movies. Here's why: %v\n", err)
 }
 return err
}
```

使用多批 DELETE 陳述式刪除項目。

```
// DeleteMovieBatch runs a batch of PartiQL DELETE statements to remove multiple
 movies
// from the DynamoDB table.
func (runner PartiQLRunner) DeleteMovieBatch(ctx context.Context, movies []Movie)
 error {
 statementRequests := make([]types.BatchStatementRequest, len(movies))
 for index, movie := range movies {
```

```
  params, err := attributevalue.MarshalList([]interface{}{movie.Title, movie.Year})
  if err != nil {
   panic(err)
  }
  statementRequests[index] = types.BatchStatementRequest{
   Statement: aws.String(
    fmt.Sprintf("DELETE FROM \"%v\" WHERE title=? AND year=?", runner.TableName)),
   Parameters: params,
  }
 }

 _, err := runner.DynamoDbClient.BatchExecuteStatement(ctx,
 &dynamodb.BatchExecuteStatementInput{
  Statements: statementRequests,
 })
 if err != nil {
  log.Printf("Couldn't delete the batch of movies. Here's why: %v\n", err)
 }
 return err
}
```

定義此範例中使用的 Movie 結構。

```
import (
 "archive/zip"
 "bytes"
 "encoding/json"
 "fmt"
 "io"
 "log"
 "net/http"

 "github.com/aws/aws-sdk-go-v2/feature/dynamodb/attributevalue"
 "github.com/aws/aws-sdk-go-v2/service/dynamodb/types"
)

// Movie encapsulates data about a movie. Title and Year are the composite primary
 key
// of the movie in Amazon DynamoDB. Title is the sort key, Year is the partition
 key,
```

```
// and Info is additional data.
type Movie struct {
 Title string                 `dynamodbav:"title"`
 Year  int                    `dynamodbav:"year"`
 Info  map[string]interface{} `dynamodbav:"info"`
}

// GetKey returns the composite primary key of the movie in a format that can be
// sent to DynamoDB.
func (movie Movie) GetKey() map[string]types.AttributeValue {
 title, err := attributevalue.Marshal(movie.Title)
 if err != nil {
  panic(err)
 }
 year, err := attributevalue.Marshal(movie.Year)
 if err != nil {
  panic(err)
 }
 return map[string]types.AttributeValue{"title": title, "year": year}
}

// String returns the title, year, rating, and plot of a movie, formatted for the
 example.
func (movie Movie) String() string {
 return fmt.Sprintf("%v\n\tReleased: %v\n\tRating: %v\n\tPlot: %v\n",
  movie.Title, movie.Year, movie.Info["rating"], movie.Info["plot"])
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的 BatchExecuteStatement。

### `BatchWriteItem`

以下程式碼範例顯示如何使用 `BatchWriteItem`。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "context"
 "errors"
 "log"
 "time"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/feature/dynamodb/attributevalue"
 "github.com/aws/aws-sdk-go-v2/feature/dynamodb/expression"
 "github.com/aws/aws-sdk-go-v2/service/dynamodb"
 "github.com/aws/aws-sdk-go-v2/service/dynamodb/types"
)

// TableBasics encapsulates the Amazon DynamoDB service actions used in the
 examples.
// It contains a DynamoDB service client that is used to act on the specified table.
type TableBasics struct {
 DynamoDbClient *dynamodb.Client
 TableName      string
}



// AddMovieBatch adds a slice of movies to the DynamoDB table. The function sends
// batches of 25 movies to DynamoDB until all movies are added or it reaches the
// specified maximum.
func (basics TableBasics) AddMovieBatch(ctx context.Context, movies []Movie,
 maxMovies int) (int, error) {
 var err error
 var item map[string]types.AttributeValue
 written := 0
 batchSize := 25 // DynamoDB allows a maximum batch size of 25 items.
 start := 0
```

```
 end := start + batchSize
 for start < maxMovies && start < len(movies) {
  var writeReqs []types.WriteRequest
  if end > len(movies) {
   end = len(movies)
  }
  for _, movie := range movies[start:end] {
   item, err = attributevalue.MarshalMap(movie)
   if err != nil {
    log.Printf("Couldn't marshal movie %v for batch writing. Here's why: %v\n",
 movie.Title, err)
   } else {
    writeReqs = append(
     writeReqs,
     types.WriteRequest{PutRequest: &types.PutRequest{Item: item}},
    )
   }
  }
  _, err = basics.DynamoDbClient.BatchWriteItem(ctx, &dynamodb.BatchWriteItemInput{
   RequestItems: map[string][]types.WriteRequest{basics.TableName: writeReqs}})
  if err != nil {
   log.Printf("Couldn't add a batch of movies to %v. Here's why: %v\n",
 basics.TableName, err)
  } else {
   written += len(writeReqs)
  }
  start = end
  end += batchSize
 }

 return written, err
}
```

定義此範例中使用的 Movie 結構。

```
import (
 "archive/zip"
 "bytes"
 "encoding/json"
 "fmt"
```

```
 "io"
 "log"
 "net/http"

 "github.com/aws/aws-sdk-go-v2/feature/dynamodb/attributevalue"
 "github.com/aws/aws-sdk-go-v2/service/dynamodb/types"
)

// Movie encapsulates data about a movie. Title and Year are the composite primary
 key
// of the movie in Amazon DynamoDB. Title is the sort key, Year is the partition
 key,
// and Info is additional data.
type Movie struct {
 Title string                 `dynamodbav:"title"`
 Year  int                    `dynamodbav:"year"`
 Info  map[string]interface{} `dynamodbav:"info"`
}

// GetKey returns the composite primary key of the movie in a format that can be
// sent to DynamoDB.
func (movie Movie) GetKey() map[string]types.AttributeValue {
 title, err := attributevalue.Marshal(movie.Title)
 if err != nil {
  panic(err)
 }
 year, err := attributevalue.Marshal(movie.Year)
 if err != nil {
  panic(err)
 }
 return map[string]types.AttributeValue{"title": title, "year": year}
}

// String returns the title, year, rating, and plot of a movie, formatted for the
 example.
func (movie Movie) String() string {
 return fmt.Sprintf("%v\n\tReleased: %v\n\tRating: %v\n\tPlot: %v\n",
  movie.Title, movie.Year, movie.Info["rating"], movie.Info["plot"])
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的 BatchWriteItem。

### `CreateTable`

以下程式碼範例顯示如何使用 `CreateTable`。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "context"
 "errors"
 "log"
 "time"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/feature/dynamodb/attributevalue"
 "github.com/aws/aws-sdk-go-v2/feature/dynamodb/expression"
 "github.com/aws/aws-sdk-go-v2/service/dynamodb"
 "github.com/aws/aws-sdk-go-v2/service/dynamodb/types"
)

// TableBasics encapsulates the Amazon DynamoDB service actions used in the
 examples.
// It contains a DynamoDB service client that is used to act on the specified table.
type TableBasics struct {
 DynamoDbClient *dynamodb.Client
 TableName      string
}



// CreateMovieTable creates a DynamoDB table with a composite primary key defined as
// a string sort key named `title`, and a numeric partition key named `year`.
// This function uses NewTableExistsWaiter to wait for the table to be created by
// DynamoDB before it returns.
func (basics TableBasics) CreateMovieTable(ctx context.Context)
 (*types.TableDescription, error) {
 var tableDesc *types.TableDescription
```

```
 table, err := basics.DynamoDbClient.CreateTable(ctx, &dynamodb.CreateTableInput{
  AttributeDefinitions: []types.AttributeDefinition{{
   AttributeName: aws.String("year"),
   AttributeType: types.ScalarAttributeTypeN,
  }, {
   AttributeName: aws.String("title"),
   AttributeType: types.ScalarAttributeTypeS,
  }},
  KeySchema: []types.KeySchemaElement{{
   AttributeName: aws.String("year"),
   KeyType:       types.KeyTypeHash,
  }, {
   AttributeName: aws.String("title"),
   KeyType:       types.KeyTypeRange,
  }},
  TableName:   aws.String(basics.TableName),
  BillingMode: types.BillingModePayPerRequest,
 })
 if err != nil {
  log.Printf("Couldn't create table %v. Here's why: %v\n", basics.TableName, err)
 } else {
  waiter := dynamodb.NewTableExistsWaiter(basics.DynamoDbClient)
  err = waiter.Wait(ctx, &dynamodb.DescribeTableInput{
   TableName: aws.String(basics.TableName)}, 5*time.Minute)
  if err != nil {
   log.Printf("Wait for table exists failed. Here's why: %v\n", err)
  }
  tableDesc = table.TableDescription
  log.Printf("Ccreating table test")
 }
 return tableDesc, err
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的 CreateTable。

### DeleteItem

以下程式碼範例顯示如何使用 DeleteItem。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "context"
 "errors"
 "log"
 "time"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/feature/dynamodb/attributevalue"
 "github.com/aws/aws-sdk-go-v2/feature/dynamodb/expression"
 "github.com/aws/aws-sdk-go-v2/service/dynamodb"
 "github.com/aws/aws-sdk-go-v2/service/dynamodb/types"
)

// TableBasics encapsulates the Amazon DynamoDB service actions used in the
 examples.
// It contains a DynamoDB service client that is used to act on the specified table.
type TableBasics struct {
 DynamoDbClient *dynamodb.Client
 TableName      string
}



// DeleteMovie removes a movie from the DynamoDB table.
func (basics TableBasics) DeleteMovie(ctx context.Context, movie Movie) error {
 _, err := basics.DynamoDbClient.DeleteItem(ctx, &dynamodb.DeleteItemInput{
  TableName: aws.String(basics.TableName), Key: movie.GetKey(),
 })
 if err != nil {
  log.Printf("Couldn't delete %v from the table. Here's why: %v\n", movie.Title,
 err)
 }
 return err
```

```
}
```

定義此範例中使用的 Movie 結構。

```
import (
 "archive/zip"
 "bytes"
 "encoding/json"
 "fmt"
 "io"
 "log"
 "net/http"

 "github.com/aws/aws-sdk-go-v2/feature/dynamodb/attributevalue"
 "github.com/aws/aws-sdk-go-v2/service/dynamodb/types"
)

// Movie encapsulates data about a movie. Title and Year are the composite primary
 key
// of the movie in Amazon DynamoDB. Title is the sort key, Year is the partition
 key,
// and Info is additional data.
type Movie struct {
 Title string                 `dynamodbav:"title"`
 Year  int                    `dynamodbav:"year"`
 Info  map[string]interface{} `dynamodbav:"info"`
}

// GetKey returns the composite primary key of the movie in a format that can be
// sent to DynamoDB.
func (movie Movie) GetKey() map[string]types.AttributeValue {
 title, err := attributevalue.Marshal(movie.Title)
 if err != nil {
  panic(err)
 }
 year, err := attributevalue.Marshal(movie.Year)
 if err != nil {
  panic(err)
 }
 return map[string]types.AttributeValue{"title": title, "year": year}
```

```
}

// String returns the title, year, rating, and plot of a movie, formatted for the
 example.
func (movie Movie) String() string {
 return fmt.Sprintf("%v\n\tReleased: %v\n\tRating: %v\n\tPlot: %v\n",
  movie.Title, movie.Year, movie.Info["rating"], movie.Info["plot"])
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的 DeleteItem。

### `DeleteTable`

以下程式碼範例顯示如何使用 `DeleteTable`。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "context"
 "errors"
 "log"
 "time"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/feature/dynamodb/attributevalue"
 "github.com/aws/aws-sdk-go-v2/feature/dynamodb/expression"
 "github.com/aws/aws-sdk-go-v2/service/dynamodb"
 "github.com/aws/aws-sdk-go-v2/service/dynamodb/types"
)

// TableBasics encapsulates the Amazon DynamoDB service actions used in the
 examples.
```

```
// It contains a DynamoDB service client that is used to act on the specified table.
type TableBasics struct {
 DynamoDbClient *dynamodb.Client
 TableName      string
}



// DeleteTable deletes the DynamoDB table and all of its data.
func (basics TableBasics) DeleteTable(ctx context.Context) error {
 _, err := basics.DynamoDbClient.DeleteTable(ctx, &dynamodb.DeleteTableInput{
  TableName: aws.String(basics.TableName)})
 if err != nil {
  log.Printf("Couldn't delete table %v. Here's why: %v\n", basics.TableName, err)
 }
 return err
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的 DeleteTable。

### `DescribeTable`

以下程式碼範例顯示如何使用 `DescribeTable`。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "context"
 "errors"
 "log"
 "time"

 "github.com/aws/aws-sdk-go-v2/aws"
```

```
 "github.com/aws/aws-sdk-go-v2/feature/dynamodb/attributevalue"
 "github.com/aws/aws-sdk-go-v2/feature/dynamodb/expression"
 "github.com/aws/aws-sdk-go-v2/service/dynamodb"
 "github.com/aws/aws-sdk-go-v2/service/dynamodb/types"
)

// TableBasics encapsulates the Amazon DynamoDB service actions used in the
 examples.
// It contains a DynamoDB service client that is used to act on the specified table.
type TableBasics struct {
 DynamoDbClient *dynamodb.Client
 TableName      string
}



// TableExists determines whether a DynamoDB table exists.
func (basics TableBasics) TableExists(ctx context.Context) (bool, error) {
 exists := true
 _, err := basics.DynamoDbClient.DescribeTable(
  ctx, &dynamodb.DescribeTableInput{TableName: aws.String(basics.TableName)},
 )
 if err != nil {
  var notFoundEx *types.ResourceNotFoundException
  if errors.As(err, &notFoundEx) {
   log.Printf("Table %v does not exist.\n", basics.TableName)
   err = nil
  } else {
   log.Printf("Couldn't determine existence of table %v. Here's why: %v\n",
 basics.TableName, err)
  }
  exists = false
 }
 return exists, err
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的 DescribeTable。

### `ExecuteStatement`

以下程式碼範例顯示如何使用 `ExecuteStatement`。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

定義範例的函數接收器結構。

```
import (
 "context"
 "fmt"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/feature/dynamodb/attributevalue"
 "github.com/aws/aws-sdk-go-v2/service/dynamodb"
 "github.com/aws/aws-sdk-go-v2/service/dynamodb/types"
)

// PartiQLRunner encapsulates the Amazon DynamoDB service actions used in the
// PartiQL examples. It contains a DynamoDB service client that is used to act on
 the
// specified table.
type PartiQLRunner struct {
 DynamoDbClient *dynamodb.Client
 TableName      string
}
```

使用 INSERT 陳述式新增項目。

```
// AddMovie runs a PartiQL INSERT statement to add a movie to the DynamoDB table.
func (runner PartiQLRunner) AddMovie(ctx context.Context, movie Movie) error {
 params, err := attributevalue.MarshalList([]interface{}{movie.Title, movie.Year,
 movie.Info})
 if err != nil {
  panic(err)
```

```
 }
 _, err = runner.DynamoDbClient.ExecuteStatement(ctx,
 &dynamodb.ExecuteStatementInput{
  Statement: aws.String(
   fmt.Sprintf("INSERT INTO \"%v\" VALUE {'title': ?, 'year': ?, 'info': ?}",
    runner.TableName)),
  Parameters: params,
 })
 if err != nil {
  log.Printf("Couldn't insert an item with PartiQL. Here's why: %v\n", err)
 }
 return err
}
```

使用 SELECT 陳述式取得項目。

```
// GetMovie runs a PartiQL SELECT statement to get a movie from the DynamoDB table
 by
// title and year.
func (runner PartiQLRunner) GetMovie(ctx context.Context, title string, year int)
 (Movie, error) {
 var movie Movie
 params, err := attributevalue.MarshalList([]interface{}{title, year})
 if err != nil {
  panic(err)
 }
 response, err := runner.DynamoDbClient.ExecuteStatement(ctx,
 &dynamodb.ExecuteStatementInput{
  Statement: aws.String(
   fmt.Sprintf("SELECT * FROM \"%v\" WHERE title=? AND year=?",
    runner.TableName)),
  Parameters: params,
 })
 if err != nil {
  log.Printf("Couldn't get info about %v. Here's why: %v\n", title, err)
 } else {
  err = attributevalue.UnmarshalMap(response.Items[0], &movie)
  if err != nil {
   log.Printf("Couldn't unmarshal response. Here's why: %v\n", err)
  }
```

```
 }
 return movie, err
}
```

使用 SELECT 陳述式取得項目清單並推斷結果。

```
// GetAllMovies runs a PartiQL SELECT statement to get all movies from the DynamoDB
 table.
// pageSize is not typically required and is used to show how to paginate the
 results.
// The results are projected to return only the title and rating of each movie.
func (runner PartiQLRunner) GetAllMovies(ctx context.Context, pageSize int32)
 ([]map[string]interface{}, error) {
 var output []map[string]interface{}
 var response *dynamodb.ExecuteStatementOutput
 var err error
 var nextToken *string
 for moreData := true; moreData; {
  response, err = runner.DynamoDbClient.ExecuteStatement(ctx,
 &dynamodb.ExecuteStatementInput{
   Statement: aws.String(
    fmt.Sprintf("SELECT title, info.rating FROM \"%v\"", runner.TableName)),
   Limit:     aws.Int32(pageSize),
   NextToken: nextToken,
  })
  if err != nil {
   log.Printf("Couldn't get movies. Here's why: %v\n", err)
   moreData = false
  } else {
   var pageOutput []map[string]interface{}
   err = attributevalue.UnmarshalListOfMaps(response.Items, &pageOutput)
   if err != nil {
    log.Printf("Couldn't unmarshal response. Here's why: %v\n", err)
   } else {
    log.Printf("Got a page of length %v.\n", len(response.Items))
    output = append(output, pageOutput...)
   }
   nextToken = response.NextToken
   moreData = nextToken != nil
  }
```

```
 }
 return output, err
}
```

使用 UPDATE 陳述式更新項目。

```
// UpdateMovie runs a PartiQL UPDATE statement to update the rating of a movie that
// already exists in the DynamoDB table.
func (runner PartiQLRunner) UpdateMovie(ctx context.Context, movie Movie, rating
 float64) error {
 params, err := attributevalue.MarshalList([]interface{}{rating, movie.Title,
 movie.Year})
 if err != nil {
  panic(err)
 }
 _, err = runner.DynamoDbClient.ExecuteStatement(ctx,
 &dynamodb.ExecuteStatementInput{
  Statement: aws.String(
   fmt.Sprintf("UPDATE \"%v\" SET info.rating=? WHERE title=? AND year=?",
    runner.TableName)),
  Parameters: params,
 })
 if err != nil {
  log.Printf("Couldn't update movie %v. Here's why: %v\n", movie.Title, err)
 }
 return err
}
```

使用 DELETE 陳述式刪除項目。

```
// DeleteMovie runs a PartiQL DELETE statement to remove a movie from the DynamoDB
 table.
func (runner PartiQLRunner) DeleteMovie(ctx context.Context, movie Movie) error {
 params, err := attributevalue.MarshalList([]interface{}{movie.Title, movie.Year})
 if err != nil {
  panic(err)
 }
```

```
 _, err = runner.DynamoDbClient.ExecuteStatement(ctx,
 &dynamodb.ExecuteStatementInput{
  Statement: aws.String(
   fmt.Sprintf("DELETE FROM \"%v\" WHERE title=? AND year=?",
    runner.TableName)),
  Parameters: params,
 })
 if err != nil {
  log.Printf("Couldn't delete %v from the table. Here's why: %v\n", movie.Title,
 err)
 }
 return err
}
```

定義此範例中使用的 Movie 結構。

```
import (
 "archive/zip"
 "bytes"
 "encoding/json"
 "fmt"
 "io"
 "log"
 "net/http"

 "github.com/aws/aws-sdk-go-v2/feature/dynamodb/attributevalue"
 "github.com/aws/aws-sdk-go-v2/service/dynamodb/types"
)

// Movie encapsulates data about a movie. Title and Year are the composite primary
 key
// of the movie in Amazon DynamoDB. Title is the sort key, Year is the partition
 key,
// and Info is additional data.
type Movie struct {
 Title string                 `dynamodbav:"title"`
 Year  int                    `dynamodbav:"year"`
 Info  map[string]interface{} `dynamodbav:"info"`
}
```

```
// GetKey returns the composite primary key of the movie in a format that can be
// sent to DynamoDB.
func (movie Movie) GetKey() map[string]types.AttributeValue {
 title, err := attributevalue.Marshal(movie.Title)
 if err != nil {
  panic(err)
 }
 year, err := attributevalue.Marshal(movie.Year)
 if err != nil {
  panic(err)
 }
 return map[string]types.AttributeValue{"title": title, "year": year}
}

// String returns the title, year, rating, and plot of a movie, formatted for the
 example.
func (movie Movie) String() string {
 return fmt.Sprintf("%v\n\tReleased: %v\n\tRating: %v\n\tPlot: %v\n",
  movie.Title, movie.Year, movie.Info["rating"], movie.Info["plot"])
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的 ExecuteStatement。

### `GetItem`

以下程式碼範例顯示如何使用 `GetItem`。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "context"
 "errors"
```

```
 "log"
 "time"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/feature/dynamodb/attributevalue"
 "github.com/aws/aws-sdk-go-v2/feature/dynamodb/expression"
 "github.com/aws/aws-sdk-go-v2/service/dynamodb"
 "github.com/aws/aws-sdk-go-v2/service/dynamodb/types"
)

// TableBasics encapsulates the Amazon DynamoDB service actions used in the
 examples.
// It contains a DynamoDB service client that is used to act on the specified table.
type TableBasics struct {
 DynamoDbClient *dynamodb.Client
 TableName      string
}



// GetMovie gets movie data from the DynamoDB table by using the primary composite
 key
// made of title and year.
func (basics TableBasics) GetMovie(ctx context.Context, title string, year int)
 (Movie, error) {
 movie := Movie{Title: title, Year: year}
 response, err := basics.DynamoDbClient.GetItem(ctx, &dynamodb.GetItemInput{
  Key: movie.GetKey(), TableName: aws.String(basics.TableName),
 })
 if err != nil {
  log.Printf("Couldn't get info about %v. Here's why: %v\n", title, err)
 } else {
  err = attributevalue.UnmarshalMap(response.Item, &movie)
  if err != nil {
   log.Printf("Couldn't unmarshal response. Here's why: %v\n", err)
  }
 }
 return movie, err
}
```

定義此範例中使用的 Movie 結構。

```
import (
 "archive/zip"
 "bytes"
 "encoding/json"
 "fmt"
 "io"
 "log"
 "net/http"

 "github.com/aws/aws-sdk-go-v2/feature/dynamodb/attributevalue"
 "github.com/aws/aws-sdk-go-v2/service/dynamodb/types"
)

// Movie encapsulates data about a movie. Title and Year are the composite primary
 key
// of the movie in Amazon DynamoDB. Title is the sort key, Year is the partition
 key,
// and Info is additional data.
type Movie struct {
 Title string                 `dynamodbav:"title"`
 Year  int                    `dynamodbav:"year"`
 Info  map[string]interface{} `dynamodbav:"info"`
}

// GetKey returns the composite primary key of the movie in a format that can be
// sent to DynamoDB.
func (movie Movie) GetKey() map[string]types.AttributeValue {
 title, err := attributevalue.Marshal(movie.Title)
 if err != nil {
  panic(err)
 }
 year, err := attributevalue.Marshal(movie.Year)
 if err != nil {
  panic(err)
 }
 return map[string]types.AttributeValue{"title": title, "year": year}
}

// String returns the title, year, rating, and plot of a movie, formatted for the
 example.
func (movie Movie) String() string {
 return fmt.Sprintf("%v\n\tReleased: %v\n\tRating: %v\n\tPlot: %v\n",
```

```
  movie.Title, movie.Year, movie.Info["rating"], movie.Info["plot"])
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的 GetItem。

### `ListTables`

以下程式碼範例顯示如何使用 `ListTables`。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "context"
 "errors"
 "log"
 "time"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/feature/dynamodb/attributevalue"
 "github.com/aws/aws-sdk-go-v2/feature/dynamodb/expression"
 "github.com/aws/aws-sdk-go-v2/service/dynamodb"
 "github.com/aws/aws-sdk-go-v2/service/dynamodb/types"
)

// TableBasics encapsulates the Amazon DynamoDB service actions used in the
 examples.
// It contains a DynamoDB service client that is used to act on the specified table.
type TableBasics struct {
 DynamoDbClient *dynamodb.Client
 TableName      string
}
```

```
// ListTables lists the DynamoDB table names for the current account.
func (basics TableBasics) ListTables(ctx context.Context) ([]string, error) {
 var tableNames []string
 var output *dynamodb.ListTablesOutput
 var err error
 tablePaginator := dynamodb.NewListTablesPaginator(basics.DynamoDbClient,
 &dynamodb.ListTablesInput{})
 for tablePaginator.HasMorePages() {
  output, err = tablePaginator.NextPage(ctx)
  if err != nil {
   log.Printf("Couldn't list tables. Here's why: %v\n", err)
   break
  } else {
   tableNames = append(tableNames, output.TableNames...)
  }
 }
 return tableNames, err
}
```

- 如需 API 詳細資訊，請參閱 適用於 Go 的 AWS SDK API 參考中的 ListTables。

### `PutItem`

以下程式碼範例顯示如何使用 `PutItem`。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "context"
 "errors"
 "log"
 "time"
```

```
 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/feature/dynamodb/attributevalue"
 "github.com/aws/aws-sdk-go-v2/feature/dynamodb/expression"
 "github.com/aws/aws-sdk-go-v2/service/dynamodb"
 "github.com/aws/aws-sdk-go-v2/service/dynamodb/types"
)

// TableBasics encapsulates the Amazon DynamoDB service actions used in the
 examples.
// It contains a DynamoDB service client that is used to act on the specified table.
type TableBasics struct {
 DynamoDbClient *dynamodb.Client
 TableName      string
}



// AddMovie adds a movie the DynamoDB table.
func (basics TableBasics) AddMovie(ctx context.Context, movie Movie) error {
 item, err := attributevalue.MarshalMap(movie)
 if err != nil {
  panic(err)
 }
 _, err = basics.DynamoDbClient.PutItem(ctx, &dynamodb.PutItemInput{
  TableName: aws.String(basics.TableName), Item: item,
 })
 if err != nil {
  log.Printf("Couldn't add item to table. Here's why: %v\n", err)
 }
 return err
}
```

定義此範例中使用的 Movie 結構。

```
import (
 "archive/zip"
 "bytes"
 "encoding/json"
 "fmt"
```

```
 "io"
 "log"
 "net/http"

 "github.com/aws/aws-sdk-go-v2/feature/dynamodb/attributevalue"
 "github.com/aws/aws-sdk-go-v2/service/dynamodb/types"
)

// Movie encapsulates data about a movie. Title and Year are the composite primary
 key
// of the movie in Amazon DynamoDB. Title is the sort key, Year is the partition
 key,
// and Info is additional data.
type Movie struct {
 Title string                 `dynamodbav:"title"`
 Year  int                    `dynamodbav:"year"`
 Info  map[string]interface{} `dynamodbav:"info"`
}

// GetKey returns the composite primary key of the movie in a format that can be
// sent to DynamoDB.
func (movie Movie) GetKey() map[string]types.AttributeValue {
 title, err := attributevalue.Marshal(movie.Title)
 if err != nil {
  panic(err)
 }
 year, err := attributevalue.Marshal(movie.Year)
 if err != nil {
  panic(err)
 }
 return map[string]types.AttributeValue{"title": title, "year": year}
}

// String returns the title, year, rating, and plot of a movie, formatted for the
 example.
func (movie Movie) String() string {
 return fmt.Sprintf("%v\n\tReleased: %v\n\tRating: %v\n\tPlot: %v\n",
  movie.Title, movie.Year, movie.Info["rating"], movie.Info["plot"])
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的 PutItem。

### `Query`

以下程式碼範例顯示如何使用 `Query`。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "context"
 "errors"
 "log"
 "time"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/feature/dynamodb/attributevalue"
 "github.com/aws/aws-sdk-go-v2/feature/dynamodb/expression"
 "github.com/aws/aws-sdk-go-v2/service/dynamodb"
 "github.com/aws/aws-sdk-go-v2/service/dynamodb/types"
)

// TableBasics encapsulates the Amazon DynamoDB service actions used in the
 examples.
// It contains a DynamoDB service client that is used to act on the specified table.
type TableBasics struct {
 DynamoDbClient *dynamodb.Client
 TableName      string
}



// Query gets all movies in the DynamoDB table that were released in the specified
 year.
// The function uses the `expression` package to build the key condition expression
// that is used in the query.
func (basics TableBasics) Query(ctx context.Context, releaseYear int) ([]Movie,
 error) {
 var err error
```

```
 var response *dynamodb.QueryOutput
 var movies []Movie
 keyEx := expression.Key("year").Equal(expression.Value(releaseYear))
 expr, err := expression.NewBuilder().WithKeyCondition(keyEx).Build()
 if err != nil {
  log.Printf("Couldn't build expression for query. Here's why: %v\n", err)
 } else {
  queryPaginator := dynamodb.NewQueryPaginator(basics.DynamoDbClient,
 &dynamodb.QueryInput{
   TableName:                 aws.String(basics.TableName),
   ExpressionAttributeNames:  expr.Names(),
   ExpressionAttributeValues: expr.Values(),
   KeyConditionExpression:    expr.KeyCondition(),
  })
  for queryPaginator.HasMorePages() {
   response, err = queryPaginator.NextPage(ctx)
   if err != nil {
    log.Printf("Couldn't query for movies released in %v. Here's why: %v\n",
 releaseYear, err)
    break
   } else {
    var moviePage []Movie
    err = attributevalue.UnmarshalListOfMaps(response.Items, &moviePage)
    if err != nil {
     log.Printf("Couldn't unmarshal query response. Here's why: %v\n", err)
     break
    } else {
     movies = append(movies, moviePage...)
    }
   }
  }
 }
 return movies, err
}
```

定義此範例中使用的 Movie 結構。

```
import (
 "archive/zip"
 "bytes"
```

```
 "encoding/json"
 "fmt"
 "io"
 "log"
 "net/http"

 "github.com/aws/aws-sdk-go-v2/feature/dynamodb/attributevalue"
 "github.com/aws/aws-sdk-go-v2/service/dynamodb/types"
)

// Movie encapsulates data about a movie. Title and Year are the composite primary
 key
// of the movie in Amazon DynamoDB. Title is the sort key, Year is the partition
 key,
// and Info is additional data.
type Movie struct {
 Title string                 `dynamodbav:"title"`
 Year  int                    `dynamodbav:"year"`
 Info  map[string]interface{} `dynamodbav:"info"`
}

// GetKey returns the composite primary key of the movie in a format that can be
// sent to DynamoDB.
func (movie Movie) GetKey() map[string]types.AttributeValue {
 title, err := attributevalue.Marshal(movie.Title)
 if err != nil {
  panic(err)
 }
 year, err := attributevalue.Marshal(movie.Year)
 if err != nil {
  panic(err)
 }
 return map[string]types.AttributeValue{"title": title, "year": year}
}

// String returns the title, year, rating, and plot of a movie, formatted for the
 example.
func (movie Movie) String() string {
 return fmt.Sprintf("%v\n\tReleased: %v\n\tRating: %v\n\tPlot: %v\n",
  movie.Title, movie.Year, movie.Info["rating"], movie.Info["plot"])
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的 Query。

### Scan

以下程式碼範例顯示如何使用 Scan。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "context"
 "errors"
 "log"
 "time"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/feature/dynamodb/attributevalue"
 "github.com/aws/aws-sdk-go-v2/feature/dynamodb/expression"
 "github.com/aws/aws-sdk-go-v2/service/dynamodb"
 "github.com/aws/aws-sdk-go-v2/service/dynamodb/types"
)

// TableBasics encapsulates the Amazon DynamoDB service actions used in the
 examples.
// It contains a DynamoDB service client that is used to act on the specified table.
type TableBasics struct {
 DynamoDbClient *dynamodb.Client
 TableName      string
}



// Scan gets all movies in the DynamoDB table that were released in a range of years
// and projects them to return a reduced set of fields.
// The function uses the `expression` package to build the filter and projection
// expressions.
```

```
func (basics TableBasics) Scan(ctx context.Context, startYear int, endYear int)
 ([]Movie, error) {
 var movies []Movie
 var err error
 var response *dynamodb.ScanOutput
 filtEx := expression.Name("year").Between(expression.Value(startYear),
 expression.Value(endYear))
 projEx := expression.NamesList(
  expression.Name("year"), expression.Name("title"), expression.Name("info.rating"))
 expr, err :=
 expression.NewBuilder().WithFilter(filtEx).WithProjection(projEx).Build()
 if err != nil {
  log.Printf("Couldn't build expressions for scan. Here's why: %v\n", err)
 } else {
  scanPaginator := dynamodb.NewScanPaginator(basics.DynamoDbClient,
 &dynamodb.ScanInput{
   TableName:                 aws.String(basics.TableName),
   ExpressionAttributeNames:  expr.Names(),
   ExpressionAttributeValues: expr.Values(),
   FilterExpression:          expr.Filter(),
   ProjectionExpression:      expr.Projection(),
  })
  for scanPaginator.HasMorePages() {
   response, err = scanPaginator.NextPage(ctx)
   if err != nil {
    log.Printf("Couldn't scan for movies released between %v and %v. Here's why: %v
\n",
     startYear, endYear, err)
    break
   } else {
    var moviePage []Movie
    err = attributevalue.UnmarshalListOfMaps(response.Items, &moviePage)
    if err != nil {
     log.Printf("Couldn't unmarshal query response. Here's why: %v\n", err)
     break
    } else {
     movies = append(movies, moviePage...)
    }
   }
  }
 }
 return movies, err
}
```

定義此範例中使用的 Movie 結構。

```
import (
 "archive/zip"
 "bytes"
 "encoding/json"
 "fmt"
 "io"
 "log"
 "net/http"

 "github.com/aws/aws-sdk-go-v2/feature/dynamodb/attributevalue"
 "github.com/aws/aws-sdk-go-v2/service/dynamodb/types"
)

// Movie encapsulates data about a movie. Title and Year are the composite primary
 key
// of the movie in Amazon DynamoDB. Title is the sort key, Year is the partition
 key,
// and Info is additional data.
type Movie struct {
 Title string                 `dynamodbav:"title"`
 Year  int                    `dynamodbav:"year"`
 Info  map[string]interface{} `dynamodbav:"info"`
}

// GetKey returns the composite primary key of the movie in a format that can be
// sent to DynamoDB.
func (movie Movie) GetKey() map[string]types.AttributeValue {
 title, err := attributevalue.Marshal(movie.Title)
 if err != nil {
  panic(err)
 }
 year, err := attributevalue.Marshal(movie.Year)
 if err != nil {
  panic(err)
 }
 return map[string]types.AttributeValue{"title": title, "year": year}
}
```

```
// String returns the title, year, rating, and plot of a movie, formatted for the
 example.
func (movie Movie) String() string {
 return fmt.Sprintf("%v\n\tReleased: %v\n\tRating: %v\n\tPlot: %v\n",
  movie.Title, movie.Year, movie.Info["rating"], movie.Info["plot"])
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的 Scan。

### `UpdateItem`

以下程式碼範例顯示如何使用 `UpdateItem`。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "context"
 "errors"
 "log"
 "time"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/feature/dynamodb/attributevalue"
 "github.com/aws/aws-sdk-go-v2/feature/dynamodb/expression"
 "github.com/aws/aws-sdk-go-v2/service/dynamodb"
 "github.com/aws/aws-sdk-go-v2/service/dynamodb/types"
)

// TableBasics encapsulates the Amazon DynamoDB service actions used in the
 examples.
// It contains a DynamoDB service client that is used to act on the specified table.
type TableBasics struct {
 DynamoDbClient *dynamodb.Client
```

```
 TableName      string
}



// UpdateMovie updates the rating and plot of a movie that already exists in the
// DynamoDB table. This function uses the `expression` package to build the update
// expression.
func (basics TableBasics) UpdateMovie(ctx context.Context, movie Movie)
 (map[string]map[string]interface{}, error) {
 var err error
 var response *dynamodb.UpdateItemOutput
 var attributeMap map[string]map[string]interface{}
 update := expression.Set(expression.Name("info.rating"),
 expression.Value(movie.Info["rating"]))
 update.Set(expression.Name("info.plot"), expression.Value(movie.Info["plot"]))
 expr, err := expression.NewBuilder().WithUpdate(update).Build()
 if err != nil {
  log.Printf("Couldn't build expression for update. Here's why: %v\n", err)
 } else {
  response, err = basics.DynamoDbClient.UpdateItem(ctx, &dynamodb.UpdateItemInput{
   TableName:                 aws.String(basics.TableName),
   Key:                       movie.GetKey(),
   ExpressionAttributeNames:  expr.Names(),
   ExpressionAttributeValues: expr.Values(),
   UpdateExpression:          expr.Update(),
   ReturnValues:              types.ReturnValueUpdatedNew,
  })
  if err != nil {
   log.Printf("Couldn't update movie %v. Here's why: %v\n", movie.Title, err)
  } else {
   err = attributevalue.UnmarshalMap(response.Attributes, &attributeMap)
   if err != nil {
    log.Printf("Couldn't unmarshall update response. Here's why: %v\n", err)
   }
  }
 }
 return attributeMap, err
}
```

定義此範例中使用的 Movie 結構。

```
import (
 "archive/zip"
 "bytes"
 "encoding/json"
 "fmt"
 "io"
 "log"
 "net/http"

 "github.com/aws/aws-sdk-go-v2/feature/dynamodb/attributevalue"
 "github.com/aws/aws-sdk-go-v2/service/dynamodb/types"
)

// Movie encapsulates data about a movie. Title and Year are the composite primary
 key
// of the movie in Amazon DynamoDB. Title is the sort key, Year is the partition
 key,
// and Info is additional data.
type Movie struct {
 Title string                 `dynamodbav:"title"`
 Year  int                    `dynamodbav:"year"`
 Info  map[string]interface{} `dynamodbav:"info"`
}

// GetKey returns the composite primary key of the movie in a format that can be
// sent to DynamoDB.
func (movie Movie) GetKey() map[string]types.AttributeValue {
 title, err := attributevalue.Marshal(movie.Title)
 if err != nil {
  panic(err)
 }
 year, err := attributevalue.Marshal(movie.Year)
 if err != nil {
  panic(err)
 }
 return map[string]types.AttributeValue{"title": title, "year": year}
}

// String returns the title, year, rating, and plot of a movie, formatted for the
 example.
func (movie Movie) String() string {
 return fmt.Sprintf("%v\n\tReleased: %v\n\tRating: %v\n\tPlot: %v\n",
```

```
  movie.Title, movie.Year, movie.Info["rating"], movie.Info["plot"])
}
```

- 如需 API 的詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的 UpdateItem。

## 案例

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。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

執行一個情境，該情境建立資料表並執行多批 PartiQL 查詢。

```
import (
 "context"
 "fmt"
 "log"
 "strings"
 "time"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/dynamodb"
 "github.com/awsdocs/aws-doc-sdk-examples/gov2/dynamodb/actions"
)
```

```
// RunPartiQLBatchScenario shows you how to use the AWS SDK for Go
// to run batches of PartiQL statements to query a table that stores data about
 movies.
//
//   - Use batches of PartiQL statements to add, get, update, and delete data for
//     individual movies.
//
// This example creates an Amazon DynamoDB service client from the specified
 sdkConfig so that
// you can replace it with a mocked or stubbed config for unit testing.
//
// This example creates and deletes a DynamoDB table to use during the scenario.
func RunPartiQLBatchScenario(ctx context.Context, sdkConfig aws.Config, tableName
 string) {
 defer func() {
  if r := recover(); r != nil {
   fmt.Printf("Something went wrong with the demo.")
  }
 }()

 log.Println(strings.Repeat("-", 88))
 log.Println("Welcome to the Amazon DynamoDB PartiQL batch demo.")
 log.Println(strings.Repeat("-", 88))

 tableBasics := actions.TableBasics{
  DynamoDbClient: dynamodb.NewFromConfig(sdkConfig),
  TableName:      tableName,
 }
 runner := actions.PartiQLRunner{
  DynamoDbClient: dynamodb.NewFromConfig(sdkConfig),
  TableName:      tableName,
 }

 exists, err := tableBasics.TableExists(ctx)
 if err != nil {
  panic(err)
 }
 if !exists {
  log.Printf("Creating table %v...\n", tableName)
  _, err = tableBasics.CreateMovieTable(ctx)
  if err != nil {
   panic(err)
  } else {
```

```
  log.Printf("Created table %v.\n", tableName)
 }
} else {
 log.Printf("Table %v already exists.\n", tableName)
}
log.Println(strings.Repeat("-", 88))

currentYear, _, _ := time.Now().Date()
customMovies := []actions.Movie{{
 Title: "House PartiQL",
 Year:  currentYear - 5,
 Info: map[string]interface{}{
  "plot":   "Wacky high jinks result from querying a mysterious database.",
  "rating": 8.5}}, {
 Title: "House PartiQL 2",
 Year:  currentYear - 3,
 Info: map[string]interface{}{
  "plot":   "Moderate high jinks result from querying another mysterious
database.",
  "rating": 6.5}}, {
 Title: "House PartiQL 3",
 Year:  currentYear - 1,
 Info: map[string]interface{}{
  "plot":   "Tepid high jinks result from querying yet another mysterious
database.",
  "rating": 2.5},
},
}

log.Printf("Inserting a batch of movies into table '%v'.\n", tableName)
err = runner.AddMovieBatch(ctx, customMovies)
if err == nil {
 log.Printf("Added %v movies to the table.\n", len(customMovies))
}
log.Println(strings.Repeat("-", 88))

log.Println("Getting data for a batch of movies.")
movies, err := runner.GetMovieBatch(ctx, customMovies)
if err == nil {
 for _, movie := range movies {
  log.Println(movie)
 }
}
log.Println(strings.Repeat("-", 88))
```

```
 newRatings := []float64{7.7, 4.4, 1.1}
 log.Println("Updating a batch of movies with new ratings.")
 err = runner.UpdateMovieBatch(ctx, customMovies, newRatings)
 if err == nil {
  log.Printf("Updated %v movies with new ratings.\n", len(customMovies))
 }
 log.Println(strings.Repeat("-", 88))

 log.Println("Getting projected data from the table to verify our update.")
 log.Println("Using a page size of 2 to demonstrate paging.")
 projections, err := runner.GetAllMovies(ctx, 2)
 if err == nil {
  log.Println("All movies:")
  for _, projection := range projections {
   log.Println(projection)
  }
 }
 log.Println(strings.Repeat("-", 88))

 log.Println("Deleting a batch of movies.")
 err = runner.DeleteMovieBatch(ctx, customMovies)
 if err == nil {
  log.Printf("Deleted %v movies.\n", len(customMovies))
 }

 err = tableBasics.DeleteTable(ctx)
 if err == nil {
  log.Printf("Deleted table %v.\n", tableBasics.TableName)
 }

 log.Println(strings.Repeat("-", 88))
 log.Println("Thanks for watching!")
 log.Println(strings.Repeat("-", 88))
}
```

定義此範例中使用的 Movie 結構。

```
import (
 "archive/zip"
```

```
 "bytes"
 "encoding/json"
 "fmt"
 "io"
 "log"
 "net/http"

 "github.com/aws/aws-sdk-go-v2/feature/dynamodb/attributevalue"
 "github.com/aws/aws-sdk-go-v2/service/dynamodb/types"
)

// Movie encapsulates data about a movie. Title and Year are the composite primary
 key
// of the movie in Amazon DynamoDB. Title is the sort key, Year is the partition
 key,
// and Info is additional data.
type Movie struct {
 Title string                 `dynamodbav:"title"`
 Year  int                    `dynamodbav:"year"`
 Info  map[string]interface{} `dynamodbav:"info"`
}

// GetKey returns the composite primary key of the movie in a format that can be
// sent to DynamoDB.
func (movie Movie) GetKey() map[string]types.AttributeValue {
 title, err := attributevalue.Marshal(movie.Title)
 if err != nil {
  panic(err)
 }
 year, err := attributevalue.Marshal(movie.Year)
 if err != nil {
  panic(err)
 }
 return map[string]types.AttributeValue{"title": title, "year": year}
}

// String returns the title, year, rating, and plot of a movie, formatted for the
 example.
func (movie Movie) String() string {
 return fmt.Sprintf("%v\n\tReleased: %v\n\tRating: %v\n\tPlot: %v\n",
  movie.Title, movie.Year, movie.Info["rating"], movie.Info["plot"])
}
```

建立結構和執行 PartiQL 陳述式的方法。

```
import (
 "context"
 "fmt"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/feature/dynamodb/attributevalue"
 "github.com/aws/aws-sdk-go-v2/service/dynamodb"
 "github.com/aws/aws-sdk-go-v2/service/dynamodb/types"
)

// PartiQLRunner encapsulates the Amazon DynamoDB service actions used in the
// PartiQL examples. It contains a DynamoDB service client that is used to act on
 the
// specified table.
type PartiQLRunner struct {
 DynamoDbClient *dynamodb.Client
 TableName      string
}



// AddMovieBatch runs a batch of PartiQL INSERT statements to add multiple movies to
 the
// DynamoDB table.
func (runner PartiQLRunner) AddMovieBatch(ctx context.Context, movies []Movie) error
 {
 statementRequests := make([]types.BatchStatementRequest, len(movies))
 for index, movie := range movies {
  params, err := attributevalue.MarshalList([]interface{}{movie.Title, movie.Year,
 movie.Info})
  if err != nil {
   panic(err)
  }
  statementRequests[index] = types.BatchStatementRequest{
   Statement: aws.String(fmt.Sprintf(
    "INSERT INTO \"%v\" VALUE {'title': ?, 'year': ?, 'info': ?}",
 runner.TableName)),
```

```
   Parameters: params,
  }
 }

 _, err := runner.DynamoDbClient.BatchExecuteStatement(ctx,
 &dynamodb.BatchExecuteStatementInput{
  Statements: statementRequests,
 })
 if err != nil {
  log.Printf("Couldn't insert a batch of items with PartiQL. Here's why: %v\n", err)
 }
 return err
}



// GetMovieBatch runs a batch of PartiQL SELECT statements to get multiple movies
 from
// the DynamoDB table by title and year.
func (runner PartiQLRunner) GetMovieBatch(ctx context.Context, movies []Movie)
 ([]Movie, error) {
 statementRequests := make([]types.BatchStatementRequest, len(movies))
 for index, movie := range movies {
  params, err := attributevalue.MarshalList([]interface{}{movie.Title, movie.Year})
  if err != nil {
   panic(err)
  }
  statementRequests[index] = types.BatchStatementRequest{
   Statement: aws.String(
    fmt.Sprintf("SELECT * FROM \"%v\" WHERE title=? AND year=?", runner.TableName)),
   Parameters: params,
  }
 }

 output, err := runner.DynamoDbClient.BatchExecuteStatement(ctx,
 &dynamodb.BatchExecuteStatementInput{
  Statements: statementRequests,
 })
 var outMovies []Movie
 if err != nil {
  log.Printf("Couldn't get a batch of items with PartiQL. Here's why: %v\n", err)
 } else {
  for _, response := range output.Responses {
   var movie Movie
```

```
    err = attributevalue.UnmarshalMap(response.Item, &movie)
    if err != nil {
     log.Printf("Couldn't unmarshal response. Here's why: %v\n", err)
    } else {
     outMovies = append(outMovies, movie)
    }
   }
  }
  return outMovies, err
}



// GetAllMovies runs a PartiQL SELECT statement to get all movies from the DynamoDB
  table.
// pageSize is not typically required and is used to show how to paginate the
  results.
// The results are projected to return only the title and rating of each movie.
func (runner PartiQLRunner) GetAllMovies(ctx context.Context, pageSize int32)
  ([]map[string]interface{}, error) {
  var output []map[string]interface{}
  var response *dynamodb.ExecuteStatementOutput
  var err error
  var nextToken *string
  for moreData := true; moreData; {
   response, err = runner.DynamoDbClient.ExecuteStatement(ctx,
  &dynamodb.ExecuteStatementInput{
    Statement: aws.String(
     fmt.Sprintf("SELECT title, info.rating FROM \"%v\"", runner.TableName)),
    Limit:     aws.Int32(pageSize),
    NextToken: nextToken,
   })
   if err != nil {
    log.Printf("Couldn't get movies. Here's why: %v\n", err)
    moreData = false
   } else {
    var pageOutput []map[string]interface{}
    err = attributevalue.UnmarshalListOfMaps(response.Items, &pageOutput)
    if err != nil {
     log.Printf("Couldn't unmarshal response. Here's why: %v\n", err)
    } else {
     log.Printf("Got a page of length %v.\n", len(response.Items))
     output = append(output, pageOutput...)
    }
```

```
    nextToken = response.NextToken
    moreData = nextToken != nil
   }
  }
  return output, err
}



// UpdateMovieBatch runs a batch of PartiQL UPDATE statements to update the rating
 of
// multiple movies that already exist in the DynamoDB table.
func (runner PartiQLRunner) UpdateMovieBatch(ctx context.Context, movies []Movie,
 ratings []float64) error {
 statementRequests := make([]types.BatchStatementRequest, len(movies))
 for index, movie := range movies {
  params, err := attributevalue.MarshalList([]interface{}{ratings[index],
 movie.Title, movie.Year})
  if err != nil {
   panic(err)
  }
  statementRequests[index] = types.BatchStatementRequest{
   Statement: aws.String(
    fmt.Sprintf("UPDATE \"%v\" SET info.rating=? WHERE title=? AND year=?",
 runner.TableName)),
   Parameters: params,
  }
 }

 _, err := runner.DynamoDbClient.BatchExecuteStatement(ctx,
 &dynamodb.BatchExecuteStatementInput{
  Statements: statementRequests,
 })
 if err != nil {
  log.Printf("Couldn't update the batch of movies. Here's why: %v\n", err)
 }
 return err
}



// DeleteMovieBatch runs a batch of PartiQL DELETE statements to remove multiple
 movies
// from the DynamoDB table.
```

```
func (runner PartiQLRunner) DeleteMovieBatch(ctx context.Context, movies []Movie)
 error {
 statementRequests := make([]types.BatchStatementRequest, len(movies))
 for index, movie := range movies {
  params, err := attributevalue.MarshalList([]interface{}{movie.Title, movie.Year})
  if err != nil {
   panic(err)
  }
  statementRequests[index] = types.BatchStatementRequest{
   Statement: aws.String(
    fmt.Sprintf("DELETE FROM \"%v\" WHERE title=? AND year=?", runner.TableName)),
   Parameters: params,
  }
 }

 _, err := runner.DynamoDbClient.BatchExecuteStatement(ctx,
 &dynamodb.BatchExecuteStatementInput{
  Statements: statementRequests,
 })
 if err != nil {
  log.Printf("Couldn't delete the batch of movies. Here's why: %v\n", err)
 }
 return err
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 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。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

執行一個情境，該情境建立資料表並執行 PartiQL 查詢。

```
import (
 "context"
 "fmt"
 "log"
 "strings"
 "time"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/dynamodb"
 "github.com/awsdocs/aws-doc-sdk-examples/gov2/dynamodb/actions"
)

// RunPartiQLSingleScenario shows you how to use the AWS SDK for Go
// to use PartiQL to query a table that stores data about movies.
//
// * Use PartiQL statements to add, get, update, and delete data for individual
 movies.
//
// This example creates an Amazon DynamoDB service client from the specified
 sdkConfig so that
// you can replace it with a mocked or stubbed config for unit testing.
//
// This example creates and deletes a DynamoDB table to use during the scenario.
func RunPartiQLSingleScenario(ctx context.Context, sdkConfig aws.Config, tableName
 string) {
 defer func() {
  if r := recover(); r != nil {
   fmt.Printf("Something went wrong with the demo.")
  }
 }()

 log.Println(strings.Repeat("-", 88))
```

```
log.Println("Welcome to the Amazon DynamoDB PartiQL single action demo.")
log.Println(strings.Repeat("-", 88))

tableBasics := actions.TableBasics{
 DynamoDbClient: dynamodb.NewFromConfig(sdkConfig),
 TableName:      tableName,
}
runner := actions.PartiQLRunner{
 DynamoDbClient: dynamodb.NewFromConfig(sdkConfig),
 TableName:      tableName,
}

exists, err := tableBasics.TableExists(ctx)
if err != nil {
 panic(err)
}
if !exists {
 log.Printf("Creating table %v...\n", tableName)
 _, err = tableBasics.CreateMovieTable(ctx)
 if err != nil {
  panic(err)
 } else {
  log.Printf("Created table %v.\n", tableName)
 }
} else {
 log.Printf("Table %v already exists.\n", tableName)
}
log.Println(strings.Repeat("-", 88))

currentYear, _, _ := time.Now().Date()
customMovie := actions.Movie{
 Title: "24 Hour PartiQL People",
 Year:  currentYear,
 Info: map[string]interface{}{
  "plot":   "A group of data developers discover a new query language they can't
stop using.",
  "rating": 9.9,
 },
}

log.Printf("Inserting movie '%v' released in %v.", customMovie.Title,
customMovie.Year)
err = runner.AddMovie(ctx, customMovie)
if err == nil {
```

```
  log.Printf("Added %v to the movie table.\n", customMovie.Title)
 }
 log.Println(strings.Repeat("-", 88))

 log.Printf("Getting data for movie '%v' released in %v.", customMovie.Title,
 customMovie.Year)
 movie, err := runner.GetMovie(ctx, customMovie.Title, customMovie.Year)
 if err == nil {
  log.Println(movie)
 }
 log.Println(strings.Repeat("-", 88))

 newRating := 6.6
 log.Printf("Updating movie '%v' with a rating of %v.", customMovie.Title,
 newRating)
 err = runner.UpdateMovie(ctx, customMovie, newRating)
 if err == nil {
  log.Printf("Updated %v with a new rating.\n", customMovie.Title)
 }
 log.Println(strings.Repeat("-", 88))

 log.Printf("Getting data again to verify the update.")
 movie, err = runner.GetMovie(ctx, customMovie.Title, customMovie.Year)
 if err == nil {
  log.Println(movie)
 }
 log.Println(strings.Repeat("-", 88))

 log.Printf("Deleting movie '%v'.\n", customMovie.Title)
 err = runner.DeleteMovie(ctx, customMovie)
 if err == nil {
  log.Printf("Deleted %v.\n", customMovie.Title)
 }

 err = tableBasics.DeleteTable(ctx)
 if err == nil {
  log.Printf("Deleted table %v.\n", tableBasics.TableName)
 }

 log.Println(strings.Repeat("-", 88))
 log.Println("Thanks for watching!")
 log.Println(strings.Repeat("-", 88))
}
```

定義此範例中使用的 Movie 結構。

```
import (
 "archive/zip"
 "bytes"
 "encoding/json"
 "fmt"
 "io"
 "log"
 "net/http"

 "github.com/aws/aws-sdk-go-v2/feature/dynamodb/attributevalue"
 "github.com/aws/aws-sdk-go-v2/service/dynamodb/types"
)

// Movie encapsulates data about a movie. Title and Year are the composite primary
 key
// of the movie in Amazon DynamoDB. Title is the sort key, Year is the partition
 key,
// and Info is additional data.
type Movie struct {
 Title string                 `dynamodbav:"title"`
 Year  int                    `dynamodbav:"year"`
 Info  map[string]interface{} `dynamodbav:"info"`
}

// GetKey returns the composite primary key of the movie in a format that can be
// sent to DynamoDB.
func (movie Movie) GetKey() map[string]types.AttributeValue {
 title, err := attributevalue.Marshal(movie.Title)
 if err != nil {
  panic(err)
 }
 year, err := attributevalue.Marshal(movie.Year)
 if err != nil {
  panic(err)
 }
 return map[string]types.AttributeValue{"title": title, "year": year}
}
```

```
// String returns the title, year, rating, and plot of a movie, formatted for the
 example.
func (movie Movie) String() string {
 return fmt.Sprintf("%v\n\tReleased: %v\n\tRating: %v\n\tPlot: %v\n",
  movie.Title, movie.Year, movie.Info["rating"], movie.Info["plot"])
}
```

建立結構和執行 PartiQL 陳述式的方法。

```
import (
 "context"
 "fmt"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/feature/dynamodb/attributevalue"
 "github.com/aws/aws-sdk-go-v2/service/dynamodb"
 "github.com/aws/aws-sdk-go-v2/service/dynamodb/types"
)

// PartiQLRunner encapsulates the Amazon DynamoDB service actions used in the
// PartiQL examples. It contains a DynamoDB service client that is used to act on
 the
// specified table.
type PartiQLRunner struct {
 DynamoDbClient *dynamodb.Client
 TableName      string
}



// AddMovie runs a PartiQL INSERT statement to add a movie to the DynamoDB table.
func (runner PartiQLRunner) AddMovie(ctx context.Context, movie Movie) error {
 params, err := attributevalue.MarshalList([]interface{}{movie.Title, movie.Year,
 movie.Info})
 if err != nil {
  panic(err)
 }
 _, err = runner.DynamoDbClient.ExecuteStatement(ctx,
 &dynamodb.ExecuteStatementInput{
```

```
  Statement: aws.String(
   fmt.Sprintf("INSERT INTO \"%v\" VALUE {'title': ?, 'year': ?, 'info': ?}",
    runner.TableName)),
  Parameters: params,
 })
 if err != nil {
  log.Printf("Couldn't insert an item with PartiQL. Here's why: %v\n", err)
 }
 return err
}



// GetMovie runs a PartiQL SELECT statement to get a movie from the DynamoDB table
 by
// title and year.
func (runner PartiQLRunner) GetMovie(ctx context.Context, title string, year int)
 (Movie, error) {
 var movie Movie
 params, err := attributevalue.MarshalList([]interface{}{title, year})
 if err != nil {
  panic(err)
 }
 response, err := runner.DynamoDbClient.ExecuteStatement(ctx,
 &dynamodb.ExecuteStatementInput{
  Statement: aws.String(
   fmt.Sprintf("SELECT * FROM \"%v\" WHERE title=? AND year=?",
    runner.TableName)),
  Parameters: params,
 })
 if err != nil {
  log.Printf("Couldn't get info about %v. Here's why: %v\n", title, err)
 } else {
  err = attributevalue.UnmarshalMap(response.Items[0], &movie)
  if err != nil {
   log.Printf("Couldn't unmarshal response. Here's why: %v\n", err)
  }
 }
 return movie, err
}



// UpdateMovie runs a PartiQL UPDATE statement to update the rating of a movie that
```

```
// already exists in the DynamoDB table.
func (runner PartiQLRunner) UpdateMovie(ctx context.Context, movie Movie, rating
 float64) error {
 params, err := attributevalue.MarshalList([]interface{}{rating, movie.Title,
 movie.Year})
 if err != nil {
  panic(err)
 }
 _, err = runner.DynamoDbClient.ExecuteStatement(ctx,
 &dynamodb.ExecuteStatementInput{
  Statement: aws.String(
   fmt.Sprintf("UPDATE \"%v\" SET info.rating=? WHERE title=? AND year=?",
    runner.TableName)),
  Parameters: params,
 })
 if err != nil {
  log.Printf("Couldn't update movie %v. Here's why: %v\n", movie.Title, err)
 }
 return err
}



// DeleteMovie runs a PartiQL DELETE statement to remove a movie from the DynamoDB
 table.
func (runner PartiQLRunner) DeleteMovie(ctx context.Context, movie Movie) error {
 params, err := attributevalue.MarshalList([]interface{}{movie.Title, movie.Year})
 if err != nil {
  panic(err)
 }
 _, err = runner.DynamoDbClient.ExecuteStatement(ctx,
 &dynamodb.ExecuteStatementInput{
  Statement: aws.String(
   fmt.Sprintf("DELETE FROM \"%v\" WHERE title=? AND year=?",
    runner.TableName)),
  Parameters: params,
 })
 if err != nil {
  log.Printf("Couldn't delete %v from the table. Here's why: %v\n", movie.Title,
 err)
 }
 return err
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的 ExecuteStatement。

## 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。

SDK for Go V2

> **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 Go 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
package main

import (
 "context"
 "github.com/aws/aws-lambda-go/lambda"
 "github.com/aws/aws-lambda-go/events"
 "fmt"
)

func HandleRequest(ctx context.Context, event events.DynamoDBEvent) (*string, error)
 {
 if len(event.Records) == 0 {
  return nil, fmt.Errorf("received empty event")
 }

 for _, record := range event.Records {
   LogDynamoDBRecord(record)
 }
```

```
 message := fmt.Sprintf("Records processed: %d", len(event.Records))
 return &message, nil
}

func main() {
 lambda.Start(HandleRequest)
}

func LogDynamoDBRecord(record events.DynamoDBEventRecord){
 fmt.Println(record.EventID)
 fmt.Println(record.EventName)
 fmt.Printf("%+v\n", record.Change)
}
```

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。

SDK for Go V2

> **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 Go 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
package main

import (
 "context"
 "github.com/aws/aws-lambda-go/events"
 "github.com/aws/aws-lambda-go/lambda"
)

type BatchItemFailure struct {
```

```
 ItemIdentifier string `json:"ItemIdentifier"`
}

type BatchResult struct {
 BatchItemFailures []BatchItemFailure `json:"BatchItemFailures"`
}

func HandleRequest(ctx context.Context, event events.DynamoDBEvent) (*BatchResult,
 error) {
 var batchItemFailures []BatchItemFailure
 curRecordSequenceNumber := ""

 for _, record := range event.Records {
  // Process your record
  curRecordSequenceNumber = record.Change.SequenceNumber
 }

 if curRecordSequenceNumber != "" {
  batchItemFailures = append(batchItemFailures, BatchItemFailure{ItemIdentifier:
 curRecordSequenceNumber})
 }

 batchResult := BatchResult{
  BatchItemFailures: batchItemFailures,
 }

 return &batchResult, nil
}

func main() {
 lambda.Start(HandleRequest)
}
```

# 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

SDK for Go V2

示範如何使用 Go 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

# 使用適用於 Go V2 的 SDK 的 IAM 範例

下列程式碼範例示範如何使用 適用於 Go 的 AWS SDK V2 搭配 IAM 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 IAM

下列程式碼範例說明如何開始使用 IAM。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
package main

import (
 "context"
 "fmt"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/config"
 "github.com/aws/aws-sdk-go-v2/service/iam"
)

// main uses the AWS SDK for Go (v2) to create an AWS Identity and Access Management
 (IAM)
// client and list up to 10 policies in your account.
// This example uses the default settings specified in your shared credentials
// and config files.
func main() {
 ctx := context.Background()
 sdkConfig, err := config.LoadDefaultConfig(ctx)
 if err != nil {
  fmt.Println("Couldn't load default configuration. Have you set up your AWS
 account?")
  fmt.Println(err)
  return
 }
 iamClient := iam.NewFromConfig(sdkConfig)
 const maxPols = 10
 fmt.Printf("Let's list up to %v policies for your account.\n", maxPols)
 result, err := iamClient.ListPolicies(ctx, &iam.ListPoliciesInput{
  MaxItems: aws.Int32(maxPols),
 })
 if err != nil {
  fmt.Printf("Couldn't list policies for your account. Here's why: %v\n", err)
```

```
  return
 }
 if len(result.Policies) == 0 {
  fmt.Println("You don't have any policies!")
 } else {
  for _, policy := range result.Policies {
   fmt.Printf("\t%v\n", *policy.PolicyName)
  }
 }
}
```

- 如需 API 詳細資訊，請參閱 適用於 Go 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。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，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。

```
import (
 "context"
 "errors"
 "fmt"
 "log"
 "math/rand"
 "strings"
 "time"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/config"
 "github.com/aws/aws-sdk-go-v2/credentials"
 "github.com/aws/aws-sdk-go-v2/service/iam"
 "github.com/aws/aws-sdk-go-v2/service/iam/types"
 "github.com/aws/aws-sdk-go-v2/service/s3"
 "github.com/aws/aws-sdk-go-v2/service/sts"
 "github.com/aws/smithy-go"
 "github.com/awsdocs/aws-doc-sdk-examples/gov2/demotools"
 "github.com/awsdocs/aws-doc-sdk-examples/gov2/iam/actions"
)

// AssumeRoleScenario shows you how to use the AWS Identity and Access Management
 (IAM)
// service to perform the following actions:
//
//  1. Create a user who has no permissions.
//  2. Create a role that grants permission to list Amazon Simple Storage Service
//     (Amazon S3) buckets for the account.
//  3. Add a policy to let the user assume the role.
//  4. Try and fail to list buckets without permissions.
//  5. Assume the role and list S3 buckets using temporary credentials.
//  6. Delete the policy, role, and user.
type AssumeRoleScenario struct {
 sdkConfig      aws.Config
 accountWrapper actions.AccountWrapper
 policyWrapper  actions.PolicyWrapper
 roleWrapper    actions.RoleWrapper
 userWrapper    actions.UserWrapper
 questioner     demotools.IQuestioner
 helper         IScenarioHelper
 isTestRun      bool
```

```
}

// NewAssumeRoleScenario constructs an AssumeRoleScenario instance from a
 configuration.
// It uses the specified config to get an IAM client and create wrappers for the
 actions
// used in the scenario.
func NewAssumeRoleScenario(sdkConfig aws.Config, questioner demotools.IQuestioner,
 helper IScenarioHelper) AssumeRoleScenario {
 iamClient := iam.NewFromConfig(sdkConfig)
 return AssumeRoleScenario{
  sdkConfig:      sdkConfig,
  accountWrapper: actions.AccountWrapper{IamClient: iamClient},
  policyWrapper:  actions.PolicyWrapper{IamClient: iamClient},
  roleWrapper:    actions.RoleWrapper{IamClient: iamClient},
  userWrapper:    actions.UserWrapper{IamClient: iamClient},
  questioner:     questioner,
  helper:         helper,
 }
}

// addTestOptions appends the API options specified in the original configuration to
// another configuration. This is used to attach the middleware stubber to clients
// that are constructed during the scenario, which is needed for unit testing.
func (scenario AssumeRoleScenario) addTestOptions(scenarioConfig *aws.Config) {
 if scenario.isTestRun {
  scenarioConfig.APIOptions = append(scenarioConfig.APIOptions,
 scenario.sdkConfig.APIOptions...)
 }
}

// Run runs the interactive scenario.
func (scenario AssumeRoleScenario) Run(ctx context.Context) {
 defer func() {
  if r := recover(); r != nil {
   log.Printf("Something went wrong with the demo.\n")
   log.Println(r)
  }
 }()

 log.Println(strings.Repeat("-", 88))
 log.Println("Welcome to the AWS Identity and Access Management (IAM) assume role
 demo.")
 log.Println(strings.Repeat("-", 88))
```

```
 user := scenario.CreateUser(ctx)
 accessKey := scenario.CreateAccessKey(ctx, user)
 role := scenario.CreateRoleAndPolicies(ctx, user)
 noPermsConfig := scenario.ListBucketsWithoutPermissions(ctx, accessKey)
 scenario.ListBucketsWithAssumedRole(ctx, noPermsConfig, role)
 scenario.Cleanup(ctx, user, role)

 log.Println(strings.Repeat("-", 88))
 log.Println("Thanks for watching!")
 log.Println(strings.Repeat("-", 88))
}

// CreateUser creates a new IAM user. This user has no permissions.
func (scenario AssumeRoleScenario) CreateUser(ctx context.Context) *types.User {
 log.Println("Let's create an example user with no permissions.")
 userName := scenario.questioner.Ask("Enter a name for the example user:",
 demotools.NotEmpty{})
 user, err := scenario.userWrapper.GetUser(ctx, userName)
 if err != nil {
  panic(err)
 }
 if user == nil {
  user, err = scenario.userWrapper.CreateUser(ctx, userName)
  if err != nil {
   panic(err)
  }
  log.Printf("Created user %v.\n", *user.UserName)
 } else {
  log.Printf("User %v already exists.\n", *user.UserName)
 }
 log.Println(strings.Repeat("-", 88))
 return user
}

// CreateAccessKey creates an access key for the user.
func (scenario AssumeRoleScenario) CreateAccessKey(ctx context.Context, user
 *types.User) *types.AccessKey {
 accessKey, err := scenario.userWrapper.CreateAccessKeyPair(ctx, *user.UserName)
 if err != nil {
  panic(err)
 }
 log.Printf("Created access key %v for your user.", *accessKey.AccessKeyId)
 log.Println("Waiting a few seconds for your user to be ready...")
```

```
 scenario.helper.Pause(10)
 log.Println(strings.Repeat("-", 88))
 return accessKey
}

// CreateRoleAndPolicies creates a policy that grants permission to list S3 buckets
 for
// the current account and attaches the policy to a newly created role. It also adds
 an
// inline policy to the specified user that grants the user permission to assume the
 role.
func (scenario AssumeRoleScenario) CreateRoleAndPolicies(ctx context.Context, user
 *types.User) *types.Role {
 log.Println("Let's create a role and policy that grant permission to list S3
 buckets.")
 scenario.questioner.Ask("Press Enter when you're ready.")
 listBucketsRole, err := scenario.roleWrapper.CreateRole(ctx,
 scenario.helper.GetName(), *user.Arn)
 if err != nil {
  panic(err)
 }
 log.Printf("Created role %v.\n", *listBucketsRole.RoleName)
 listBucketsPolicy, err := scenario.policyWrapper.CreatePolicy(
  ctx, scenario.helper.GetName(), []string{"s3:ListAllMyBuckets"}, "arn:aws:s3:::*")
 if err != nil {
  panic(err)
 }
 log.Printf("Created policy %v.\n", *listBucketsPolicy.PolicyName)
 err = scenario.roleWrapper.AttachRolePolicy(ctx, *listBucketsPolicy.Arn,
 *listBucketsRole.RoleName)
 if err != nil {
  panic(err)
 }
 log.Printf("Attached policy %v to role %v.\n", *listBucketsPolicy.PolicyName,
  *listBucketsRole.RoleName)
 err = scenario.userWrapper.CreateUserPolicy(ctx, *user.UserName,
 scenario.helper.GetName(),
  []string{"sts:AssumeRole"}, *listBucketsRole.Arn)
 if err != nil {
  panic(err)
 }
 log.Printf("Created an inline policy for user %v that lets the user assume the
 role.\n",
  *user.UserName)
```

```
 log.Println("Let's give AWS a few seconds to propagate these new resources and
 connections...")
 scenario.helper.Pause(10)
 log.Println(strings.Repeat("-", 88))
 return listBucketsRole
}

// ListBucketsWithoutPermissions creates an Amazon S3 client from the user's access
 key
// credentials and tries to list buckets for the account. Because the user does not
 have
// permission to perform this action, the action fails.
func (scenario AssumeRoleScenario) ListBucketsWithoutPermissions(ctx
 context.Context, accessKey *types.AccessKey) *aws.Config {
 log.Println("Let's try to list buckets without permissions. This should return an
 AccessDenied error.")
 scenario.questioner.Ask("Press Enter when you're ready.")
 noPermsConfig, err := config.LoadDefaultConfig(ctx,
  config.WithCredentialsProvider(credentials.NewStaticCredentialsProvider(
   *accessKey.AccessKeyId, *accessKey.SecretAccessKey, ""),
  ))
 if err != nil {
  panic(err)
 }

 // Add test options if this is a test run. This is needed only for testing
 purposes.
 scenario.addTestOptions(&noPermsConfig)

 s3Client := s3.NewFromConfig(noPermsConfig)
 _, err = s3Client.ListBuckets(ctx, &s3.ListBucketsInput{})
 if err != nil {
  // The SDK for Go does not model the AccessDenied error, so check ErrorCode
 directly.
  var ae smithy.APIError
  if errors.As(err, &ae) {
   switch ae.ErrorCode() {
   case "AccessDenied":
    log.Println("Got AccessDenied error, which is the expected result because\n" +
     "the ListBuckets call was made without permissions.")
   default:
    log.Println("Expected AccessDenied, got something else.")
    panic(err)
   }
```

```
  }
 } else {
  log.Println("Expected AccessDenied error when calling ListBuckets without
 permissions,\n" +
    "but the call succeeded. Continuing the example anyway...")
 }
 log.Println(strings.Repeat("-", 88))
 return &noPermsConfig
}

// ListBucketsWithAssumedRole performs the following actions:
//
//  1. Creates an AWS Security Token Service (AWS STS) client from the config
 created from
//     the user's access key credentials.
//  2. Gets temporary credentials by assuming the role that grants permission to
 list the
//     buckets.
//  3. Creates an Amazon S3 client from the temporary credentials.
//  4. Lists buckets for the account. Because the temporary credentials are
 generated by
//     assuming the role that grants permission, the action succeeds.
func (scenario AssumeRoleScenario) ListBucketsWithAssumedRole(ctx context.Context,
 noPermsConfig *aws.Config, role *types.Role) {
 log.Println("Let's assume the role that grants permission to list buckets and try
 again.")
 scenario.questioner.Ask("Press Enter when you're ready.")
 stsClient := sts.NewFromConfig(*noPermsConfig)
 tempCredentials, err := stsClient.AssumeRole(ctx, &sts.AssumeRoleInput{
  RoleArn:         role.Arn,
  RoleSessionName: aws.String("AssumeRoleExampleSession"),
  DurationSeconds: aws.Int32(900),
 })
 if err != nil {
  log.Printf("Couldn't assume role %v.\n", *role.RoleName)
  panic(err)
 }
 log.Printf("Assumed role %v, got temporary credentials.\n", *role.RoleName)
 assumeRoleConfig, err := config.LoadDefaultConfig(ctx,
  config.WithCredentialsProvider(credentials.NewStaticCredentialsProvider(
   *tempCredentials.Credentials.AccessKeyId,
   *tempCredentials.Credentials.SecretAccessKey,
   *tempCredentials.Credentials.SessionToken),
  ),
```

```
 )
 if err != nil {
  panic(err)
 }

 // Add test options if this is a test run. This is needed only for testing
 purposes.
 scenario.addTestOptions(&assumeRoleConfig)

 s3Client := s3.NewFromConfig(assumeRoleConfig)
 result, err := s3Client.ListBuckets(ctx, &s3.ListBucketsInput{})
 if err != nil {
  log.Println("Couldn't list buckets with assumed role credentials.")
  panic(err)
 }
 log.Println("Successfully called ListBuckets with assumed role credentials, \n" +
  "here are some of them:")
 for i := 0; i < len(result.Buckets) && i < 5; i++ {
  log.Printf("\t%v\n", *result.Buckets[i].Name)
 }
 log.Println(strings.Repeat("-", 88))
}

// Cleanup deletes all resources created for the scenario.
func (scenario AssumeRoleScenario) Cleanup(ctx context.Context, user *types.User,
 role *types.Role) {
 if scenario.questioner.AskBool(
  "Do you want to delete the resources created for this example? (y/n)", "y",
 ) {
  policies, err := scenario.roleWrapper.ListAttachedRolePolicies(ctx,
 *role.RoleName)
  if err != nil {
   panic(err)
  }
  for _, policy := range policies {
   err = scenario.roleWrapper.DetachRolePolicy(ctx, *role.RoleName,
 *policy.PolicyArn)
   if err != nil {
    panic(err)
   }
   err = scenario.policyWrapper.DeletePolicy(ctx, *policy.PolicyArn)
   if err != nil {
    panic(err)
   }
```

```
    log.Printf("Detached policy %v from role %v and deleted the policy.\n",
     *policy.PolicyName, *role.RoleName)
   }
   err = scenario.roleWrapper.DeleteRole(ctx, *role.RoleName)
   if err != nil {
    panic(err)
   }
   log.Printf("Deleted role %v.\n", *role.RoleName)

   userPols, err := scenario.userWrapper.ListUserPolicies(ctx, *user.UserName)
   if err != nil {
    panic(err)
   }
   for _, userPol := range userPols {
    err = scenario.userWrapper.DeleteUserPolicy(ctx, *user.UserName, userPol)
    if err != nil {
     panic(err)
    }
    log.Printf("Deleted policy %v from user %v.\n", userPol, *user.UserName)
   }
   keys, err := scenario.userWrapper.ListAccessKeys(ctx, *user.UserName)
   if err != nil {
    panic(err)
   }
   for _, key := range keys {
    err = scenario.userWrapper.DeleteAccessKey(ctx, *user.UserName, *key.AccessKeyId)
    if err != nil {
     panic(err)
    }
    log.Printf("Deleted access key %v from user %v.\n", *key.AccessKeyId,
  *user.UserName)
    }
   err = scenario.userWrapper.DeleteUser(ctx, *user.UserName)
   if err != nil {
    panic(err)
   }
   log.Printf("Deleted user %v.\n", *user.UserName)
   log.Println(strings.Repeat("-", 88))
  }

}

// IScenarioHelper abstracts input and wait functions from a scenario so that they
// can be mocked for unit testing.
```

```
type IScenarioHelper interface {
 GetName() string
 Pause(secs int)
}

const rMax = 100000

type ScenarioHelper struct {
 Prefix string
 Random *rand.Rand
}

// GetName returns a unique name formed of a prefix and a random number.
func (helper *ScenarioHelper) GetName() string {
 return fmt.Sprintf("%v%v", helper.Prefix, helper.Random.Intn(rMax))
}

// Pause waits for the specified number of seconds.
func (helper ScenarioHelper) Pause(secs int) {
 time.Sleep(time.Duration(secs) * time.Second)
}
```

定義包裝帳號動作的結構。

```
import (
 "context"
 "log"

 "github.com/aws/aws-sdk-go-v2/service/iam"
 "github.com/aws/aws-sdk-go-v2/service/iam/types"
)

// AccountWrapper encapsulates AWS Identity and Access Management (IAM) account
 actions
// used in the examples.
// It contains an IAM service client that is used to perform account actions.
type AccountWrapper struct {
 IamClient *iam.Client
}
```

```
// GetAccountPasswordPolicy gets the account password policy for the current
 account.
// If no policy has been set, a NoSuchEntityException is error is returned.
func (wrapper AccountWrapper) GetAccountPasswordPolicy(ctx context.Context)
 (*types.PasswordPolicy, error) {
 var pwPolicy *types.PasswordPolicy
 result, err := wrapper.IamClient.GetAccountPasswordPolicy(ctx,
  &iam.GetAccountPasswordPolicyInput{})
 if err != nil {
  log.Printf("Couldn't get account password policy. Here's why: %v\n", err)
 } else {
  pwPolicy = result.PasswordPolicy
 }
 return pwPolicy, err
}



// ListSAMLProviders gets the SAML providers for the account.
func (wrapper AccountWrapper) ListSAMLProviders(ctx context.Context)
 ([]types.SAMLProviderListEntry, error) {
 var providers []types.SAMLProviderListEntry
 result, err := wrapper.IamClient.ListSAMLProviders(ctx,
 &iam.ListSAMLProvidersInput{})
 if err != nil {
  log.Printf("Couldn't list SAML providers. Here's why: %v\n", err)
 } else {
  providers = result.SAMLProviderList
 }
 return providers, err
}
```

定義包裝政策動作的結構。

```
import (
 "context"
 "encoding/json"
 "log"
```

```
 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/iam"
 "github.com/aws/aws-sdk-go-v2/service/iam/types"
)

// PolicyWrapper encapsulates AWS Identity and Access Management (IAM) policy
 actions
// used in the examples.
// It contains an IAM service client that is used to perform policy actions.
type PolicyWrapper struct {
 IamClient *iam.Client
}



// ListPolicies gets up to maxPolicies policies.
func (wrapper PolicyWrapper) ListPolicies(ctx context.Context, maxPolicies int32)
 ([]types.Policy, error) {
 var policies []types.Policy
 result, err := wrapper.IamClient.ListPolicies(ctx, &iam.ListPoliciesInput{
  MaxItems: aws.Int32(maxPolicies),
 })
 if err != nil {
  log.Printf("Couldn't list policies. Here's why: %v\n", err)
 } else {
  policies = result.Policies
 }
 return policies, err
}



// PolicyDocument defines a policy document as a Go struct that can be serialized
// to JSON.
type PolicyDocument struct {
 Version   string
 Statement []PolicyStatement
}

// PolicyStatement defines a statement in a policy document.
type PolicyStatement struct {
 Effect    string
 Action    []string
```

```
 Principal map[string]string `json:",omitempty"`
 Resource  *string           `json:",omitempty"`
}

// CreatePolicy creates a policy that grants a list of actions to the specified
 resource.
// PolicyDocument shows how to work with a policy document as a data structure and
// serialize it to JSON by using Go's JSON marshaler.
func (wrapper PolicyWrapper) CreatePolicy(ctx context.Context, policyName string,
 actions []string,
 resourceArn string) (*types.Policy, error) {
 var policy *types.Policy
 policyDoc := PolicyDocument{
  Version: "2012-10-17",
  Statement: []PolicyStatement{{
   Effect:   "Allow",
   Action:   actions,
   Resource: aws.String(resourceArn),
  }},
 }
 policyBytes, err := json.Marshal(policyDoc)
 if err != nil {
  log.Printf("Couldn't create policy document for %v. Here's why: %v\n",
 resourceArn, err)
  return nil, err
 }
 result, err := wrapper.IamClient.CreatePolicy(ctx, &iam.CreatePolicyInput{
  PolicyDocument: aws.String(string(policyBytes)),
  PolicyName:     aws.String(policyName),
 })
 if err != nil {
  log.Printf("Couldn't create policy %v. Here's why: %v\n", policyName, err)
 } else {
  policy = result.Policy
 }
 return policy, err
}



// GetPolicy gets data about a policy.
func (wrapper PolicyWrapper) GetPolicy(ctx context.Context, policyArn string)
 (*types.Policy, error) {
 var policy *types.Policy
```

```
 result, err := wrapper.IamClient.GetPolicy(ctx, &iam.GetPolicyInput{
  PolicyArn: aws.String(policyArn),
 })
 if err != nil {
  log.Printf("Couldn't get policy %v. Here's why: %v\n", policyArn, err)
 } else {
  policy = result.Policy
 }
 return policy, err
}



// DeletePolicy deletes a policy.
func (wrapper PolicyWrapper) DeletePolicy(ctx context.Context, policyArn string)
 error {
 _, err := wrapper.IamClient.DeletePolicy(ctx, &iam.DeletePolicyInput{
  PolicyArn: aws.String(policyArn),
 })
 if err != nil {
  log.Printf("Couldn't delete policy %v. Here's why: %v\n", policyArn, err)
 }
 return err
}
```

定義包裝角色動作的結構。

```
import (
 "context"
 "encoding/json"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/iam"
 "github.com/aws/aws-sdk-go-v2/service/iam/types"
)

// RoleWrapper encapsulates AWS Identity and Access Management (IAM) role actions
// used in the examples.
// It contains an IAM service client that is used to perform role actions.
```

```
type RoleWrapper struct {
 IamClient *iam.Client
}



// ListRoles gets up to maxRoles roles.
func (wrapper RoleWrapper) ListRoles(ctx context.Context, maxRoles int32)
 ([]types.Role, error) {
 var roles []types.Role
 result, err := wrapper.IamClient.ListRoles(ctx,
  &iam.ListRolesInput{MaxItems: aws.Int32(maxRoles)},
 )
 if err != nil {
  log.Printf("Couldn't list roles. Here's why: %v\n", err)
 } else {
  roles = result.Roles
 }
 return roles, err
}



// CreateRole creates a role that trusts a specified user. The trusted user can
 assume
// the role to acquire its permissions.
// PolicyDocument shows how to work with a policy document as a data structure and
// serialize it to JSON by using Go's JSON marshaler.
func (wrapper RoleWrapper) CreateRole(ctx context.Context, roleName string,
 trustedUserArn string) (*types.Role, error) {
 var role *types.Role
 trustPolicy := PolicyDocument{
  Version: "2012-10-17",
  Statement: []PolicyStatement{{
   Effect:    "Allow",
   Principal: map[string]string{"AWS": trustedUserArn},
   Action:    []string{"sts:AssumeRole"},
  }},
 }
 policyBytes, err := json.Marshal(trustPolicy)
 if err != nil {
  log.Printf("Couldn't create trust policy for %v. Here's why: %v\n",
 trustedUserArn, err)
  return nil, err
```

```
 }
 result, err := wrapper.IamClient.CreateRole(ctx, &iam.CreateRoleInput{
  AssumeRolePolicyDocument: aws.String(string(policyBytes)),
  RoleName:                 aws.String(roleName),
 })
 if err != nil {
  log.Printf("Couldn't create role %v. Here's why: %v\n", roleName, err)
 } else {
  role = result.Role
 }
 return role, err
}



// GetRole gets data about a role.
func (wrapper RoleWrapper) GetRole(ctx context.Context, roleName string)
 (*types.Role, error) {
 var role *types.Role
 result, err := wrapper.IamClient.GetRole(ctx,
  &iam.GetRoleInput{RoleName: aws.String(roleName)})
 if err != nil {
  log.Printf("Couldn't get role %v. Here's why: %v\n", roleName, err)
 } else {
  role = result.Role
 }
 return role, err
}



// CreateServiceLinkedRole creates a service-linked role that is owned by the
 specified service.
func (wrapper RoleWrapper) CreateServiceLinkedRole(ctx context.Context, serviceName
 string, description string) (
 *types.Role, error) {
 var role *types.Role
 result, err := wrapper.IamClient.CreateServiceLinkedRole(ctx,
 &iam.CreateServiceLinkedRoleInput{
  AWSServiceName: aws.String(serviceName),
  Description:    aws.String(description),
 })
 if err != nil {
```

```
  log.Printf("Couldn't create service-linked role %v. Here's why: %v\n",
 serviceName, err)
 } else {
  role = result.Role
 }
 return role, err
}



// DeleteServiceLinkedRole deletes a service-linked role.
func (wrapper RoleWrapper) DeleteServiceLinkedRole(ctx context.Context, roleName
 string) error {
 _, err := wrapper.IamClient.DeleteServiceLinkedRole(ctx,
 &iam.DeleteServiceLinkedRoleInput{
  RoleName: aws.String(roleName)},
 )
 if err != nil {
  log.Printf("Couldn't delete service-linked role %v. Here's why: %v\n", roleName,
 err)
 }
 return err
}



// AttachRolePolicy attaches a policy to a role.
func (wrapper RoleWrapper) AttachRolePolicy(ctx context.Context, policyArn string,
 roleName string) error {
 _, err := wrapper.IamClient.AttachRolePolicy(ctx, &iam.AttachRolePolicyInput{
  PolicyArn: aws.String(policyArn),
  RoleName:  aws.String(roleName),
 })
 if err != nil {
  log.Printf("Couldn't attach policy %v to role %v. Here's why: %v\n", policyArn,
 roleName, err)
 }
 return err
}



// ListAttachedRolePolicies lists the policies that are attached to the specified
 role.
```

```
func (wrapper RoleWrapper) ListAttachedRolePolicies(ctx context.Context, roleName
 string) ([]types.AttachedPolicy, error) {
 var policies []types.AttachedPolicy
 result, err := wrapper.IamClient.ListAttachedRolePolicies(ctx,
 &iam.ListAttachedRolePoliciesInput{
  RoleName: aws.String(roleName),
 })
 if err != nil {
  log.Printf("Couldn't list attached policies for role %v. Here's why: %v\n",
 roleName, err)
 } else {
  policies = result.AttachedPolicies
 }
 return policies, err
}



// DetachRolePolicy detaches a policy from a role.
func (wrapper RoleWrapper) DetachRolePolicy(ctx context.Context, roleName string,
 policyArn string) error {
 _, err := wrapper.IamClient.DetachRolePolicy(ctx, &iam.DetachRolePolicyInput{
  PolicyArn: aws.String(policyArn),
  RoleName:  aws.String(roleName),
 })
 if err != nil {
  log.Printf("Couldn't detach policy from role %v. Here's why: %v\n", roleName, err)
 }
 return err
}



// ListRolePolicies lists the inline policies for a role.
func (wrapper RoleWrapper) ListRolePolicies(ctx context.Context, roleName string)
 ([]string, error) {
 var policies []string
 result, err := wrapper.IamClient.ListRolePolicies(ctx, &iam.ListRolePoliciesInput{
  RoleName: aws.String(roleName),
 })
 if err != nil {
  log.Printf("Couldn't list policies for role %v. Here's why: %v\n", roleName, err)
 } else {
  policies = result.PolicyNames
```

```
 }
 return policies, err
}



// DeleteRole deletes a role. All attached policies must be detached before a
// role can be deleted.
func (wrapper RoleWrapper) DeleteRole(ctx context.Context, roleName string) error {
 _, err := wrapper.IamClient.DeleteRole(ctx, &iam.DeleteRoleInput{
  RoleName: aws.String(roleName),
 })
 if err != nil {
  log.Printf("Couldn't delete role %v. Here's why: %v\n", roleName, err)
 }
 return err
}
```

定義包裝使用者動作的結構。

```
import (
 "context"
 "encoding/json"
 "errors"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/iam"
 "github.com/aws/aws-sdk-go-v2/service/iam/types"
 "github.com/aws/smithy-go"
)

// UserWrapper encapsulates user actions used in the examples.
// It contains an IAM service client that is used to perform user actions.
type UserWrapper struct {
 IamClient *iam.Client
}
```

```
// ListUsers gets up to maxUsers number of users.
func (wrapper UserWrapper) ListUsers(ctx context.Context, maxUsers int32)
 ([]types.User, error) {
 var users []types.User
 result, err := wrapper.IamClient.ListUsers(ctx, &iam.ListUsersInput{
  MaxItems: aws.Int32(maxUsers),
 })
 if err != nil {
  log.Printf("Couldn't list users. Here's why: %v\n", err)
 } else {
  users = result.Users
 }
 return users, err
}



// GetUser gets data about a user.
func (wrapper UserWrapper) GetUser(ctx context.Context, userName string)
 (*types.User, error) {
 var user *types.User
 result, err := wrapper.IamClient.GetUser(ctx, &iam.GetUserInput{
  UserName: aws.String(userName),
 })
 if err != nil {
  var apiError smithy.APIError
  if errors.As(err, &apiError) {
   switch apiError.(type) {
   case *types.NoSuchEntityException:
    log.Printf("User %v does not exist.\n", userName)
    err = nil
   default:
    log.Printf("Couldn't get user %v. Here's why: %v\n", userName, err)
   }
  }
 } else {
  user = result.User
 }
 return user, err
}
```

```
// CreateUser creates a new user with the specified name.
func (wrapper UserWrapper) CreateUser(ctx context.Context, userName string)
 (*types.User, error) {
 var user *types.User
 result, err := wrapper.IamClient.CreateUser(ctx, &iam.CreateUserInput{
  UserName: aws.String(userName),
 })
 if err != nil {
  log.Printf("Couldn't create user %v. Here's why: %v\n", userName, err)
 } else {
  user = result.User
 }
 return user, err
}



// CreateUserPolicy adds an inline policy to a user. This example creates a policy
 that
// grants a list of actions on a specified role.
// PolicyDocument shows how to work with a policy document as a data structure and
// serialize it to JSON by using Go's JSON marshaler.
func (wrapper UserWrapper) CreateUserPolicy(ctx context.Context, userName string,
 policyName string, actions []string,
 roleArn string) error {
 policyDoc := PolicyDocument{
  Version: "2012-10-17",
  Statement: []PolicyStatement{{
   Effect:   "Allow",
   Action:   actions,
   Resource: aws.String(roleArn),
  }},
 }
 policyBytes, err := json.Marshal(policyDoc)
 if err != nil {
  log.Printf("Couldn't create policy document for %v. Here's why: %v\n", roleArn,
 err)
  return err
 }
 _, err = wrapper.IamClient.PutUserPolicy(ctx, &iam.PutUserPolicyInput{
  PolicyDocument: aws.String(string(policyBytes)),
  PolicyName:     aws.String(policyName),
  UserName:       aws.String(userName),
 })
```

```
 if err != nil {
  log.Printf("Couldn't create policy for user %v. Here's why: %v\n", userName, err)
 }
 return err
}



// ListUserPolicies lists the inline policies for the specified user.
func (wrapper UserWrapper) ListUserPolicies(ctx context.Context, userName string)
 ([]string, error) {
 var policies []string
 result, err := wrapper.IamClient.ListUserPolicies(ctx, &iam.ListUserPoliciesInput{
  UserName: aws.String(userName),
 })
 if err != nil {
  log.Printf("Couldn't list policies for user %v. Here's why: %v\n", userName, err)
 } else {
  policies = result.PolicyNames
 }
 return policies, err
}



// DeleteUserPolicy deletes an inline policy from a user.
func (wrapper UserWrapper) DeleteUserPolicy(ctx context.Context, userName string,
 policyName string) error {
 _, err := wrapper.IamClient.DeleteUserPolicy(ctx, &iam.DeleteUserPolicyInput{
  PolicyName: aws.String(policyName),
  UserName:   aws.String(userName),
 })
 if err != nil {
  log.Printf("Couldn't delete policy from user %v. Here's why: %v\n", userName, err)
 }
 return err
}



// DeleteUser deletes a user.
func (wrapper UserWrapper) DeleteUser(ctx context.Context, userName string) error {
 _, err := wrapper.IamClient.DeleteUser(ctx, &iam.DeleteUserInput{
  UserName: aws.String(userName),
```

```
 })
 if err != nil {
  log.Printf("Couldn't delete user %v. Here's why: %v\n", userName, err)
 }
 return err
}



// CreateAccessKeyPair creates an access key for a user. The returned access key
 contains
// the ID and secret credentials needed to use the key.
func (wrapper UserWrapper) CreateAccessKeyPair(ctx context.Context, userName string)
 (*types.AccessKey, error) {
 var key *types.AccessKey
 result, err := wrapper.IamClient.CreateAccessKey(ctx, &iam.CreateAccessKeyInput{
  UserName: aws.String(userName)})
 if err != nil {
  log.Printf("Couldn't create access key pair for user %v. Here's why: %v\n",
 userName, err)
 } else {
  key = result.AccessKey
 }
 return key, err
}



// DeleteAccessKey deletes an access key from a user.
func (wrapper UserWrapper) DeleteAccessKey(ctx context.Context, userName string,
 keyId string) error {
 _, err := wrapper.IamClient.DeleteAccessKey(ctx, &iam.DeleteAccessKeyInput{
  AccessKeyId: aws.String(keyId),
  UserName:    aws.String(userName),
 })
 if err != nil {
  log.Printf("Couldn't delete access key %v. Here's why: %v\n", keyId, err)
 }
 return err
}



// ListAccessKeys lists the access keys for the specified user.
```

```
func (wrapper UserWrapper) ListAccessKeys(ctx context.Context, userName string)
 ([]types.AccessKeyMetadata, error) {
 var keys []types.AccessKeyMetadata
 result, err := wrapper.IamClient.ListAccessKeys(ctx, &iam.ListAccessKeysInput{
  UserName: aws.String(userName),
 })
 if err != nil {
  log.Printf("Couldn't list access keys for user %v. Here's why: %v\n", userName,
 err)
 } else {
  keys = result.AccessKeyMetadata
 }
 return keys, err
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 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`。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "context"
 "encoding/json"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/iam"
 "github.com/aws/aws-sdk-go-v2/service/iam/types"
)

// RoleWrapper encapsulates AWS Identity and Access Management (IAM) role actions
// used in the examples.
// It contains an IAM service client that is used to perform role actions.
type RoleWrapper struct {
 IamClient *iam.Client
}



// AttachRolePolicy attaches a policy to a role.
func (wrapper RoleWrapper) AttachRolePolicy(ctx context.Context, policyArn string,
 roleName string) error {
 _, err := wrapper.IamClient.AttachRolePolicy(ctx, &iam.AttachRolePolicyInput{
  PolicyArn: aws.String(policyArn),
  RoleName:  aws.String(roleName),
 })
 if err != nil {
  log.Printf("Couldn't attach policy %v to role %v. Here's why: %v\n", policyArn,
 roleName, err)
 }
 return err
}
```

- 如需 API 詳細資訊，請參閱 適用於 Go 的 AWS SDK API Reference 中的 AttachRolePolicy。

### `CreateAccessKey`

以下程式碼範例顯示如何使用 `CreateAccessKey`。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "context"
 "encoding/json"
 "errors"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/iam"
 "github.com/aws/aws-sdk-go-v2/service/iam/types"
 "github.com/aws/smithy-go"
)

// UserWrapper encapsulates user actions used in the examples.
// It contains an IAM service client that is used to perform user actions.
type UserWrapper struct {
 IamClient *iam.Client
}



// CreateAccessKeyPair creates an access key for a user. The returned access key
 contains
// the ID and secret credentials needed to use the key.
func (wrapper UserWrapper) CreateAccessKeyPair(ctx context.Context, userName string)
 (*types.AccessKey, error) {
```

```
 var key *types.AccessKey
 result, err := wrapper.IamClient.CreateAccessKey(ctx, &iam.CreateAccessKeyInput{
  UserName: aws.String(userName)})
 if err != nil {
  log.Printf("Couldn't create access key pair for user %v. Here's why: %v\n",
 userName, err)
 } else {
  key = result.AccessKey
 }
 return key, err
}
```

- 如需 API 詳細資訊，請參閱 適用於 Go 的 AWS SDK API Reference 中的 CreateAccessKey。

### `CreatePolicy`

以下程式碼範例顯示如何使用 `CreatePolicy`。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "context"
 "encoding/json"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/iam"
 "github.com/aws/aws-sdk-go-v2/service/iam/types"
)

// PolicyWrapper encapsulates AWS Identity and Access Management (IAM) policy
 actions
// used in the examples.
```

```
// It contains an IAM service client that is used to perform policy actions.
type PolicyWrapper struct {
 IamClient *iam.Client
}



// PolicyDocument defines a policy document as a Go struct that can be serialized
// to JSON.
type PolicyDocument struct {
 Version   string
 Statement []PolicyStatement
}

// PolicyStatement defines a statement in a policy document.
type PolicyStatement struct {
 Effect    string
 Action    []string
 Principal map[string]string `json:",omitempty"`
 Resource  *string           `json:",omitempty"`
}

// CreatePolicy creates a policy that grants a list of actions to the specified
 resource.
// PolicyDocument shows how to work with a policy document as a data structure and
// serialize it to JSON by using Go's JSON marshaler.
func (wrapper PolicyWrapper) CreatePolicy(ctx context.Context, policyName string,
 actions []string,
 resourceArn string) (*types.Policy, error) {
 var policy *types.Policy
 policyDoc := PolicyDocument{
  Version: "2012-10-17",
  Statement: []PolicyStatement{{
   Effect:   "Allow",
   Action:   actions,
   Resource: aws.String(resourceArn),
  }},
 }
 policyBytes, err := json.Marshal(policyDoc)
 if err != nil {
  log.Printf("Couldn't create policy document for %v. Here's why: %v\n",
 resourceArn, err)
  return nil, err
 }
```

```
 result, err := wrapper.IamClient.CreatePolicy(ctx, &iam.CreatePolicyInput{
  PolicyDocument: aws.String(string(policyBytes)),
  PolicyName:     aws.String(policyName),
 })
 if err != nil {
  log.Printf("Couldn't create policy %v. Here's why: %v\n", policyName, err)
 } else {
  policy = result.Policy
 }
 return policy, err
}
```

- 如需 API 詳細資訊，請參閱 適用於 Go 的 AWS SDK API Reference 中的 CreatePolicy。

### `CreateRole`

以下程式碼範例顯示如何使用 `CreateRole`。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "context"
 "encoding/json"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/iam"
 "github.com/aws/aws-sdk-go-v2/service/iam/types"
)

// RoleWrapper encapsulates AWS Identity and Access Management (IAM) role actions
// used in the examples.
```

```
// It contains an IAM service client that is used to perform role actions.
type RoleWrapper struct {
 IamClient *iam.Client
}



// CreateRole creates a role that trusts a specified user. The trusted user can
 assume
// the role to acquire its permissions.
// PolicyDocument shows how to work with a policy document as a data structure and
// serialize it to JSON by using Go's JSON marshaler.
func (wrapper RoleWrapper) CreateRole(ctx context.Context, roleName string,
 trustedUserArn string) (*types.Role, error) {
 var role *types.Role
 trustPolicy := PolicyDocument{
  Version: "2012-10-17",
  Statement: []PolicyStatement{{
   Effect:    "Allow",
   Principal: map[string]string{"AWS": trustedUserArn},
   Action:    []string{"sts:AssumeRole"},
  }},
 }
 policyBytes, err := json.Marshal(trustPolicy)
 if err != nil {
  log.Printf("Couldn't create trust policy for %v. Here's why: %v\n",
 trustedUserArn, err)
  return nil, err
 }
 result, err := wrapper.IamClient.CreateRole(ctx, &iam.CreateRoleInput{
  AssumeRolePolicyDocument: aws.String(string(policyBytes)),
  RoleName:                 aws.String(roleName),
 })
 if err != nil {
  log.Printf("Couldn't create role %v. Here's why: %v\n", roleName, err)
 } else {
  role = result.Role
 }
 return role, err
}
```

- 如需 API 詳細資訊，請參閱 適用於 Go 的 AWS SDK API Reference 中的 CreateRole。

### `CreateServiceLinkedRole`

以下程式碼範例顯示如何使用 `CreateServiceLinkedRole`。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "context"
 "encoding/json"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/iam"
 "github.com/aws/aws-sdk-go-v2/service/iam/types"
)

// RoleWrapper encapsulates AWS Identity and Access Management (IAM) role actions
// used in the examples.
// It contains an IAM service client that is used to perform role actions.
type RoleWrapper struct {
 IamClient *iam.Client
}



// CreateServiceLinkedRole creates a service-linked role that is owned by the
 specified service.
func (wrapper RoleWrapper) CreateServiceLinkedRole(ctx context.Context, serviceName
 string, description string) (
 *types.Role, error) {
 var role *types.Role
 result, err := wrapper.IamClient.CreateServiceLinkedRole(ctx,
 &iam.CreateServiceLinkedRoleInput{
  AWSServiceName: aws.String(serviceName),
  Description:    aws.String(description),
 })
```

```
 if err != nil {
  log.Printf("Couldn't create service-linked role %v. Here's why: %v\n",
 serviceName, err)
 } else {
  role = result.Role
 }
 return role, err
}
```

- 如需 API 詳細資訊，請參閱 適用於 Go 的 AWS SDK API Reference 中的 CreateServiceLinkedRole。

### `CreateUser`

以下程式碼範例顯示如何使用 `CreateUser`。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "context"
 "encoding/json"
 "errors"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/iam"
 "github.com/aws/aws-sdk-go-v2/service/iam/types"
 "github.com/aws/smithy-go"
)

// UserWrapper encapsulates user actions used in the examples.
// It contains an IAM service client that is used to perform user actions.
```

```
type UserWrapper struct {
 IamClient *iam.Client
}



// CreateUser creates a new user with the specified name.
func (wrapper UserWrapper) CreateUser(ctx context.Context, userName string)
 (*types.User, error) {
 var user *types.User
 result, err := wrapper.IamClient.CreateUser(ctx, &iam.CreateUserInput{
  UserName: aws.String(userName),
 })
 if err != nil {
  log.Printf("Couldn't create user %v. Here's why: %v\n", userName, err)
 } else {
  user = result.User
 }
 return user, err
}
```

- 如需 API 詳細資訊，請參閱 適用於 Go 的 AWS SDK API Reference 中的 CreateUser。

### `DeleteAccessKey`

以下程式碼範例顯示如何使用 `DeleteAccessKey`。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "context"
 "encoding/json"
```

```
 "errors"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/iam"
 "github.com/aws/aws-sdk-go-v2/service/iam/types"
 "github.com/aws/smithy-go"
)

// UserWrapper encapsulates user actions used in the examples.
// It contains an IAM service client that is used to perform user actions.
type UserWrapper struct {
 IamClient *iam.Client
}



// DeleteAccessKey deletes an access key from a user.
func (wrapper UserWrapper) DeleteAccessKey(ctx context.Context, userName string,
 keyId string) error {
 _, err := wrapper.IamClient.DeleteAccessKey(ctx, &iam.DeleteAccessKeyInput{
  AccessKeyId: aws.String(keyId),
  UserName:    aws.String(userName),
 })
 if err != nil {
  log.Printf("Couldn't delete access key %v. Here's why: %v\n", keyId, err)
 }
 return err
}
```

- 如需 API 詳細資訊，請參閱 適用於 Go 的 AWS SDK API Reference 中的 DeleteAccessKey。

### DeletePolicy

以下程式碼範例顯示如何使用 DeletePolicy。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "context"
 "encoding/json"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/iam"
 "github.com/aws/aws-sdk-go-v2/service/iam/types"
)

// PolicyWrapper encapsulates AWS Identity and Access Management (IAM) policy
 actions
// used in the examples.
// It contains an IAM service client that is used to perform policy actions.
type PolicyWrapper struct {
 IamClient *iam.Client
}



// DeletePolicy deletes a policy.
func (wrapper PolicyWrapper) DeletePolicy(ctx context.Context, policyArn string)
 error {
 _, err := wrapper.IamClient.DeletePolicy(ctx, &iam.DeletePolicyInput{
  PolicyArn: aws.String(policyArn),
 })
 if err != nil {
  log.Printf("Couldn't delete policy %v. Here's why: %v\n", policyArn, err)
 }
 return err
}
```

- 如需 API 詳細資訊，請參閱 適用於 Go 的 AWS SDK API Reference 中的 DeletePolicy。

### `DeleteRole`

以下程式碼範例顯示如何使用 `DeleteRole`。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "context"
 "encoding/json"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/iam"
 "github.com/aws/aws-sdk-go-v2/service/iam/types"
)

// RoleWrapper encapsulates AWS Identity and Access Management (IAM) role actions
// used in the examples.
// It contains an IAM service client that is used to perform role actions.
type RoleWrapper struct {
 IamClient *iam.Client
}



// DeleteRole deletes a role. All attached policies must be detached before a
// role can be deleted.
func (wrapper RoleWrapper) DeleteRole(ctx context.Context, roleName string) error {
 _, err := wrapper.IamClient.DeleteRole(ctx, &iam.DeleteRoleInput{
  RoleName: aws.String(roleName),
 })
 if err != nil {
  log.Printf("Couldn't delete role %v. Here's why: %v\n", roleName, err)
```

```
 }
 return err
}
```

- 如需 API 詳細資訊，請參閱 適用於 Go 的 AWS SDK API Reference 中的 DeleteRole。

### `DeleteServiceLinkedRole`

以下程式碼範例顯示如何使用 `DeleteServiceLinkedRole`。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "context"
 "encoding/json"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/iam"
 "github.com/aws/aws-sdk-go-v2/service/iam/types"
)

// RoleWrapper encapsulates AWS Identity and Access Management (IAM) role actions
// used in the examples.
// It contains an IAM service client that is used to perform role actions.
type RoleWrapper struct {
 IamClient *iam.Client
}



// DeleteServiceLinkedRole deletes a service-linked role.
```

```
func (wrapper RoleWrapper) DeleteServiceLinkedRole(ctx context.Context, roleName
 string) error {
 _, err := wrapper.IamClient.DeleteServiceLinkedRole(ctx,
 &iam.DeleteServiceLinkedRoleInput{
  RoleName: aws.String(roleName)},
 )
 if err != nil {
  log.Printf("Couldn't delete service-linked role %v. Here's why: %v\n", roleName,
 err)
 }
 return err
}
```

- 如需 API 詳細資訊，請參閱 適用於 Go 的 AWS SDK API Reference 中的 DeleteServiceLinkedRole。

### `DeleteUser`

以下程式碼範例顯示如何使用 `DeleteUser`。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "context"
 "encoding/json"
 "errors"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/iam"
 "github.com/aws/aws-sdk-go-v2/service/iam/types"
 "github.com/aws/smithy-go"
```

```
)

// UserWrapper encapsulates user actions used in the examples.
// It contains an IAM service client that is used to perform user actions.
type UserWrapper struct {
 IamClient *iam.Client
}



// DeleteUser deletes a user.
func (wrapper UserWrapper) DeleteUser(ctx context.Context, userName string) error {
 _, err := wrapper.IamClient.DeleteUser(ctx, &iam.DeleteUserInput{
  UserName: aws.String(userName),
 })
 if err != nil {
  log.Printf("Couldn't delete user %v. Here's why: %v\n", userName, err)
 }
 return err
}
```

- 如需 API 詳細資訊，請參閱 適用於 Go 的 AWS SDK API Reference 中的 DeleteUser。

### `DeleteUserPolicy`

以下程式碼範例顯示如何使用 `DeleteUserPolicy`。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "context"
 "encoding/json"
```

```
 "errors"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/iam"
 "github.com/aws/aws-sdk-go-v2/service/iam/types"
 "github.com/aws/smithy-go"
)

// UserWrapper encapsulates user actions used in the examples.
// It contains an IAM service client that is used to perform user actions.
type UserWrapper struct {
 IamClient *iam.Client
}



// DeleteUserPolicy deletes an inline policy from a user.
func (wrapper UserWrapper) DeleteUserPolicy(ctx context.Context, userName string,
 policyName string) error {
 _, err := wrapper.IamClient.DeleteUserPolicy(ctx, &iam.DeleteUserPolicyInput{
  PolicyName: aws.String(policyName),
  UserName:   aws.String(userName),
 })
 if err != nil {
  log.Printf("Couldn't delete policy from user %v. Here's why: %v\n", userName, err)
 }
 return err
}
```

- 如需 API 詳細資訊，請參閱 適用於 Go 的 AWS SDK API Reference 中的 DeleteUserPolicy。

### DetachRolePolicy

以下程式碼範例顯示如何使用 DetachRolePolicy。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "context"
 "encoding/json"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/iam"
 "github.com/aws/aws-sdk-go-v2/service/iam/types"
)

// RoleWrapper encapsulates AWS Identity and Access Management (IAM) role actions
// used in the examples.
// It contains an IAM service client that is used to perform role actions.
type RoleWrapper struct {
 IamClient *iam.Client
}



// DetachRolePolicy detaches a policy from a role.
func (wrapper RoleWrapper) DetachRolePolicy(ctx context.Context, roleName string,
 policyArn string) error {
 _, err := wrapper.IamClient.DetachRolePolicy(ctx, &iam.DetachRolePolicyInput{
  PolicyArn: aws.String(policyArn),
  RoleName:  aws.String(roleName),
 })
 if err != nil {
  log.Printf("Couldn't detach policy from role %v. Here's why: %v\n", roleName, err)
 }
 return err
}
```

- 如需 API 詳細資訊，請參閱 適用於 Go 的 AWS SDK API Reference 中的 DetachRolePolicy。

### `GetAccountPasswordPolicy`

以下程式碼範例顯示如何使用 `GetAccountPasswordPolicy`。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "context"
 "log"

 "github.com/aws/aws-sdk-go-v2/service/iam"
 "github.com/aws/aws-sdk-go-v2/service/iam/types"
)

// AccountWrapper encapsulates AWS Identity and Access Management (IAM) account
 actions
// used in the examples.
// It contains an IAM service client that is used to perform account actions.
type AccountWrapper struct {
 IamClient *iam.Client
}



// GetAccountPasswordPolicy gets the account password policy for the current
 account.
// If no policy has been set, a NoSuchEntityException is error is returned.
func (wrapper AccountWrapper) GetAccountPasswordPolicy(ctx context.Context)
 (*types.PasswordPolicy, error) {
 var pwPolicy *types.PasswordPolicy
 result, err := wrapper.IamClient.GetAccountPasswordPolicy(ctx,
  &iam.GetAccountPasswordPolicyInput{})
 if err != nil {
```

```
  log.Printf("Couldn't get account password policy. Here's why: %v\n", err)
 } else {
  pwPolicy = result.PasswordPolicy
 }
 return pwPolicy, err
}
```

- 如需 API 詳細資訊，請參閱 適用於 Go 的 AWS SDK API Reference 中的 GetAccountPasswordPolicy。

### `GetPolicy`

以下程式碼範例顯示如何使用 `GetPolicy`。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "context"
 "encoding/json"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/iam"
 "github.com/aws/aws-sdk-go-v2/service/iam/types"
)

// PolicyWrapper encapsulates AWS Identity and Access Management (IAM) policy
 actions
// used in the examples.
// It contains an IAM service client that is used to perform policy actions.
type PolicyWrapper struct {
 IamClient *iam.Client
```

```
}



// GetPolicy gets data about a policy.
func (wrapper PolicyWrapper) GetPolicy(ctx context.Context, policyArn string)
 (*types.Policy, error) {
 var policy *types.Policy
 result, err := wrapper.IamClient.GetPolicy(ctx, &iam.GetPolicyInput{
  PolicyArn: aws.String(policyArn),
 })
 if err != nil {
  log.Printf("Couldn't get policy %v. Here's why: %v\n", policyArn, err)
 } else {
  policy = result.Policy
 }
 return policy, err
}
```

- 如需 API 詳細資訊，請參閱 適用於 Go 的 AWS SDK API Reference 中的 GetPolicy。

### `GetRole`

以下程式碼範例顯示如何使用 `GetRole`。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "context"
 "encoding/json"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
```

```
 "github.com/aws/aws-sdk-go-v2/service/iam"
 "github.com/aws/aws-sdk-go-v2/service/iam/types"
)

// RoleWrapper encapsulates AWS Identity and Access Management (IAM) role actions
// used in the examples.
// It contains an IAM service client that is used to perform role actions.
type RoleWrapper struct {
 IamClient *iam.Client
}



// GetRole gets data about a role.
func (wrapper RoleWrapper) GetRole(ctx context.Context, roleName string)
 (*types.Role, error) {
 var role *types.Role
 result, err := wrapper.IamClient.GetRole(ctx,
  &iam.GetRoleInput{RoleName: aws.String(roleName)})
 if err != nil {
  log.Printf("Couldn't get role %v. Here's why: %v\n", roleName, err)
 } else {
  role = result.Role
 }
 return role, err
}
```

- 如需 API 詳細資訊，請參閱 適用於 Go 的 AWS SDK API Reference 中的 GetRole。

### `GetUser`

以下程式碼範例顯示如何使用 `GetUser`。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "context"
 "encoding/json"
 "errors"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/iam"
 "github.com/aws/aws-sdk-go-v2/service/iam/types"
 "github.com/aws/smithy-go"
)

// UserWrapper encapsulates user actions used in the examples.
// It contains an IAM service client that is used to perform user actions.
type UserWrapper struct {
 IamClient *iam.Client
}



// GetUser gets data about a user.
func (wrapper UserWrapper) GetUser(ctx context.Context, userName string)
 (*types.User, error) {
 var user *types.User
 result, err := wrapper.IamClient.GetUser(ctx, &iam.GetUserInput{
  UserName: aws.String(userName),
 })
 if err != nil {
  var apiError smithy.APIError
  if errors.As(err, &apiError) {
   switch apiError.(type) {
   case *types.NoSuchEntityException:
    log.Printf("User %v does not exist.\n", userName)
    err = nil
   default:
    log.Printf("Couldn't get user %v. Here's why: %v\n", userName, err)
   }
  }
 } else {
  user = result.User
 }
 return user, err
```

```
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的 GetUser。

### `ListAccessKeys`

以下程式碼範例顯示如何使用 `ListAccessKeys`。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "context"
 "encoding/json"
 "errors"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/iam"
 "github.com/aws/aws-sdk-go-v2/service/iam/types"
 "github.com/aws/smithy-go"
)

// UserWrapper encapsulates user actions used in the examples.
// It contains an IAM service client that is used to perform user actions.
type UserWrapper struct {
 IamClient *iam.Client
}



// ListAccessKeys lists the access keys for the specified user.
func (wrapper UserWrapper) ListAccessKeys(ctx context.Context, userName string)
 ([]types.AccessKeyMetadata, error) {
```

```
 var keys []types.AccessKeyMetadata
 result, err := wrapper.IamClient.ListAccessKeys(ctx, &iam.ListAccessKeysInput{
  UserName: aws.String(userName),
 })
 if err != nil {
  log.Printf("Couldn't list access keys for user %v. Here's why: %v\n", userName,
 err)
 } else {
  keys = result.AccessKeyMetadata
 }
 return keys, err
}
```

- 如需 API 詳細資訊，請參閱 適用於 Go 的 AWS SDK API Reference 中的 ListAccessKeys。

### `ListAttachedRolePolicies`

以下程式碼範例顯示如何使用 `ListAttachedRolePolicies`。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "context"
 "encoding/json"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/iam"
 "github.com/aws/aws-sdk-go-v2/service/iam/types"
)

// RoleWrapper encapsulates AWS Identity and Access Management (IAM) role actions
```

```
// used in the examples.
// It contains an IAM service client that is used to perform role actions.
type RoleWrapper struct {
 IamClient *iam.Client
}



// ListAttachedRolePolicies lists the policies that are attached to the specified
 role.
func (wrapper RoleWrapper) ListAttachedRolePolicies(ctx context.Context, roleName
 string) ([]types.AttachedPolicy, error) {
 var policies []types.AttachedPolicy
 result, err := wrapper.IamClient.ListAttachedRolePolicies(ctx,
 &iam.ListAttachedRolePoliciesInput{
  RoleName: aws.String(roleName),
 })
 if err != nil {
  log.Printf("Couldn't list attached policies for role %v. Here's why: %v\n",
 roleName, err)
 } else {
  policies = result.AttachedPolicies
 }
 return policies, err
}
```

- 如需 API 詳細資訊，請參閱 適用於 Go 的 AWS SDK API Reference 中的 ListAttachedRolePolicies。

### `ListGroups`

以下程式碼範例顯示如何使用 `ListGroups`。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "context"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/iam"
 "github.com/aws/aws-sdk-go-v2/service/iam/types"
)

// GroupWrapper encapsulates AWS Identity and Access Management (IAM) group actions
// used in the examples.
// It contains an IAM service client that is used to perform group actions.
type GroupWrapper struct {
 IamClient *iam.Client
}



// ListGroups lists up to maxGroups number of groups.
func (wrapper GroupWrapper) ListGroups(ctx context.Context, maxGroups int32)
 ([]types.Group, error) {
 var groups []types.Group
 result, err := wrapper.IamClient.ListGroups(ctx, &iam.ListGroupsInput{
  MaxItems: aws.Int32(maxGroups),
 })
 if err != nil {
  log.Printf("Couldn't list groups. Here's why: %v\n", err)
 } else {
  groups = result.Groups
 }
 return groups, err
}
```

- 如需 API 詳細資訊，請參閱 適用於 Go 的 AWS SDK API Reference 中的 ListGroups。

### ListPolicies

以下程式碼範例顯示如何使用 ListPolicies。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "context"
 "encoding/json"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/iam"
 "github.com/aws/aws-sdk-go-v2/service/iam/types"
)

// PolicyWrapper encapsulates AWS Identity and Access Management (IAM) policy
 actions
// used in the examples.
// It contains an IAM service client that is used to perform policy actions.
type PolicyWrapper struct {
 IamClient *iam.Client
}



// ListPolicies gets up to maxPolicies policies.
func (wrapper PolicyWrapper) ListPolicies(ctx context.Context, maxPolicies int32)
 ([]types.Policy, error) {
 var policies []types.Policy
 result, err := wrapper.IamClient.ListPolicies(ctx, &iam.ListPoliciesInput{
  MaxItems: aws.Int32(maxPolicies),
 })
 if err != nil {
  log.Printf("Couldn't list policies. Here's why: %v\n", err)
 } else {
  policies = result.Policies
 }
 return policies, err
```

```
}
```

- 如需 API 詳細資訊，請參閱 適用於 Go 的 AWS SDK API Reference 中的 ListPolicies。

### `ListRolePolicies`

以下程式碼範例顯示如何使用 `ListRolePolicies`。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "context"
 "encoding/json"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/iam"
 "github.com/aws/aws-sdk-go-v2/service/iam/types"
)

// RoleWrapper encapsulates AWS Identity and Access Management (IAM) role actions
// used in the examples.
// It contains an IAM service client that is used to perform role actions.
type RoleWrapper struct {
 IamClient *iam.Client
}



// ListRolePolicies lists the inline policies for a role.
func (wrapper RoleWrapper) ListRolePolicies(ctx context.Context, roleName string)
 ([]string, error) {
 var policies []string
```

```
 result, err := wrapper.IamClient.ListRolePolicies(ctx, &iam.ListRolePoliciesInput{
  RoleName: aws.String(roleName),
 })
 if err != nil {
  log.Printf("Couldn't list policies for role %v. Here's why: %v\n", roleName, err)
 } else {
  policies = result.PolicyNames
 }
 return policies, err
}
```

- 如需 API 詳細資訊，請參閱 適用於 Go 的 AWS SDK API Reference 中的 ListRolePolicies。

### `ListRoles`

以下程式碼範例顯示如何使用 `ListRoles`。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "context"
 "encoding/json"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/iam"
 "github.com/aws/aws-sdk-go-v2/service/iam/types"
)

// RoleWrapper encapsulates AWS Identity and Access Management (IAM) role actions
// used in the examples.
// It contains an IAM service client that is used to perform role actions.
type RoleWrapper struct {
```

```
 IamClient *iam.Client
}



// ListRoles gets up to maxRoles roles.
func (wrapper RoleWrapper) ListRoles(ctx context.Context, maxRoles int32)
 ([]types.Role, error) {
 var roles []types.Role
 result, err := wrapper.IamClient.ListRoles(ctx,
  &iam.ListRolesInput{MaxItems: aws.Int32(maxRoles)},
 )
 if err != nil {
  log.Printf("Couldn't list roles. Here's why: %v\n", err)
 } else {
  roles = result.Roles
 }
 return roles, err
}
```

- 如需 API 詳細資訊，請參閱 適用於 Go 的 AWS SDK API Reference 中的 ListRoles。

### `ListSAMLProviders`

以下程式碼範例顯示如何使用 `ListSAMLProviders`。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "context"
 "log"

 "github.com/aws/aws-sdk-go-v2/service/iam"
```

```
 "github.com/aws/aws-sdk-go-v2/service/iam/types"
)

// AccountWrapper encapsulates AWS Identity and Access Management (IAM) account
 actions
// used in the examples.
// It contains an IAM service client that is used to perform account actions.
type AccountWrapper struct {
 IamClient *iam.Client
}



// ListSAMLProviders gets the SAML providers for the account.
func (wrapper AccountWrapper) ListSAMLProviders(ctx context.Context)
 ([]types.SAMLProviderListEntry, error) {
 var providers []types.SAMLProviderListEntry
 result, err := wrapper.IamClient.ListSAMLProviders(ctx,
 &iam.ListSAMLProvidersInput{})
 if err != nil {
  log.Printf("Couldn't list SAML providers. Here's why: %v\n", err)
 } else {
  providers = result.SAMLProviderList
 }
 return providers, err
}
```

- 如需 API 詳細資訊，請參閱 適用於 Go 的 AWS SDK API Reference 中的 ListSAMLProviders。

### `ListUserPolicies`

以下程式碼範例顯示如何使用 `ListUserPolicies`。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "context"
 "encoding/json"
 "errors"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/iam"
 "github.com/aws/aws-sdk-go-v2/service/iam/types"
 "github.com/aws/smithy-go"
)

// UserWrapper encapsulates user actions used in the examples.
// It contains an IAM service client that is used to perform user actions.
type UserWrapper struct {
 IamClient *iam.Client
}



// ListUserPolicies lists the inline policies for the specified user.
func (wrapper UserWrapper) ListUserPolicies(ctx context.Context, userName string)
 ([]string, error) {
 var policies []string
 result, err := wrapper.IamClient.ListUserPolicies(ctx, &iam.ListUserPoliciesInput{
  UserName: aws.String(userName),
 })
 if err != nil {
  log.Printf("Couldn't list policies for user %v. Here's why: %v\n", userName, err)
 } else {
  policies = result.PolicyNames
 }
 return policies, err
}
```

- 如需 API 詳細資訊，請參閱 適用於 Go 的 AWS SDK API Reference 中的 ListUserPolicies。

### `ListUsers`

以下程式碼範例顯示如何使用 `ListUsers`。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "context"
 "encoding/json"
 "errors"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/iam"
 "github.com/aws/aws-sdk-go-v2/service/iam/types"
 "github.com/aws/smithy-go"
)

// UserWrapper encapsulates user actions used in the examples.
// It contains an IAM service client that is used to perform user actions.
type UserWrapper struct {
 IamClient *iam.Client
}



// ListUsers gets up to maxUsers number of users.
func (wrapper UserWrapper) ListUsers(ctx context.Context, maxUsers int32)
 ([]types.User, error) {
 var users []types.User
 result, err := wrapper.IamClient.ListUsers(ctx, &iam.ListUsersInput{
  MaxItems: aws.Int32(maxUsers),
 })
 if err != nil {
  log.Printf("Couldn't list users. Here's why: %v\n", err)
 } else {
```

```
  users = result.Users
 }
 return users, err
}
```

- 如需 API 詳細資訊，請參閱 適用於 Go 的 AWS SDK API Reference 中的 ListUsers。

### `PutUserPolicy`

以下程式碼範例顯示如何使用 `PutUserPolicy`。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "context"
 "encoding/json"
 "errors"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/iam"
 "github.com/aws/aws-sdk-go-v2/service/iam/types"
 "github.com/aws/smithy-go"
)

// UserWrapper encapsulates user actions used in the examples.
// It contains an IAM service client that is used to perform user actions.
type UserWrapper struct {
 IamClient *iam.Client
}
```

```
// CreateUserPolicy adds an inline policy to a user. This example creates a policy
 that
// grants a list of actions on a specified role.
// PolicyDocument shows how to work with a policy document as a data structure and
// serialize it to JSON by using Go's JSON marshaler.
func (wrapper UserWrapper) CreateUserPolicy(ctx context.Context, userName string,
 policyName string, actions []string,
 roleArn string) error {
 policyDoc := PolicyDocument{
  Version: "2012-10-17",
  Statement: []PolicyStatement{{
   Effect:   "Allow",
   Action:   actions,
   Resource: aws.String(roleArn),
  }},
 }
 policyBytes, err := json.Marshal(policyDoc)
 if err != nil {
  log.Printf("Couldn't create policy document for %v. Here's why: %v\n", roleArn,
 err)
  return err
 }
 _, err = wrapper.IamClient.PutUserPolicy(ctx, &iam.PutUserPolicyInput{
  PolicyDocument: aws.String(string(policyBytes)),
  PolicyName:     aws.String(policyName),
  UserName:       aws.String(userName),
 })
 if err != nil {
  log.Printf("Couldn't create policy for user %v. Here's why: %v\n", userName, err)
 }
 return err
}
```

- 如需 API 詳細資訊，請參閱 適用於 Go 的 AWS SDK API Reference 中的 PutUserPolicy。

# 使用適用於 Go V2 的 SDK 的 Kinesis 範例

下列程式碼範例示範如何使用 適用於 Go 的 AWS SDK V2 搭配 Kinesis 來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 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。

SDK for Go V2

> **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 Go 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
package main

import (
 "context"
 "log"

 "github.com/aws/aws-lambda-go/events"
 "github.com/aws/aws-lambda-go/lambda"
)

func handler(ctx context.Context, kinesisEvent events.KinesisEvent) error {
 if len(kinesisEvent.Records) == 0 {
  log.Printf("empty Kinesis event received")
  return nil
 }

 for _, record := range kinesisEvent.Records {
  log.Printf("processed Kinesis event with EventId: %v", record.EventID)
  recordDataBytes := record.Kinesis.Data
```

```
  recordDataText := string(recordDataBytes)
  log.Printf("record data: %v", recordDataText)
  // TODO: Do interesting work based on the new data
 }
 log.Printf("successfully processed %v records", len(kinesisEvent.Records))
 return nil
}

func main() {
 lambda.Start(handler)
}
```

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。

SDK for Go V2

> **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 Go 搭配 Lambda 來報告 Kinesis 批次項目失敗。

```
// Copyright Amazon.com, Inc. or its affiliates. All Rights Reserved.
// SPDX-License-Identifier: Apache-2.0
package main

import (
 "context"
 "fmt"
 "github.com/aws/aws-lambda-go/events"
 "github.com/aws/aws-lambda-go/lambda"
)

func handler(ctx context.Context, kinesisEvent events.KinesisEvent)
 (map[string]interface{}, error) {
 batchItemFailures := []map[string]interface{}{}
```

```
 for _, record := range kinesisEvent.Records {
  curRecordSequenceNumber := ""

  // Process your record
  if /* Your record processing condition here */ {
   curRecordSequenceNumber = record.Kinesis.SequenceNumber
  }

  // Add a condition to check if the record processing failed
  if curRecordSequenceNumber != "" {
   batchItemFailures = append(batchItemFailures, map[string]interface{}
{"itemIdentifier": curRecordSequenceNumber})
  }
 }

 kinesisBatchResponse := map[string]interface{}{
  "batchItemFailures": batchItemFailures,
 }
 return kinesisBatchResponse, nil
}

func main() {
 lambda.Start(handler)
}
```

# 使用適用於 Go V2 的 SDK 的 Lambda 範例

下列程式碼範例示範如何使用 適用於 Go 的 AWS SDK V2 搭配 Lambda 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。

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。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
package main

import (
 "context"
 "fmt"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/config"
 "github.com/aws/aws-sdk-go-v2/service/lambda"
)

// main uses the AWS SDK for Go (v2) to create an AWS Lambda client and list up to
 10
// functions in your account.
// This example uses the default settings specified in your shared credentials
// and config files.
```

```
func main() {
 ctx := context.Background()
 sdkConfig, err := config.LoadDefaultConfig(ctx)
 if err != nil {
  fmt.Println("Couldn't load default configuration. Have you set up your AWS
 account?")
  fmt.Println(err)
  return
 }
 lambdaClient := lambda.NewFromConfig(sdkConfig)

 maxItems := 10
 fmt.Printf("Let's list up to %v functions for your account.\n", maxItems)
 result, err := lambdaClient.ListFunctions(ctx, &lambda.ListFunctionsInput{
  MaxItems: aws.Int32(int32(maxItems)),
 })
 if err != nil {
  fmt.Printf("Couldn't list functions for your account. Here's why: %v\n", err)
  return
 }
 if len(result.Functions) == 0 {
  fmt.Println("You don't have any functions!")
 } else {
  for _, function := range result.Functions {
   fmt.Printf("\t%v\n", *function.FunctionName)
  }
 }
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 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。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

建立互動式案例，示範如何開始使用 Lambda 函數。

```
import (
 "archive/zip"
 "bytes"
 "context"
 "encoding/base64"
 "encoding/json"
 "errors"
 "fmt"
 "log"
 "os"
 "strings"
 "time"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/iam"
 iamtypes "github.com/aws/aws-sdk-go-v2/service/iam/types"
 "github.com/aws/aws-sdk-go-v2/service/lambda"
 "github.com/awsdocs/aws-doc-sdk-examples/gov2/demotools"
 "github.com/awsdocs/aws-doc-sdk-examples/gov2/lambda/actions"
)

// GetStartedFunctionsScenario shows you how to use AWS Lambda to perform the
 following
// actions:
//
```

```
//  1. Create an AWS Identity and Access Management (IAM) role and Lambda function,
 then upload handler code.
//  2. Invoke the function with a single parameter and get results.
//  3. Update the function code and configure with an environment variable.
//  4. Invoke the function with new parameters and get results. Display the returned
 execution log.
//  5. List the functions for your account, then clean up resources.
type GetStartedFunctionsScenario struct {
 sdkConfig       aws.Config
 functionWrapper actions.FunctionWrapper
 questioner      demotools.IQuestioner
 helper          IScenarioHelper
 isTestRun       bool
}

// NewGetStartedFunctionsScenario constructs a GetStartedFunctionsScenario instance
 from a configuration.
// It uses the specified config to get a Lambda client and create wrappers for the
 actions
// used in the scenario.
func NewGetStartedFunctionsScenario(sdkConfig aws.Config, questioner
 demotools.IQuestioner,
 helper IScenarioHelper) GetStartedFunctionsScenario {
 lambdaClient := lambda.NewFromConfig(sdkConfig)
 return GetStartedFunctionsScenario{
  sdkConfig:       sdkConfig,
  functionWrapper: actions.FunctionWrapper{LambdaClient: lambdaClient},
  questioner:      questioner,
  helper:          helper,
 }
}

// Run runs the interactive scenario.
func (scenario GetStartedFunctionsScenario) Run(ctx context.Context) {
 defer func() {
  if r := recover(); r != nil {
   log.Printf("Something went wrong with the demo.\n")
  }
 }()

 log.Println(strings.Repeat("-", 88))
 log.Println("Welcome to the AWS Lambda get started with functions demo.")
 log.Println(strings.Repeat("-", 88))
```

```
 role := scenario.GetOrCreateRole(ctx)
 funcName := scenario.CreateFunction(ctx, role)
 scenario.InvokeIncrement(ctx, funcName)
 scenario.UpdateFunction(ctx, funcName)
 scenario.InvokeCalculator(ctx, funcName)
 scenario.ListFunctions(ctx)
 scenario.Cleanup(ctx, role, funcName)

 log.Println(strings.Repeat("-", 88))
 log.Println("Thanks for watching!")
 log.Println(strings.Repeat("-", 88))
}

// GetOrCreateRole checks whether the specified role exists and returns it if it
 does.
// Otherwise, a role is created that specifies Lambda as a trusted principal.
// The AWSLambdaBasicExecutionRole managed policy is attached to the role and the
 role
// is returned.
func (scenario GetStartedFunctionsScenario) GetOrCreateRole(ctx context.Context)
 *iamtypes.Role {
 var role *iamtypes.Role
 iamClient := iam.NewFromConfig(scenario.sdkConfig)
 log.Println("First, we need an IAM role that Lambda can assume.")
 roleName := scenario.questioner.Ask("Enter a name for the role:",
 demotools.NotEmpty{})
 getOutput, err := iamClient.GetRole(ctx, &iam.GetRoleInput{
  RoleName: aws.String(roleName)})
 if err != nil {
  var noSuch *iamtypes.NoSuchEntityException
  if errors.As(err, &noSuch) {
   log.Printf("Role %v doesn't exist. Creating it....\n", roleName)
  } else {
   log.Panicf("Couldn't check whether role %v exists. Here's why: %v\n",
    roleName, err)
  }
 } else {
  role = getOutput.Role
  log.Printf("Found role %v.\n", *role.RoleName)
 }
 if role == nil {
  trustPolicy := PolicyDocument{
   Version: "2012-10-17",
   Statement: []PolicyStatement{{
```

```
    Effect:    "Allow",
    Principal: map[string]string{"Service": "lambda.amazonaws.com"},
    Action:    []string{"sts:AssumeRole"},
   }},
  }
  policyArn := "arn:aws:iam::aws:policy/service-role/AWSLambdaBasicExecutionRole"
  createOutput, err := iamClient.CreateRole(ctx, &iam.CreateRoleInput{
   AssumeRolePolicyDocument: aws.String(trustPolicy.String()),
   RoleName:                 aws.String(roleName),
  })
  if err != nil {
   log.Panicf("Couldn't create role %v. Here's why: %v\n", roleName, err)
  }
  role = createOutput.Role
  _, err = iamClient.AttachRolePolicy(ctx, &iam.AttachRolePolicyInput{
   PolicyArn: aws.String(policyArn),
   RoleName:  aws.String(roleName),
  })
  if err != nil {
   log.Panicf("Couldn't attach a policy to role %v. Here's why: %v\n", roleName,
 err)
  }
  log.Printf("Created role %v.\n", *role.RoleName)
  log.Println("Let's give AWS a few seconds to propagate resources...")
  scenario.helper.Pause(10)
 }
 log.Println(strings.Repeat("-", 88))
 return role
}

// CreateFunction creates a Lambda function and uploads a handler written in Python.
// The code for the Python handler is packaged as a []byte in .zip format.
func (scenario GetStartedFunctionsScenario) CreateFunction(ctx context.Context, role
 *iamtypes.Role) string {
 log.Println("Let's create a function that increments a number.\n" +
  "The function uses the 'lambda_handler_basic.py' script found in the \n" +
  "'handlers' directory of this project.")
 funcName := scenario.questioner.Ask("Enter a name for the Lambda function:",
 demotools.NotEmpty{})
 zipPackage := scenario.helper.CreateDeploymentPackage("lambda_handler_basic.py",
 fmt.Sprintf("%v.py", funcName))
 log.Printf("Creating function %v and waiting for it to be ready.", funcName)
 funcState := scenario.functionWrapper.CreateFunction(ctx, funcName,
 fmt.Sprintf("%v.lambda_handler", funcName),
```

```
  role.Arn, zipPackage)
 log.Printf("Your function is %v.", funcState)
 log.Println(strings.Repeat("-", 88))
 return funcName
}

// InvokeIncrement invokes a Lambda function that increments a number. The function
// parameters are contained in a Go struct that is used to serialize the parameters
 to
// a JSON payload that is passed to the function.
// The result payload is deserialized into a Go struct that contains an int value.
func (scenario GetStartedFunctionsScenario) InvokeIncrement(ctx context.Context,
 funcName string) {
 parameters := actions.IncrementParameters{Action: "increment"}
 log.Println("Let's invoke our function. This function increments a number.")
 parameters.Number = scenario.questioner.AskInt("Enter a number to increment:",
 demotools.NotEmpty{})
 log.Printf("Invoking %v with %v...\n", funcName, parameters.Number)
 invokeOutput := scenario.functionWrapper.Invoke(ctx, funcName, parameters, false)
 var payload actions.LambdaResultInt
 err := json.Unmarshal(invokeOutput.Payload, &payload)
 if err != nil {
  log.Panicf("Couldn't unmarshal payload from invoking %v. Here's why: %v\n",
   funcName, err)
 }
 log.Printf("Invoking %v with %v returned %v.\n", funcName, parameters.Number,
 payload)
 log.Println(strings.Repeat("-", 88))
}

// UpdateFunction updates the code for a Lambda function by uploading a simple
 arithmetic
// calculator written in Python. The code for the Python handler is packaged as a
// []byte in .zip format.
// After the code is updated, the configuration is also updated with a new log
// level that instructs the handler to log additional information.
func (scenario GetStartedFunctionsScenario) UpdateFunction(ctx context.Context,
 funcName string) {
 log.Println("Let's update the function to an arithmetic calculator.\n" +
  "The function uses the 'lambda_handler_calculator.py' script found in the \n" +
  "'handlers' directory of this project.")
 scenario.questioner.Ask("Press Enter when you're ready.")
 log.Println("Creating deployment package...")
```

```
 zipPackage :=
 scenario.helper.CreateDeploymentPackage("lambda_handler_calculator.py",
  fmt.Sprintf("%v.py", funcName))
 log.Println("...and updating the Lambda function and waiting for it to be ready.")
 funcState := scenario.functionWrapper.UpdateFunctionCode(ctx, funcName, zipPackage)
 log.Printf("Updated function %v. Its current state is %v.", funcName, funcState)
 log.Println("This function uses an environment variable to control logging level.")
 log.Println("Let's set it to DEBUG to get the most logging.")
 scenario.functionWrapper.UpdateFunctionConfiguration(ctx, funcName,
  map[string]string{"LOG_LEVEL": "DEBUG"})
 log.Println(strings.Repeat("-", 88))
}

// InvokeCalculator invokes the Lambda calculator function. The parameters are
 stored in a
// Go struct that is used to serialize the parameters to a JSON payload. That
 payload is then passed
// to the function.
// The result payload is deserialized to a Go struct that stores the result as
 either an
// int or float32, depending on the kind of operation that was specified.
func (scenario GetStartedFunctionsScenario) InvokeCalculator(ctx context.Context,
 funcName string) {
 wantInvoke := true
 choices := []string{"plus", "minus", "times", "divided-by"}
 for wantInvoke {
  choice := scenario.questioner.AskChoice("Select an arithmetic operation:\n",
 choices)
  x := scenario.questioner.AskInt("Enter a value for x:", demotools.NotEmpty{})
  y := scenario.questioner.AskInt("Enter a value for y:", demotools.NotEmpty{})
  log.Printf("Invoking %v %v %v...", x, choices[choice], y)
  calcParameters := actions.CalculatorParameters{
   Action: choices[choice],
   X:      x,
   Y:      y,
  }
  invokeOutput := scenario.functionWrapper.Invoke(ctx, funcName, calcParameters,
 true)
  var payload any
  if choice == 3 { // divide-by results in a float.
   payload = actions.LambdaResultFloat{}
  } else {
   payload = actions.LambdaResultInt{}
  }
```

```
  err := json.Unmarshal(invokeOutput.Payload, &payload)
  if err != nil {
   log.Panicf("Couldn't unmarshal payload from invoking %v. Here's why: %v\n",
    funcName, err)
  }
  log.Printf("Invoking %v with %v %v %v returned %v.\n", funcName,
   calcParameters.X, calcParameters.Action, calcParameters.Y, payload)
  scenario.questioner.Ask("Press Enter to see the logs from the call.")
  logRes, err := base64.StdEncoding.DecodeString(*invokeOutput.LogResult)
  if err != nil {
   log.Panicf("Couldn't decode log result. Here's why: %v\n", err)
  }
  log.Println(string(logRes))
  wantInvoke = scenario.questioner.AskBool("Do you want to calculate again? (y/n)",
 "y")
 }
 log.Println(strings.Repeat("-", 88))
}

// ListFunctions lists up to the specified number of functions for your account.
func (scenario GetStartedFunctionsScenario) ListFunctions(ctx context.Context) {
 count := scenario.questioner.AskInt(
  "Let's list functions for your account. How many do you want to see?",
 demotools.NotEmpty{})
 functions := scenario.functionWrapper.ListFunctions(ctx, count)
 log.Printf("Found %v functions:", len(functions))
 for _, function := range functions {
  log.Printf("\t%v", *function.FunctionName)
 }
 log.Println(strings.Repeat("-", 88))
}

// Cleanup removes the IAM and Lambda resources created by the example.
func (scenario GetStartedFunctionsScenario) Cleanup(ctx context.Context, role
 *iamtypes.Role, funcName string) {
 if scenario.questioner.AskBool("Do you want to clean up resources created for this
 example? (y/n)",
  "y") {
  iamClient := iam.NewFromConfig(scenario.sdkConfig)
  policiesOutput, err := iamClient.ListAttachedRolePolicies(ctx,
   &iam.ListAttachedRolePoliciesInput{RoleName: role.RoleName})
  if err != nil {
   log.Panicf("Couldn't get policies attached to role %v. Here's why: %v\n",
    *role.RoleName, err)
```

```
  }
  for _, policy := range policiesOutput.AttachedPolicies {
   _, err = iamClient.DetachRolePolicy(ctx, &iam.DetachRolePolicyInput{
    PolicyArn: policy.PolicyArn, RoleName: role.RoleName,
   })
   if err != nil {
    log.Panicf("Couldn't detach policy %v from role %v. Here's why: %v\n",
     *policy.PolicyArn, *role.RoleName, err)
   }
  }
  _, err = iamClient.DeleteRole(ctx, &iam.DeleteRoleInput{RoleName: role.RoleName})
  if err != nil {
   log.Panicf("Couldn't delete role %v. Here's why: %v\n", *role.RoleName, err)
  }
  log.Printf("Deleted role %v.\n", *role.RoleName)

  scenario.functionWrapper.DeleteFunction(ctx, funcName)
  log.Printf("Deleted function %v.\n", funcName)
 } else {
  log.Println("Okay. Don't forget to delete the resources when you're done with
 them.")
 }
}

// IScenarioHelper abstracts I/O and wait functions from a scenario so that they
// can be mocked for unit testing.
type IScenarioHelper interface {
 Pause(secs int)
 CreateDeploymentPackage(sourceFile string, destinationFile string) *bytes.Buffer
}

// ScenarioHelper lets the caller specify the path to Lambda handler functions.
type ScenarioHelper struct {
 HandlerPath string
}

// Pause waits for the specified number of seconds.
func (helper *ScenarioHelper) Pause(secs int) {
 time.Sleep(time.Duration(secs) * time.Second)
}

// CreateDeploymentPackage creates an AWS Lambda deployment package from a source
 file. The
// deployment package is stored in .zip format in a bytes.Buffer. The buffer can be
```

```
// used to pass a []byte to Lambda when creating the function.
// The specified destinationFile is the name to give the file when it's deployed to
 Lambda.
func (helper *ScenarioHelper) CreateDeploymentPackage(sourceFile string,
 destinationFile string) *bytes.Buffer {
 var err error
 buffer := &bytes.Buffer{}
 writer := zip.NewWriter(buffer)
 zFile, err := writer.Create(destinationFile)
 if err != nil {
  log.Panicf("Couldn't create destination archive %v. Here's why: %v\n",
 destinationFile, err)
 }
 sourceBody, err := os.ReadFile(fmt.Sprintf("%v/%v", helper.HandlerPath,
 sourceFile))
 if err != nil {
  log.Panicf("Couldn't read handler source file %v. Here's why: %v\n",
   sourceFile, err)
 } else {
  _, err = zFile.Write(sourceBody)
  if err != nil {
   log.Panicf("Couldn't write handler %v to zip archive. Here's why: %v\n",
    sourceFile, err)
  }
 }
 err = writer.Close()
 if err != nil {
  log.Panicf("Couldn't close zip writer. Here's why: %v\n", err)
 }
 return buffer
}
```

建立包裝個別 Lambda 動作的結構。

```
import (
 "bytes"
 "context"
 "encoding/json"
 "errors"
 "log"
```

```
 "time"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/lambda"
 "github.com/aws/aws-sdk-go-v2/service/lambda/types"
)

// FunctionWrapper encapsulates function actions used in the examples.
// It contains an AWS Lambda service client that is used to perform user actions.
type FunctionWrapper struct {
 LambdaClient *lambda.Client
}


// GetFunction gets data about the Lambda function specified by functionName.
func (wrapper FunctionWrapper) GetFunction(ctx context.Context, functionName string)
 types.State {
 var state types.State
 funcOutput, err := wrapper.LambdaClient.GetFunction(ctx, &lambda.GetFunctionInput{
  FunctionName: aws.String(functionName),
 })
 if err != nil {
  log.Panicf("Couldn't get function %v. Here's why: %v\n", functionName, err)
 } else {
  state = funcOutput.Configuration.State
 }
 return state
}



// CreateFunction creates a new Lambda function from code contained in the
 zipPackage
// buffer. The specified handlerName must match the name of the file and function
// contained in the uploaded code. The role specified by iamRoleArn is assumed by
// Lambda and grants specific permissions.
// When the function already exists, types.StateActive is returned.
// When the function is created, a lambda.FunctionActiveV2Waiter is used to wait
 until the
// function is active.
func (wrapper FunctionWrapper) CreateFunction(ctx context.Context, functionName
 string, handlerName string,
 iamRoleArn *string, zipPackage *bytes.Buffer) types.State {
 var state types.State
```

```
 _, err := wrapper.LambdaClient.CreateFunction(ctx, &lambda.CreateFunctionInput{
  Code:         &types.FunctionCode{ZipFile: zipPackage.Bytes()},
  FunctionName: aws.String(functionName),
  Role:         iamRoleArn,
  Handler:      aws.String(handlerName),
  Publish:      true,
  Runtime:      types.RuntimePython39,
 })
 if err != nil {
  var resConflict *types.ResourceConflictException
  if errors.As(err, &resConflict) {
   log.Printf("Function %v already exists.\n", functionName)
   state = types.StateActive
  } else {
   log.Panicf("Couldn't create function %v. Here's why: %v\n", functionName, err)
  }
 } else {
  waiter := lambda.NewFunctionActiveV2Waiter(wrapper.LambdaClient)
  funcOutput, err := waiter.WaitForOutput(ctx, &lambda.GetFunctionInput{
   FunctionName: aws.String(functionName)}, 1*time.Minute)
  if err != nil {
   log.Panicf("Couldn't wait for function %v to be active. Here's why: %v\n",
 functionName, err)
  } else {
   state = funcOutput.Configuration.State
  }
 }
 return state
}



// UpdateFunctionCode updates the code for the Lambda function specified by
 functionName.
// The existing code for the Lambda function is entirely replaced by the code in the
// zipPackage buffer. After the update action is called, a
 lambda.FunctionUpdatedV2Waiter
// is used to wait until the update is successful.
func (wrapper FunctionWrapper) UpdateFunctionCode(ctx context.Context, functionName
 string, zipPackage *bytes.Buffer) types.State {
 var state types.State
 _, err := wrapper.LambdaClient.UpdateFunctionCode(ctx,
 &lambda.UpdateFunctionCodeInput{
  FunctionName: aws.String(functionName), ZipFile: zipPackage.Bytes(),
```

```
 })
 if err != nil {
  log.Panicf("Couldn't update code for function %v. Here's why: %v\n", functionName,
 err)
 } else {
  waiter := lambda.NewFunctionUpdatedV2Waiter(wrapper.LambdaClient)
  funcOutput, err := waiter.WaitForOutput(ctx, &lambda.GetFunctionInput{
   FunctionName: aws.String(functionName)}, 1*time.Minute)
  if err != nil {
   log.Panicf("Couldn't wait for function %v to be active. Here's why: %v\n",
 functionName, err)
  } else {
   state = funcOutput.Configuration.State
  }
 }
 return state
}



// UpdateFunctionConfiguration updates a map of environment variables configured for
// the Lambda function specified by functionName.
func (wrapper FunctionWrapper) UpdateFunctionConfiguration(ctx context.Context,
 functionName string, envVars map[string]string) {
 _, err := wrapper.LambdaClient.UpdateFunctionConfiguration(ctx,
 &lambda.UpdateFunctionConfigurationInput{
  FunctionName: aws.String(functionName),
  Environment:  &types.Environment{Variables: envVars},
 })
 if err != nil {
  log.Panicf("Couldn't update configuration for %v. Here's why: %v", functionName,
 err)
 }
}



// ListFunctions lists up to maxItems functions for the account. This function uses
 a
// lambda.ListFunctionsPaginator to paginate the results.
func (wrapper FunctionWrapper) ListFunctions(ctx context.Context, maxItems int)
 []types.FunctionConfiguration {
 var functions []types.FunctionConfiguration
```

```
 paginator := lambda.NewListFunctionsPaginator(wrapper.LambdaClient,
 &lambda.ListFunctionsInput{
  MaxItems: aws.Int32(int32(maxItems)),
 })
 for paginator.HasMorePages() && len(functions) < maxItems {
  pageOutput, err := paginator.NextPage(ctx)
  if err != nil {
   log.Panicf("Couldn't list functions for your account. Here's why: %v\n", err)
  }
  functions = append(functions, pageOutput.Functions...)
 }
 return functions
}



// DeleteFunction deletes the Lambda function specified by functionName.
func (wrapper FunctionWrapper) DeleteFunction(ctx context.Context, functionName
 string) {
 _, err := wrapper.LambdaClient.DeleteFunction(ctx, &lambda.DeleteFunctionInput{
  FunctionName: aws.String(functionName),
 })
 if err != nil {
  log.Panicf("Couldn't delete function %v. Here's why: %v\n", functionName, err)
 }
}



// Invoke invokes the Lambda function specified by functionName, passing the
 parameters
// as a JSON payload. When getLog is true, types.LogTypeTail is specified, which
 tells
// Lambda to include the last few log lines in the returned result.
func (wrapper FunctionWrapper) Invoke(ctx context.Context, functionName string,
 parameters any, getLog bool) *lambda.InvokeOutput {
 logType := types.LogTypeNone
 if getLog {
  logType = types.LogTypeTail
 }
 payload, err := json.Marshal(parameters)
 if err != nil {
  log.Panicf("Couldn't marshal parameters to JSON. Here's why %v\n", err)
 }
```

```
 invokeOutput, err := wrapper.LambdaClient.Invoke(ctx, &lambda.InvokeInput{
  FunctionName: aws.String(functionName),
  LogType:      logType,
  Payload:      payload,
 })
 if err != nil {
  log.Panicf("Couldn't invoke function %v. Here's why: %v\n", functionName, err)
 }
 return invokeOutput
}



// IncrementParameters is used to serialize parameters to the increment Lambda
 handler.
type IncrementParameters struct {
 Action string `json:"action"`
 Number int    `json:"number"`
}

// CalculatorParameters is used to serialize parameters to the calculator Lambda
 handler.
type CalculatorParameters struct {
 Action string `json:"action"`
 X      int    `json:"x"`
 Y      int    `json:"y"`
}

// LambdaResultInt is used to deserialize an int result from a Lambda handler.
type LambdaResultInt struct {
 Result int `json:"result"`
}

// LambdaResultFloat is used to deserialize a float32 result from a Lambda handler.
type LambdaResultFloat struct {
 Result float32 `json:"result"`
}
```

定義增量一個數字的 Lambda 處理常式。

```
import logging
```

```
logger = logging.getLogger()
logger.setLevel(logging.INFO)


def lambda_handler(event, context):
    """
    Accepts an action and a single number, performs the specified action on the
 number,
    and returns the result. The only allowable action is 'increment'.

    :param event: The event dict that contains the parameters sent when the function
                  is invoked.
    :param context: The context in which the function is called.
    :return: The result of the action.
    """
    result = None
    action = event.get("action")
    if action == "increment":
        result = event.get("number", 0) + 1
        logger.info("Calculated result of %s", result)
    else:
        logger.error("%s is not a valid action.", action)

    response = {"result": result}
    return response
```

定義可執行算術運算的第二個 Lambda 處理常式。

```
import logging
import os


logger = logging.getLogger()

# Define a list of Python lambda functions that are called by this AWS Lambda
 function.
ACTIONS = {
    "plus": lambda x, y: x + y,
    "minus": lambda x, y: x - y,
```

```
    "times": lambda x, y: x * y,
    "divided-by": lambda x, y: x / y,
}


def lambda_handler(event, context):
    """
    Accepts an action and two numbers, performs the specified action on the numbers,
    and returns the result.

    :param event: The event dict that contains the parameters sent when the function
                  is invoked.
    :param context: The context in which the function is called.
    :return: The result of the specified action.
    """
    # Set the log level based on a variable configured in the Lambda environment.
    logger.setLevel(os.environ.get("LOG_LEVEL", logging.INFO))
    logger.debug("Event: %s", event)

    action = event.get("action")
    func = ACTIONS.get(action)
    x = event.get("x")
    y = event.get("y")
    result = None
    try:
        if func is not None and x is not None and y is not None:
            result = func(x, y)
            logger.info("%s %s %s is %s", x, action, y, result)
        else:
            logger.error("I can't calculate %s %s %s.", x, action, y)
    except ZeroDivisionError:
        logger.warning("I can't divide %s by 0!", x)

    response = {"result": result}
    return response
```

- 如需 API 詳細資訊，請參閱《適用於 Go 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`。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "bytes"
 "context"
 "encoding/json"
 "errors"
 "log"
 "time"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/lambda"
 "github.com/aws/aws-sdk-go-v2/service/lambda/types"
)

// FunctionWrapper encapsulates function actions used in the examples.
// It contains an AWS Lambda service client that is used to perform user actions.
type FunctionWrapper struct {
 LambdaClient *lambda.Client
}
```

```
// CreateFunction creates a new Lambda function from code contained in the
 zipPackage
// buffer. The specified handlerName must match the name of the file and function
// contained in the uploaded code. The role specified by iamRoleArn is assumed by
// Lambda and grants specific permissions.
// When the function already exists, types.StateActive is returned.
// When the function is created, a lambda.FunctionActiveV2Waiter is used to wait
 until the
// function is active.
func (wrapper FunctionWrapper) CreateFunction(ctx context.Context, functionName
 string, handlerName string,
 iamRoleArn *string, zipPackage *bytes.Buffer) types.State {
 var state types.State
 _, err := wrapper.LambdaClient.CreateFunction(ctx, &lambda.CreateFunctionInput{
  Code:         &types.FunctionCode{ZipFile: zipPackage.Bytes()},
  FunctionName: aws.String(functionName),
  Role:         iamRoleArn,
  Handler:      aws.String(handlerName),
  Publish:      true,
  Runtime:      types.RuntimePython39,
 })
 if err != nil {
  var resConflict *types.ResourceConflictException
  if errors.As(err, &resConflict) {
   log.Printf("Function %v already exists.\n", functionName)
   state = types.StateActive
  } else {
   log.Panicf("Couldn't create function %v. Here's why: %v\n", functionName, err)
  }
 } else {
  waiter := lambda.NewFunctionActiveV2Waiter(wrapper.LambdaClient)
  funcOutput, err := waiter.WaitForOutput(ctx, &lambda.GetFunctionInput{
   FunctionName: aws.String(functionName)}, 1*time.Minute)
  if err != nil {
   log.Panicf("Couldn't wait for function %v to be active. Here's why: %v\n",
 functionName, err)
  } else {
   state = funcOutput.Configuration.State
  }
 }
 return state
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的「CreateFunction」。

### `DeleteFunction`

以下程式碼範例顯示如何使用 `DeleteFunction`。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "bytes"
 "context"
 "encoding/json"
 "errors"
 "log"
 "time"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/lambda"
 "github.com/aws/aws-sdk-go-v2/service/lambda/types"
)

// FunctionWrapper encapsulates function actions used in the examples.
// It contains an AWS Lambda service client that is used to perform user actions.
type FunctionWrapper struct {
 LambdaClient *lambda.Client
}



// DeleteFunction deletes the Lambda function specified by functionName.
func (wrapper FunctionWrapper) DeleteFunction(ctx context.Context, functionName
 string) {
```

```
 _, err := wrapper.LambdaClient.DeleteFunction(ctx, &lambda.DeleteFunctionInput{
  FunctionName: aws.String(functionName),
 })
 if err != nil {
  log.Panicf("Couldn't delete function %v. Here's why: %v\n", functionName, err)
 }
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的 DeleteFunction。

### `GetFunction`

以下程式碼範例顯示如何使用 `GetFunction`。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "bytes"
 "context"
 "encoding/json"
 "errors"
 "log"
 "time"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/lambda"
 "github.com/aws/aws-sdk-go-v2/service/lambda/types"
)

// FunctionWrapper encapsulates function actions used in the examples.
// It contains an AWS Lambda service client that is used to perform user actions.
type FunctionWrapper struct {
 LambdaClient *lambda.Client
```

```
}



// GetFunction gets data about the Lambda function specified by functionName.
func (wrapper FunctionWrapper) GetFunction(ctx context.Context, functionName string)
 types.State {
 var state types.State
 funcOutput, err := wrapper.LambdaClient.GetFunction(ctx, &lambda.GetFunctionInput{
  FunctionName: aws.String(functionName),
 })
 if err != nil {
  log.Panicf("Couldn't get function %v. Here's why: %v\n", functionName, err)
 } else {
  state = funcOutput.Configuration.State
 }
 return state
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的 GetFunction。

### `Invoke`

以下程式碼範例顯示如何使用 `Invoke`。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "bytes"
 "context"
 "encoding/json"
 "errors"
 "log"
```

```
 "time"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/lambda"
 "github.com/aws/aws-sdk-go-v2/service/lambda/types"
)

// FunctionWrapper encapsulates function actions used in the examples.
// It contains an AWS Lambda service client that is used to perform user actions.
type FunctionWrapper struct {
 LambdaClient *lambda.Client
}



// Invoke invokes the Lambda function specified by functionName, passing the
 parameters
// as a JSON payload. When getLog is true, types.LogTypeTail is specified, which
 tells
// Lambda to include the last few log lines in the returned result.
func (wrapper FunctionWrapper) Invoke(ctx context.Context, functionName string,
 parameters any, getLog bool) *lambda.InvokeOutput {
 logType := types.LogTypeNone
 if getLog {
  logType = types.LogTypeTail
 }
 payload, err := json.Marshal(parameters)
 if err != nil {
  log.Panicf("Couldn't marshal parameters to JSON. Here's why %v\n", err)
 }
 invokeOutput, err := wrapper.LambdaClient.Invoke(ctx, &lambda.InvokeInput{
  FunctionName: aws.String(functionName),
  LogType:      logType,
  Payload:      payload,
 })
 if err != nil {
  log.Panicf("Couldn't invoke function %v. Here's why: %v\n", functionName, err)
 }
 return invokeOutput
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的 Invoke。

### `ListFunctions`

以下程式碼範例顯示如何使用 `ListFunctions`。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "bytes"
 "context"
 "encoding/json"
 "errors"
 "log"
 "time"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/lambda"
 "github.com/aws/aws-sdk-go-v2/service/lambda/types"
)

// FunctionWrapper encapsulates function actions used in the examples.
// It contains an AWS Lambda service client that is used to perform user actions.
type FunctionWrapper struct {
 LambdaClient *lambda.Client
}



// ListFunctions lists up to maxItems functions for the account. This function uses
 a
// lambda.ListFunctionsPaginator to paginate the results.
func (wrapper FunctionWrapper) ListFunctions(ctx context.Context, maxItems int)
 []types.FunctionConfiguration {
 var functions []types.FunctionConfiguration
 paginator := lambda.NewListFunctionsPaginator(wrapper.LambdaClient,
 &lambda.ListFunctionsInput{
  MaxItems: aws.Int32(int32(maxItems)),
```

```
 })
 for paginator.HasMorePages() && len(functions) < maxItems {
  pageOutput, err := paginator.NextPage(ctx)
  if err != nil {
   log.Panicf("Couldn't list functions for your account. Here's why: %v\n", err)
  }
  functions = append(functions, pageOutput.Functions...)
 }
 return functions
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的 ListFunctions。

### `UpdateFunctionCode`

以下程式碼範例顯示如何使用 `UpdateFunctionCode`。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "bytes"
 "context"
 "encoding/json"
 "errors"
 "log"
 "time"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/lambda"
 "github.com/aws/aws-sdk-go-v2/service/lambda/types"
)
```

```
// FunctionWrapper encapsulates function actions used in the examples.
// It contains an AWS Lambda service client that is used to perform user actions.
type FunctionWrapper struct {
 LambdaClient *lambda.Client
}



// UpdateFunctionCode updates the code for the Lambda function specified by
 functionName.
// The existing code for the Lambda function is entirely replaced by the code in the
// zipPackage buffer. After the update action is called, a
 lambda.FunctionUpdatedV2Waiter
// is used to wait until the update is successful.
func (wrapper FunctionWrapper) UpdateFunctionCode(ctx context.Context, functionName
 string, zipPackage *bytes.Buffer) types.State {
 var state types.State
 _, err := wrapper.LambdaClient.UpdateFunctionCode(ctx,
 &lambda.UpdateFunctionCodeInput{
  FunctionName: aws.String(functionName), ZipFile: zipPackage.Bytes(),
 })
 if err != nil {
  log.Panicf("Couldn't update code for function %v. Here's why: %v\n", functionName,
 err)
 } else {
  waiter := lambda.NewFunctionUpdatedV2Waiter(wrapper.LambdaClient)
  funcOutput, err := waiter.WaitForOutput(ctx, &lambda.GetFunctionInput{
   FunctionName: aws.String(functionName)}, 1*time.Minute)
  if err != nil {
   log.Panicf("Couldn't wait for function %v to be active. Here's why: %v\n",
 functionName, err)
  } else {
   state = funcOutput.Configuration.State
  }
 }
 return state
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的 UpdateFunctionCode。

### UpdateFunctionConfiguration

以下程式碼範例顯示如何使用 UpdateFunctionConfiguration。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "bytes"
 "context"
 "encoding/json"
 "errors"
 "log"
 "time"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/lambda"
 "github.com/aws/aws-sdk-go-v2/service/lambda/types"
)

// FunctionWrapper encapsulates function actions used in the examples.
// It contains an AWS Lambda service client that is used to perform user actions.
type FunctionWrapper struct {
 LambdaClient *lambda.Client
}



// UpdateFunctionConfiguration updates a map of environment variables configured for
// the Lambda function specified by functionName.
func (wrapper FunctionWrapper) UpdateFunctionConfiguration(ctx context.Context,
 functionName string, envVars map[string]string) {
 _, err := wrapper.LambdaClient.UpdateFunctionConfiguration(ctx,
 &lambda.UpdateFunctionConfigurationInput{
  FunctionName: aws.String(functionName),
  Environment:  &types.Environment{Variables: envVars},
 })
```

```
 if err != nil {
  log.Panicf("Couldn't update configuration for %v. Here's why: %v", functionName,
 err)
 }
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的 UpdateFunctionConfiguration。

## 案例

使用 Lambda 函數自動確認已知使用者

下列程式碼範例示範如何使用 Lambda 函式自動確認已知的 Amazon Cognito 使用者。

- 設定使用者集區以呼叫 PreSignUp 觸發條件的 Lambda 函數。
- 使用 Amazon Cognito 註冊使用者。
- Lambda 函數會掃描 DynamoDB 資料表，並自動確認已知使用者。
- 以新使用者身分登入，然後清除資源。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，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。

```
import (
 "context"
 "errors"
 "log"
 "strings"
 "user_pools_and_lambda_triggers/actions"
```

```
 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/cognitoidentityprovider"
 "github.com/aws/aws-sdk-go-v2/service/cognitoidentityprovider/types"
 "github.com/awsdocs/aws-doc-sdk-examples/gov2/demotools"
)

// AutoConfirm separates the steps of this scenario into individual functions so
 that
// they are simpler to read and understand.
type AutoConfirm struct {
 helper       IScenarioHelper
 questioner   demotools.IQuestioner
 resources    Resources
 cognitoActor *actions.CognitoActions
}

// NewAutoConfirm constructs a new auto confirm runner.
func NewAutoConfirm(sdkConfig aws.Config, questioner demotools.IQuestioner, helper
 IScenarioHelper) AutoConfirm {
 scenario := AutoConfirm{
  helper:       helper,
  questioner:   questioner,
  resources:    Resources{},
  cognitoActor: &actions.CognitoActions{CognitoClient:
 cognitoidentityprovider.NewFromConfig(sdkConfig)},
 }
 scenario.resources.init(scenario.cognitoActor, questioner)
 return scenario
}

// AddPreSignUpTrigger adds a Lambda handler as an invocation target for the
 PreSignUp trigger.
func (runner *AutoConfirm) AddPreSignUpTrigger(ctx context.Context, userPoolId
 string, functionArn string) {
 log.Printf("Let's add a Lambda function to handle the PreSignUp trigger from
 Cognito.\n" +
  "This trigger happens when a user signs up, and lets your function take action
 before the main Cognito\n" +
  "sign up processing occurs.\n")
 err := runner.cognitoActor.UpdateTriggers(
  ctx, userPoolId,
  actions.TriggerInfo{Trigger: actions.PreSignUp, HandlerArn:
 aws.String(functionArn)})
```

```
 if err != nil {
  panic(err)
 }
 log.Printf("Lambda function %v added to user pool %v to handle the PreSignUp
 trigger.\n",
  functionArn, userPoolId)
}

// SignUpUser signs up a user from the known user table with a password you specify.
func (runner *AutoConfirm) SignUpUser(ctx context.Context, clientId string,
 usersTable string) (string, string) {
 log.Println("Let's sign up a user to your Cognito user pool. When the user's email
 matches an email in the\n" +
  "DynamoDB known users table, it is automatically verified and the user is
 confirmed.")

 knownUsers, err := runner.helper.GetKnownUsers(ctx, usersTable)
 if err != nil {
  panic(err)
 }
 userChoice := runner.questioner.AskChoice("Which user do you want to use?\n",
 knownUsers.UserNameList())
 user := knownUsers.Users[userChoice]

 var signedUp bool
 var userConfirmed bool
 password := runner.questioner.AskPassword("Enter a password that has at least eight
 characters, uppercase, lowercase, numbers and symbols.\n"+
  "(the password will not display as you type):", 8)
 for !signedUp {
  log.Printf("Signing up user '%v' with email '%v' to Cognito.\n", user.UserName,
 user.UserEmail)
  userConfirmed, err = runner.cognitoActor.SignUp(ctx, clientId, user.UserName,
 password, user.UserEmail)
  if err != nil {
   var invalidPassword *types.InvalidPasswordException
   if errors.As(err, &invalidPassword) {
    password = runner.questioner.AskPassword("Enter another password:", 8)
   } else {
    panic(err)
   }
  } else {
   signedUp = true
  }
```

```
 }
 log.Printf("User %v signed up, confirmed = %v.\n", user.UserName, userConfirmed)

 log.Println(strings.Repeat("-", 88))

 return user.UserName, password
}

// SignInUser signs in a user.
func (runner *AutoConfirm) SignInUser(ctx context.Context, clientId string, userName
 string, password string) string {
 runner.questioner.Ask("Press Enter when you're ready to continue.")
 log.Printf("Let's sign in as %v...\n", userName)
 authResult, err := runner.cognitoActor.SignIn(ctx, clientId, userName, password)
 if err != nil {
  panic(err)
 }
 log.Printf("Successfully signed in. Your access token starts with: %v...\n",
 (*authResult.AccessToken)[:10])
 log.Println(strings.Repeat("-", 88))
 return *authResult.AccessToken
}

// Run runs the scenario.
func (runner *AutoConfirm) Run(ctx context.Context, stackName string) {
 defer func() {
  if r := recover(); r != nil {
   log.Println("Something went wrong with the demo.")
   runner.resources.Cleanup(ctx)
  }
 }()

 log.Println(strings.Repeat("-", 88))
 log.Printf("Welcome\n")

 log.Println(strings.Repeat("-", 88))

 stackOutputs, err := runner.helper.GetStackOutputs(ctx, stackName)
 if err != nil {
  panic(err)
 }
 runner.resources.userPoolId = stackOutputs["UserPoolId"]
 runner.helper.PopulateUserTable(ctx, stackOutputs["TableName"])
```

```
 runner.AddPreSignUpTrigger(ctx, stackOutputs["UserPoolId"],
 stackOutputs["AutoConfirmFunctionArn"])
 runner.resources.triggers = append(runner.resources.triggers, actions.PreSignUp)
 userName, password := runner.SignUpUser(ctx, stackOutputs["UserPoolClientId"],
 stackOutputs["TableName"])
 runner.helper.ListRecentLogEvents(ctx, stackOutputs["AutoConfirmFunction"])
 runner.resources.userAccessTokens = append(runner.resources.userAccessTokens,
  runner.SignInUser(ctx, stackOutputs["UserPoolClientId"], userName, password))

 runner.resources.Cleanup(ctx)

 log.Println(strings.Repeat("-", 88))
 log.Println("Thanks for watching!")
 log.Println(strings.Repeat("-", 88))
}
```

使用 Lambda 函數來處理 PreSignUp 觸發條件。

```
import (
 "context"
 "log"
 "os"

 "github.com/aws/aws-lambda-go/events"
 "github.com/aws/aws-lambda-go/lambda"
 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/config"
 "github.com/aws/aws-sdk-go-v2/feature/dynamodb/attributevalue"
 "github.com/aws/aws-sdk-go-v2/service/dynamodb"
 dynamodbtypes "github.com/aws/aws-sdk-go-v2/service/dynamodb/types"
)

const TABLE_NAME = "TABLE_NAME"

// UserInfo defines structured user data that can be marshalled to a DynamoDB
 format.
type UserInfo struct {
 UserName  string `dynamodbav:"UserName"`
 UserEmail string `dynamodbav:"UserEmail"`
}
```

```
// GetKey marshals the user email value to a DynamoDB key format.
func (user UserInfo) GetKey() map[string]dynamodbtypes.AttributeValue {
 userEmail, err := attributevalue.Marshal(user.UserEmail)
 if err != nil {
  panic(err)
 }
 return map[string]dynamodbtypes.AttributeValue{"UserEmail": userEmail}
}

type handler struct {
 dynamoClient *dynamodb.Client
}

// HandleRequest handles the PreSignUp event by looking up a user in an Amazon
 DynamoDB table and
// specifying whether they should be confirmed and verified.
func (h *handler) HandleRequest(ctx context.Context, event
 events.CognitoEventUserPoolsPreSignup) (events.CognitoEventUserPoolsPreSignup,
 error) {
 log.Printf("Received presignup from %v for user '%v'", event.TriggerSource,
 event.UserName)
 if event.TriggerSource != "PreSignUp_SignUp" {
  // Other trigger sources, such as PreSignUp_AdminInitiateAuth, ignore the response
 from this handler.
  return event, nil
 }
 tableName := os.Getenv(TABLE_NAME)
 user := UserInfo{
  UserEmail: event.Request.UserAttributes["email"],
 }
 log.Printf("Looking up email %v in table %v.\n", user.UserEmail, tableName)
 output, err := h.dynamoClient.GetItem(ctx, &dynamodb.GetItemInput{
  Key:       user.GetKey(),
  TableName: aws.String(tableName),
 })
 if err != nil {
  log.Printf("Error looking up email %v.\n", user.UserEmail)
  return event, err
 }
 if output.Item == nil {
  log.Printf("Email %v not found. Email verification is required.\n",
 user.UserEmail)
  return event, err
```

```
 }

 err = attributevalue.UnmarshalMap(output.Item, &user)
 if err != nil {
  log.Printf("Couldn't unmarshal DynamoDB item. Here's why: %v\n", err)
  return event, err
 }

 if user.UserName != event.UserName {
  log.Printf("UserEmail %v found, but stored UserName '%v' does not match supplied
 UserName '%v'. Verification is required.\n",
   user.UserEmail, user.UserName, event.UserName)
 } else {
  log.Printf("UserEmail %v found with matching UserName %v. User is confirmed.\n",
 user.UserEmail, user.UserName)
  event.Response.AutoConfirmUser = true
  event.Response.AutoVerifyEmail = true
 }

 return event, err
}

func main() {
 ctx := context.Background()
 sdkConfig, err := config.LoadDefaultConfig(ctx)
 if err != nil {
  log.Panicln(err)
 }
 h := handler{
  dynamoClient: dynamodb.NewFromConfig(sdkConfig),
 }
 lambda.Start(h.HandleRequest)
}
```

建立執行一般任務的 struct。

```
import (
 "context"
 "log"
 "strings"
```

```
 "time"
 "user_pools_and_lambda_triggers/actions"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/cloudformation"
 "github.com/aws/aws-sdk-go-v2/service/cloudwatchlogs"
 "github.com/aws/aws-sdk-go-v2/service/dynamodb"
 "github.com/awsdocs/aws-doc-sdk-examples/gov2/demotools"
)

// IScenarioHelper defines common functions used by the workflows in this example.
type IScenarioHelper interface {
 Pause(secs int)
 GetStackOutputs(ctx context.Context, stackName string) (actions.StackOutputs,
 error)
 PopulateUserTable(ctx context.Context, tableName string)
 GetKnownUsers(ctx context.Context, tableName string) (actions.UserList, error)
 AddKnownUser(ctx context.Context, tableName string, user actions.User)
 ListRecentLogEvents(ctx context.Context, functionName string)
}

// ScenarioHelper contains AWS wrapper structs used by the workflows in this
 example.
type ScenarioHelper struct {
 questioner  demotools.IQuestioner
 dynamoActor *actions.DynamoActions
 cfnActor    *actions.CloudFormationActions
 cwlActor    *actions.CloudWatchLogsActions
 isTestRun   bool
}

// NewScenarioHelper constructs a new scenario helper.
func NewScenarioHelper(sdkConfig aws.Config, questioner demotools.IQuestioner)
 ScenarioHelper {
 scenario := ScenarioHelper{
  questioner:  questioner,
  dynamoActor: &actions.DynamoActions{DynamoClient:
 dynamodb.NewFromConfig(sdkConfig)},
  cfnActor:    &actions.CloudFormationActions{CfnClient:
 cloudformation.NewFromConfig(sdkConfig)},
  cwlActor:    &actions.CloudWatchLogsActions{CwlClient:
 cloudwatchlogs.NewFromConfig(sdkConfig)},
 }
 return scenario
```

```
}

// Pause waits for the specified number of seconds.
func (helper ScenarioHelper) Pause(secs int) {
 if !helper.isTestRun {
  time.Sleep(time.Duration(secs) * time.Second)
 }
}

// GetStackOutputs gets the outputs from the specified CloudFormation stack in a
 structured format.
func (helper ScenarioHelper) GetStackOutputs(ctx context.Context, stackName string)
 (actions.StackOutputs, error) {
 return helper.cfnActor.GetOutputs(ctx, stackName), nil
}

// PopulateUserTable fills the known user table with example data.
func (helper ScenarioHelper) PopulateUserTable(ctx context.Context, tableName
 string) {
 log.Printf("First, let's add some users to the DynamoDB %v table we'll use for this
 example.\n", tableName)
 err := helper.dynamoActor.PopulateTable(ctx, tableName)
 if err != nil {
  panic(err)
 }
}

// GetKnownUsers gets the users from the known users table in a structured format.
func (helper ScenarioHelper) GetKnownUsers(ctx context.Context, tableName string)
 (actions.UserList, error) {
 knownUsers, err := helper.dynamoActor.Scan(ctx, tableName)
 if err != nil {
  log.Printf("Couldn't get known users from table %v. Here's why: %v\n", tableName,
 err)
 }
 return knownUsers, err
}

// AddKnownUser adds a user to the known users table.
func (helper ScenarioHelper) AddKnownUser(ctx context.Context, tableName string,
 user actions.User) {
 log.Printf("Adding user '%v' with email '%v' to the DynamoDB known users table...
\n",
  user.UserName, user.UserEmail)
```

```
 err := helper.dynamoActor.AddUser(ctx, tableName, user)
 if err != nil {
  panic(err)
 }
}

// ListRecentLogEvents gets the most recent log stream and events for the specified
 Lambda function and displays them.
func (helper ScenarioHelper) ListRecentLogEvents(ctx context.Context, functionName
 string) {
 log.Println("Waiting a few seconds to let Lambda write to CloudWatch Logs...")
 helper.Pause(10)
 log.Println("Okay, let's check the logs to find what's happened recently with your
 Lambda function.")
 logStream, err := helper.cwlActor.GetLatestLogStream(ctx, functionName)
 if err != nil {
  panic(err)
 }
 log.Printf("Getting some recent events from log stream %v\n",
 *logStream.LogStreamName)
 events, err := helper.cwlActor.GetLogEvents(ctx, functionName,
 *logStream.LogStreamName, 10)
 if err != nil {
  panic(err)
 }
 for _, event := range events {
  log.Printf("\t%v", *event.Message)
 }
 log.Println(strings.Repeat("-", 88))
}
```

建立包裝 Amazon Cognito 動作的 struct。

```
import (
 "context"
 "errors"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/cognitoidentityprovider"
```

```
 "github.com/aws/aws-sdk-go-v2/service/cognitoidentityprovider/types"
)

type CognitoActions struct {
 CognitoClient *cognitoidentityprovider.Client
}



// Trigger and TriggerInfo define typed data for updating an Amazon Cognito trigger.
type Trigger int

const (
 PreSignUp Trigger = iota
 UserMigration
 PostAuthentication
)

type TriggerInfo struct {
 Trigger    Trigger
 HandlerArn *string
}

// UpdateTriggers adds or removes Lambda triggers for a user pool. When a trigger is
 specified with a `nil` value,
// it is removed from the user pool.
func (actor CognitoActions) UpdateTriggers(ctx context.Context, userPoolId string,
 triggers ...TriggerInfo) error {
 output, err := actor.CognitoClient.DescribeUserPool(ctx,
 &cognitoidentityprovider.DescribeUserPoolInput{
  UserPoolId: aws.String(userPoolId),
 })
 if err != nil {
  log.Printf("Couldn't get info about user pool %v. Here's why: %v\n", userPoolId,
 err)
  return err
 }
 lambdaConfig := output.UserPool.LambdaConfig
 for _, trigger := range triggers {
  switch trigger.Trigger {
  case PreSignUp:
   lambdaConfig.PreSignUp = trigger.HandlerArn
  case UserMigration:
   lambdaConfig.UserMigration = trigger.HandlerArn
```

```
  case PostAuthentication:
   lambdaConfig.PostAuthentication = trigger.HandlerArn
  }
 }
 _, err = actor.CognitoClient.UpdateUserPool(ctx,
 &cognitoidentityprovider.UpdateUserPoolInput{
  UserPoolId:   aws.String(userPoolId),
  LambdaConfig: lambdaConfig,
 })
 if err != nil {
  log.Printf("Couldn't update user pool %v. Here's why: %v\n", userPoolId, err)
 }
 return err
}



// SignUp signs up a user with Amazon Cognito.
func (actor CognitoActions) SignUp(ctx context.Context, clientId string, userName
 string, password string, userEmail string) (bool, error) {
 confirmed := false
 output, err := actor.CognitoClient.SignUp(ctx,
 &cognitoidentityprovider.SignUpInput{
  ClientId: aws.String(clientId),
  Password: aws.String(password),
  Username: aws.String(userName),
  UserAttributes: []types.AttributeType{
   {Name: aws.String("email"), Value: aws.String(userEmail)},
  },
 })
 if err != nil {
  var invalidPassword *types.InvalidPasswordException
  if errors.As(err, &invalidPassword) {
   log.Println(*invalidPassword.Message)
  } else {
   log.Printf("Couldn't sign up user %v. Here's why: %v\n", userName, err)
  }
 } else {
  confirmed = output.UserConfirmed
 }
 return confirmed, err
}
```

```
// SignIn signs in a user to Amazon Cognito using a username and password
 authentication flow.
func (actor CognitoActions) SignIn(ctx context.Context, clientId string, userName
 string, password string) (*types.AuthenticationResultType, error) {
 var authResult *types.AuthenticationResultType
 output, err := actor.CognitoClient.InitiateAuth(ctx,
 &cognitoidentityprovider.InitiateAuthInput{
  AuthFlow:       "USER_PASSWORD_AUTH",
  ClientId:       aws.String(clientId),
  AuthParameters: map[string]string{"USERNAME": userName, "PASSWORD": password},
 })
 if err != nil {
  var resetRequired *types.PasswordResetRequiredException
  if errors.As(err, &resetRequired) {
   log.Println(*resetRequired.Message)
  } else {
   log.Printf("Couldn't sign in user %v. Here's why: %v\n", userName, err)
  }
 } else {
  authResult = output.AuthenticationResult
 }
 return authResult, err
}



// ForgotPassword starts a password recovery flow for a user. This flow typically
 sends a confirmation code
// to the user's configured notification destination, such as email.
func (actor CognitoActions) ForgotPassword(ctx context.Context, clientId string,
 userName string) (*types.CodeDeliveryDetailsType, error) {
 output, err := actor.CognitoClient.ForgotPassword(ctx,
 &cognitoidentityprovider.ForgotPasswordInput{
  ClientId: aws.String(clientId),
  Username: aws.String(userName),
 })
 if err != nil {
  log.Printf("Couldn't start password reset for user '%v'. Here;s why: %v\n",
 userName, err)
 }
 return output.CodeDeliveryDetails, err
}
```

```
// ConfirmForgotPassword confirms a user with a confirmation code and a new
 password.
func (actor CognitoActions) ConfirmForgotPassword(ctx context.Context, clientId
 string, code string, userName string, password string) error {
 _, err := actor.CognitoClient.ConfirmForgotPassword(ctx,
 &cognitoidentityprovider.ConfirmForgotPasswordInput{
  ClientId:         aws.String(clientId),
  ConfirmationCode: aws.String(code),
  Password:         aws.String(password),
  Username:         aws.String(userName),
 })
 if err != nil {
  var invalidPassword *types.InvalidPasswordException
  if errors.As(err, &invalidPassword) {
   log.Println(*invalidPassword.Message)
  } else {
   log.Printf("Couldn't confirm user %v. Here's why: %v", userName, err)
  }
 }
 return err
}



// DeleteUser removes a user from the user pool.
func (actor CognitoActions) DeleteUser(ctx context.Context, userAccessToken string)
 error {
 _, err := actor.CognitoClient.DeleteUser(ctx,
 &cognitoidentityprovider.DeleteUserInput{
  AccessToken: aws.String(userAccessToken),
 })
 if err != nil {
  log.Printf("Couldn't delete user. Here's why: %v\n", err)
 }
 return err
}



// AdminCreateUser uses administrator credentials to add a user to a user pool. This
 method leaves the user
// in a state that requires they enter a new password next time they sign in.
```

```
func (actor CognitoActions) AdminCreateUser(ctx context.Context, userPoolId string,
 userName string, userEmail string) error {
 _, err := actor.CognitoClient.AdminCreateUser(ctx,
 &cognitoidentityprovider.AdminCreateUserInput{
  UserPoolId:     aws.String(userPoolId),
  Username:       aws.String(userName),
  MessageAction:  types.MessageActionTypeSuppress,
  UserAttributes: []types.AttributeType{{Name: aws.String("email"), Value:
 aws.String(userEmail)}},
 })
 if err != nil {
  var userExists *types.UsernameExistsException
  if errors.As(err, &userExists) {
   log.Printf("User %v already exists in the user pool.", userName)
   err = nil
  } else {
   log.Printf("Couldn't create user %v. Here's why: %v\n", userName, err)
  }
 }
 return err
}



// AdminSetUserPassword uses administrator credentials to set a password for a user
 without requiring a
// temporary password.
func (actor CognitoActions) AdminSetUserPassword(ctx context.Context, userPoolId
 string, userName string, password string) error {
 _, err := actor.CognitoClient.AdminSetUserPassword(ctx,
 &cognitoidentityprovider.AdminSetUserPasswordInput{
  Password:   aws.String(password),
  UserPoolId: aws.String(userPoolId),
  Username:   aws.String(userName),
  Permanent:  true,
 })
 if err != nil {
  var invalidPassword *types.InvalidPasswordException
  if errors.As(err, &invalidPassword) {
   log.Println(*invalidPassword.Message)
  } else {
   log.Printf("Couldn't set password for user %v. Here's why: %v\n", userName, err)
  }
 }
```

```
 return err
}
```

建立包裝 DynamoDB 動作的 struct。

```
import (
 "context"
 "fmt"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/feature/dynamodb/attributevalue"
 "github.com/aws/aws-sdk-go-v2/service/dynamodb"
 "github.com/aws/aws-sdk-go-v2/service/dynamodb/types"
)

// DynamoActions encapsulates the Amazon Simple Notification Service (Amazon SNS)
 actions
// used in the examples.
type DynamoActions struct {
 DynamoClient *dynamodb.Client
}

// User defines structured user data.
type User struct {
 UserName  string
 UserEmail string
 LastLogin *LoginInfo `dynamodbav:",omitempty"`
}

// LoginInfo defines structured custom login data.
type LoginInfo struct {
 UserPoolId string
 ClientId   string
 Time       string
}

// UserList defines a list of users.
type UserList struct {
 Users []User
```

```
}

// UserNameList returns the usernames contained in a UserList as a list of strings.
func (users *UserList) UserNameList() []string {
 names := make([]string, len(users.Users))
 for i := 0; i < len(users.Users); i++ {
  names[i] = users.Users[i].UserName
 }
 return names
}

// PopulateTable adds a set of test users to the table.
func (actor DynamoActions) PopulateTable(ctx context.Context, tableName string)
 error {
 var err error
 var item map[string]types.AttributeValue
 var writeReqs []types.WriteRequest
 for i := 1; i < 4; i++ {
  item, err = attributevalue.MarshalMap(User{UserName: fmt.Sprintf("test_user_%v",
 i), UserEmail: fmt.Sprintf("test_email_%v@example.com", i)})
  if err != nil {
   log.Printf("Couldn't marshall user into DynamoDB format. Here's why: %v\n", err)
   return err
  }
  writeReqs = append(writeReqs, types.WriteRequest{PutRequest:
 &types.PutRequest{Item: item}})
 }
 _, err = actor.DynamoClient.BatchWriteItem(ctx, &dynamodb.BatchWriteItemInput{
  RequestItems: map[string][]types.WriteRequest{tableName: writeReqs},
 })
 if err != nil {
  log.Printf("Couldn't populate table %v with users. Here's why: %v\n", tableName,
 err)
 }
 return err
}

// Scan scans the table for all items.
func (actor DynamoActions) Scan(ctx context.Context, tableName string) (UserList,
 error) {
 var userList UserList
 output, err := actor.DynamoClient.Scan(ctx, &dynamodb.ScanInput{
  TableName: aws.String(tableName),
 })
```

```
 if err != nil {
  log.Printf("Couldn't scan table %v for items. Here's why: %v\n", tableName, err)
 } else {
  err = attributevalue.UnmarshalListOfMaps(output.Items, &userList.Users)
  if err != nil {
   log.Printf("Couldn't unmarshal items into users. Here's why: %v\n", err)
  }
 }
 return userList, err
}

// AddUser adds a user item to a table.
func (actor DynamoActions) AddUser(ctx context.Context, tableName string, user User)
 error {
 userItem, err := attributevalue.MarshalMap(user)
 if err != nil {
  log.Printf("Couldn't marshall user to item. Here's why: %v\n", err)
 }
 _, err = actor.DynamoClient.PutItem(ctx, &dynamodb.PutItemInput{
  Item:      userItem,
  TableName: aws.String(tableName),
 })
 if err != nil {
  log.Printf("Couldn't put item in table %v. Here's why: %v", tableName, err)
 }
 return err
}
```

建立包裝 CloudWatch Logs 動作的 struct。

```
import (
 "context"
 "fmt"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/cloudwatchlogs"
 "github.com/aws/aws-sdk-go-v2/service/cloudwatchlogs/types"
)
```

```
type CloudWatchLogsActions struct {
 CwlClient *cloudwatchlogs.Client
}

// GetLatestLogStream gets the most recent log stream for a Lambda function.
func (actor CloudWatchLogsActions) GetLatestLogStream(ctx context.Context,
 functionName string) (types.LogStream, error) {
 var logStream types.LogStream
 logGroupName := fmt.Sprintf("/aws/lambda/%s", functionName)
 output, err := actor.CwlClient.DescribeLogStreams(ctx,
 &cloudwatchlogs.DescribeLogStreamsInput{
  Descending:   aws.Bool(true),
  Limit:        aws.Int32(1),
  LogGroupName: aws.String(logGroupName),
  OrderBy:      types.OrderByLastEventTime,
 })
 if err != nil {
  log.Printf("Couldn't get log streams for log group %v. Here's why: %v\n",
 logGroupName, err)
 } else {
  logStream = output.LogStreams[0]
 }
 return logStream, err
}

// GetLogEvents gets the most recent eventCount events from the specified log
 stream.
func (actor CloudWatchLogsActions) GetLogEvents(ctx context.Context, functionName
 string, logStreamName string, eventCount int32) (
 []types.OutputLogEvent, error) {
 var events []types.OutputLogEvent
 logGroupName := fmt.Sprintf("/aws/lambda/%s", functionName)
 output, err := actor.CwlClient.GetLogEvents(ctx, &cloudwatchlogs.GetLogEventsInput{
  LogStreamName: aws.String(logStreamName),
  Limit:         aws.Int32(eventCount),
  LogGroupName:  aws.String(logGroupName),
 })
 if err != nil {
  log.Printf("Couldn't get log event for log stream %v. Here's why: %v\n",
 logStreamName, err)
 } else {
  events = output.Events
 }
 return events, err
```

```
}
```

建立包裝 CloudFormation 動作的結構。

```
import (
 "context"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/cloudformation"
)

// StackOutputs defines a map of outputs from a specific stack.
type StackOutputs map[string]string

type CloudFormationActions struct {
 CfnClient *cloudformation.Client
}

// GetOutputs gets the outputs from a CloudFormation stack and puts them into a
 structured format.
func (actor CloudFormationActions) GetOutputs(ctx context.Context, stackName string)
 StackOutputs {
 output, err := actor.CfnClient.DescribeStacks(ctx,
 &cloudformation.DescribeStacksInput{
  StackName: aws.String(stackName),
 })
 if err != nil || len(output.Stacks) == 0 {
  log.Panicf("Couldn't find a CloudFormation stack named %v. Here's why: %v\n",
 stackName, err)
 }
 stackOutputs := StackOutputs{}
 for _, out := range output.Stacks[0].Outputs {
  stackOutputs[*out.OutputKey] = *out.OutputValue
 }
 return stackOutputs
}
```

清除資源。

```
import (
 "context"
 "log"
 "user_pools_and_lambda_triggers/actions"

 "github.com/awsdocs/aws-doc-sdk-examples/gov2/demotools"
)

// Resources keeps track of AWS resources created during an example and handles
// cleanup when the example finishes.
type Resources struct {
 userPoolId       string
 userAccessTokens []string
 triggers         []actions.Trigger

 cognitoActor *actions.CognitoActions
 questioner   demotools.IQuestioner
}

func (resources *Resources) init(cognitoActor *actions.CognitoActions, questioner
 demotools.IQuestioner) {
 resources.userAccessTokens = []string{}
 resources.triggers = []actions.Trigger{}
 resources.cognitoActor = cognitoActor
 resources.questioner = questioner
}

// Cleanup deletes all AWS resources created during an example.
func (resources *Resources) Cleanup(ctx context.Context) {
 defer func() {
  if r := recover(); r != nil {
   log.Printf("Something went wrong during cleanup.\n%v\n", r)
   log.Println("Use the AWS Management Console to remove any remaining resources \n"
 +
    "that were created for this scenario.")
  }
 }()

 wantDelete := resources.questioner.AskBool("Do you want to remove all of the AWS
 resources that were created "+
  "during this demo (y/n)?", "y")
```

```
 if wantDelete {
  for _, accessToken := range resources.userAccessTokens {
   err := resources.cognitoActor.DeleteUser(ctx, accessToken)
   if err != nil {
    log.Println("Couldn't delete user during cleanup.")
    panic(err)
   }
   log.Println("Deleted user.")
  }
  triggerList := make([]actions.TriggerInfo, len(resources.triggers))
  for i := 0; i < len(resources.triggers); i++ {
   triggerList[i] = actions.TriggerInfo{Trigger: resources.triggers[i], HandlerArn:
 nil}
  }
  err := resources.cognitoActor.UpdateTriggers(ctx, resources.userPoolId,
 triggerList...)
  if err != nil {
   log.Println("Couldn't update Cognito triggers during cleanup.")
   panic(err)
  }
  log.Println("Removed Cognito triggers from user pool.")
 } else {
  log.Println("Be sure to remove resources when you're done with them to avoid
 unexpected charges!")
 }
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的下列主題。
  - DeleteUser
  - InitiateAuth
  - SignUp
  - UpdateUserPool

使用 Lambda 函數自動遷移已知使用者

下列程式碼範例示範如何使用 Lambda 函數自動遷移已知的 Amazon Cognito 使用者。

- 設定使用者集區以呼叫 `MigrateUser` 觸發條件的 Lambda 函數。
- 使用不在使用者集區中的使用者名稱和電子郵件登入 Amazon Cognito。

- Lambda 函數會掃描 DynamoDB 資料表，並自動將已知使用者遷移至使用者集區。
- 執行忘記密碼流程，重設已遷移使用者的密碼。
- 以新使用者身分登入，然後清除資源。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，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。

```
import (
 "context"
 "errors"
 "fmt"
 "log"
 "strings"
 "user_pools_and_lambda_triggers/actions"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/cognitoidentityprovider"
 "github.com/aws/aws-sdk-go-v2/service/cognitoidentityprovider/types"
 "github.com/awsdocs/aws-doc-sdk-examples/gov2/demotools"
)

// MigrateUser separates the steps of this scenario into individual functions so
 that
// they are simpler to read and understand.
type MigrateUser struct {
 helper       IScenarioHelper
 questioner   demotools.IQuestioner
 resources    Resources
 cognitoActor *actions.CognitoActions
}

// NewMigrateUser constructs a new migrate user runner.
```

```
func NewMigrateUser(sdkConfig aws.Config, questioner demotools.IQuestioner, helper
 IScenarioHelper) MigrateUser {
 scenario := MigrateUser{
  helper:       helper,
  questioner:   questioner,
  resources:    Resources{},
  cognitoActor: &actions.CognitoActions{CognitoClient:
 cognitoidentityprovider.NewFromConfig(sdkConfig)},
 }
 scenario.resources.init(scenario.cognitoActor, questioner)
 return scenario
}

// AddMigrateUserTrigger adds a Lambda handler as an invocation target for the
 MigrateUser trigger.
func (runner *MigrateUser) AddMigrateUserTrigger(ctx context.Context, userPoolId
 string, functionArn string) {
 log.Printf("Let's add a Lambda function to handle the MigrateUser trigger from
 Cognito.\n" +
  "This trigger happens when an unknown user signs in, and lets your function take
 action before Cognito\n" +
  "rejects the user.\n\n")
 err := runner.cognitoActor.UpdateTriggers(
  ctx, userPoolId,
  actions.TriggerInfo{Trigger: actions.UserMigration, HandlerArn:
 aws.String(functionArn)})
 if err != nil {
  panic(err)
 }
 log.Printf("Lambda function %v added to user pool %v to handle the MigrateUser
 trigger.\n",
  functionArn, userPoolId)

 log.Println(strings.Repeat("-", 88))
}

// SignInUser adds a new user to the known users table and signs that user in to
 Amazon Cognito.
func (runner *MigrateUser) SignInUser(ctx context.Context, usersTable string,
 clientId string) (bool, actions.User) {
 log.Println("Let's sign in a user to your Cognito user pool. When the username and
 email matches an entry in the\n" +
  "DynamoDB known users table, the email is automatically verified and the user is
 migrated to the Cognito user pool.")
```

```
 user := actions.User{}
 user.UserName = runner.questioner.Ask("\nEnter a username:")
 user.UserEmail = runner.questioner.Ask("\nEnter an email that you own. This email
 will be used to confirm user migration\n" +
  "during this example:")

 runner.helper.AddKnownUser(ctx, usersTable, user)

 var err error
 var resetRequired *types.PasswordResetRequiredException
 var authResult *types.AuthenticationResultType
 signedIn := false
 for !signedIn && resetRequired == nil {
  log.Printf("Signing in to Cognito as user '%v'. The expected result is a
 PasswordResetRequiredException.\n\n", user.UserName)
  authResult, err = runner.cognitoActor.SignIn(ctx, clientId, user.UserName, "_")
  if err != nil {
   if errors.As(err, &resetRequired) {
    log.Printf("\nUser '%v' is not in the Cognito user pool but was found in the
 DynamoDB known users table.\n"+
     "User migration is started and a password reset is required.", user.UserName)
   } else {
    panic(err)
   }
  } else {
   log.Printf("User '%v' successfully signed in. This is unexpected and probably
 means you have not\n"+
    "cleaned up a previous run of this scenario, so the user exist in the Cognito
 user pool.\n"+
    "You can continue this example and select to clean up resources, or manually
 remove\n"+
    "the user from your user pool and try again.", user.UserName)
   runner.resources.userAccessTokens = append(runner.resources.userAccessTokens,
 *authResult.AccessToken)
   signedIn = true
  }
 }

 log.Println(strings.Repeat("-", 88))
 return resetRequired != nil, user
}

// ResetPassword starts a password recovery flow.
```

```
func (runner *MigrateUser) ResetPassword(ctx context.Context, clientId string, user
 actions.User) {
 wantCode := runner.questioner.AskBool(fmt.Sprintf("In order to migrate the user to
 Cognito, you must be able to receive a confirmation\n"+
  "code by email at %v. Do you want to send a code (y/n)?", user.UserEmail), "y")
 if !wantCode {
  log.Println("To complete this example and successfully migrate a user to Cognito,
 you must enter an email\n" +
   "you own that can receive a confirmation code.")
  return
 }
 codeDelivery, err := runner.cognitoActor.ForgotPassword(ctx, clientId,
 user.UserName)
 if err != nil {
  panic(err)
 }
 log.Printf("\nA confirmation code has been sent to %v.", *codeDelivery.Destination)
 code := runner.questioner.Ask("Check your email and enter it here:")

 confirmed := false
 password := runner.questioner.AskPassword("\nEnter a password that has at least
 eight characters, uppercase, lowercase, numbers and symbols.\n"+
  "(the password will not display as you type):", 8)
 for !confirmed {
  log.Printf("\nConfirming password reset for user '%v'.\n", user.UserName)
  err = runner.cognitoActor.ConfirmForgotPassword(ctx, clientId, code,
 user.UserName, password)
  if err != nil {
   var invalidPassword *types.InvalidPasswordException
   if errors.As(err, &invalidPassword) {
    password = runner.questioner.AskPassword("\nEnter another password:", 8)
   } else {
    panic(err)
   }
  } else {
   confirmed = true
  }
 }
 log.Printf("User '%v' successfully confirmed and migrated.\n", user.UserName)
 log.Println("Signing in with your username and password...")
 authResult, err := runner.cognitoActor.SignIn(ctx, clientId, user.UserName,
 password)
 if err != nil {
  panic(err)
```

```
 }
 log.Printf("Successfully signed in. Your access token starts with: %v...\n",
 (*authResult.AccessToken)[:10])
 runner.resources.userAccessTokens = append(runner.resources.userAccessTokens,
 *authResult.AccessToken)

 log.Println(strings.Repeat("-", 88))
}

// Run runs the scenario.
func (runner *MigrateUser) Run(ctx context.Context, stackName string) {
 defer func() {
  if r := recover(); r != nil {
   log.Println("Something went wrong with the demo.")
   runner.resources.Cleanup(ctx)
  }
 }()

 log.Println(strings.Repeat("-", 88))
 log.Printf("Welcome\n")

 log.Println(strings.Repeat("-", 88))

 stackOutputs, err := runner.helper.GetStackOutputs(ctx, stackName)
 if err != nil {
  panic(err)
 }
 runner.resources.userPoolId = stackOutputs["UserPoolId"]

 runner.AddMigrateUserTrigger(ctx, stackOutputs["UserPoolId"],
 stackOutputs["MigrateUserFunctionArn"])
 runner.resources.triggers = append(runner.resources.triggers,
 actions.UserMigration)
 resetNeeded, user := runner.SignInUser(ctx, stackOutputs["TableName"],
 stackOutputs["UserPoolClientId"])
 if resetNeeded {
  runner.helper.ListRecentLogEvents(ctx, stackOutputs["MigrateUserFunction"])
  runner.ResetPassword(ctx, stackOutputs["UserPoolClientId"], user)
 }

 runner.resources.Cleanup(ctx)

 log.Println(strings.Repeat("-", 88))
 log.Println("Thanks for watching!")
```

```
 log.Println(strings.Repeat("-", 88))
}
```

使用 Lambda 函數來處理 MigrateUser 觸發條件。

```
import (
 "context"
 "log"
 "os"

 "github.com/aws/aws-lambda-go/events"
 "github.com/aws/aws-lambda-go/lambda"
 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/config"
 "github.com/aws/aws-sdk-go-v2/feature/dynamodb/attributevalue"
 "github.com/aws/aws-sdk-go-v2/feature/dynamodb/expression"
 "github.com/aws/aws-sdk-go-v2/service/dynamodb"
)

const TABLE_NAME = "TABLE_NAME"

// UserInfo defines structured user data that can be marshalled to a DynamoDB
 format.
type UserInfo struct {
 UserName  string `dynamodbav:"UserName"`
 UserEmail string `dynamodbav:"UserEmail"`
}

type handler struct {
 dynamoClient *dynamodb.Client
}

// HandleRequest handles the MigrateUser event by looking up a user in an Amazon
 DynamoDB table and
// specifying whether they should be migrated to the user pool.
func (h *handler) HandleRequest(ctx context.Context, event
 events.CognitoEventUserPoolsMigrateUser) (events.CognitoEventUserPoolsMigrateUser,
 error) {
 log.Printf("Received migrate trigger from %v for user '%v'", event.TriggerSource,
 event.UserName)
```

```
if event.TriggerSource != "UserMigration_Authentication" {
 return event, nil
}
tableName := os.Getenv(TABLE_NAME)
user := UserInfo{
 UserName: event.UserName,
}
log.Printf("Looking up user '%v' in table %v.\n", user.UserName, tableName)
filterEx := expression.Name("UserName").Equal(expression.Value(user.UserName))
expr, err := expression.NewBuilder().WithFilter(filterEx).Build()
if err != nil {
 log.Printf("Error building expression to query for user '%v'.\n", user.UserName)
 return event, err
}
output, err := h.dynamoClient.Scan(ctx, &dynamodb.ScanInput{
 TableName:                 aws.String(tableName),
 FilterExpression:          expr.Filter(),
 ExpressionAttributeNames:  expr.Names(),
 ExpressionAttributeValues: expr.Values(),
})
if err != nil {
 log.Printf("Error looking up user '%v'.\n", user.UserName)
 return event, err
}
if len(output.Items) == 0 {
 log.Printf("User '%v' not found, not migrating user.\n", user.UserName)
 return event, err
}

var users []UserInfo
err = attributevalue.UnmarshalListOfMaps(output.Items, &users)
if err != nil {
 log.Printf("Couldn't unmarshal DynamoDB items. Here's why: %v\n", err)
 return event, err
}

user = users[0]
log.Printf("UserName '%v' found with email %v. User is migrated and must reset
password.\n", user.UserName, user.UserEmail)
event.CognitoEventUserPoolsMigrateUserResponse.UserAttributes = map[string]string{
 "email":          user.UserEmail,
 "email_verified": "true", // email_verified is required for the forgot password
flow.
}
```

```
 event.CognitoEventUserPoolsMigrateUserResponse.FinalUserStatus = "RESET_REQUIRED"
 event.CognitoEventUserPoolsMigrateUserResponse.MessageAction = "SUPPRESS"

 return event, err
}

func main() {
 ctx := context.Background()
 sdkConfig, err := config.LoadDefaultConfig(ctx)
 if err != nil {
  log.Panicln(err)
 }
 h := handler{
  dynamoClient: dynamodb.NewFromConfig(sdkConfig),
 }
 lambda.Start(h.HandleRequest)
}
```

建立執行一般任務的 struct。

```
import (
 "context"
 "log"
 "strings"
 "time"
 "user_pools_and_lambda_triggers/actions"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/cloudformation"
 "github.com/aws/aws-sdk-go-v2/service/cloudwatchlogs"
 "github.com/aws/aws-sdk-go-v2/service/dynamodb"
 "github.com/awsdocs/aws-doc-sdk-examples/gov2/demotools"
)

// IScenarioHelper defines common functions used by the workflows in this example.
type IScenarioHelper interface {
 Pause(secs int)
 GetStackOutputs(ctx context.Context, stackName string) (actions.StackOutputs,
 error)
 PopulateUserTable(ctx context.Context, tableName string)
```

```
 GetKnownUsers(ctx context.Context, tableName string) (actions.UserList, error)
 AddKnownUser(ctx context.Context, tableName string, user actions.User)
 ListRecentLogEvents(ctx context.Context, functionName string)
}

// ScenarioHelper contains AWS wrapper structs used by the workflows in this
 example.
type ScenarioHelper struct {
 questioner  demotools.IQuestioner
 dynamoActor *actions.DynamoActions
 cfnActor    *actions.CloudFormationActions
 cwlActor    *actions.CloudWatchLogsActions
 isTestRun   bool
}

// NewScenarioHelper constructs a new scenario helper.
func NewScenarioHelper(sdkConfig aws.Config, questioner demotools.IQuestioner)
 ScenarioHelper {
 scenario := ScenarioHelper{
  questioner:  questioner,
  dynamoActor: &actions.DynamoActions{DynamoClient:
 dynamodb.NewFromConfig(sdkConfig)},
  cfnActor:    &actions.CloudFormationActions{CfnClient:
 cloudformation.NewFromConfig(sdkConfig)},
  cwlActor:    &actions.CloudWatchLogsActions{CwlClient:
 cloudwatchlogs.NewFromConfig(sdkConfig)},
 }
 return scenario
}

// Pause waits for the specified number of seconds.
func (helper ScenarioHelper) Pause(secs int) {
 if !helper.isTestRun {
  time.Sleep(time.Duration(secs) * time.Second)
 }
}

// GetStackOutputs gets the outputs from the specified CloudFormation stack in a
 structured format.
func (helper ScenarioHelper) GetStackOutputs(ctx context.Context, stackName string)
 (actions.StackOutputs, error) {
 return helper.cfnActor.GetOutputs(ctx, stackName), nil
}
```

```
// PopulateUserTable fills the known user table with example data.
func (helper ScenarioHelper) PopulateUserTable(ctx context.Context, tableName
 string) {
 log.Printf("First, let's add some users to the DynamoDB %v table we'll use for this
 example.\n", tableName)
 err := helper.dynamoActor.PopulateTable(ctx, tableName)
 if err != nil {
  panic(err)
 }
}

// GetKnownUsers gets the users from the known users table in a structured format.
func (helper ScenarioHelper) GetKnownUsers(ctx context.Context, tableName string)
 (actions.UserList, error) {
 knownUsers, err := helper.dynamoActor.Scan(ctx, tableName)
 if err != nil {
  log.Printf("Couldn't get known users from table %v. Here's why: %v\n", tableName,
 err)
 }
 return knownUsers, err
}

// AddKnownUser adds a user to the known users table.
func (helper ScenarioHelper) AddKnownUser(ctx context.Context, tableName string,
 user actions.User) {
 log.Printf("Adding user '%v' with email '%v' to the DynamoDB known users table...
\n",
  user.UserName, user.UserEmail)
 err := helper.dynamoActor.AddUser(ctx, tableName, user)
 if err != nil {
  panic(err)
 }
}

// ListRecentLogEvents gets the most recent log stream and events for the specified
 Lambda function and displays them.
func (helper ScenarioHelper) ListRecentLogEvents(ctx context.Context, functionName
 string) {
 log.Println("Waiting a few seconds to let Lambda write to CloudWatch Logs...")
 helper.Pause(10)
 log.Println("Okay, let's check the logs to find what's happened recently with your
 Lambda function.")
 logStream, err := helper.cwlActor.GetLatestLogStream(ctx, functionName)
 if err != nil {
```

```
  panic(err)
 }
 log.Printf("Getting some recent events from log stream %v\n",
 *logStream.LogStreamName)
 events, err := helper.cwlActor.GetLogEvents(ctx, functionName,
 *logStream.LogStreamName, 10)
 if err != nil {
  panic(err)
 }
 for _, event := range events {
  log.Printf("\t%v", *event.Message)
 }
 log.Println(strings.Repeat("-", 88))
}
```

建立包裝 Amazon Cognito 動作的 struct。

```
import (
 "context"
 "errors"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/cognitoidentityprovider"
 "github.com/aws/aws-sdk-go-v2/service/cognitoidentityprovider/types"
)

type CognitoActions struct {
 CognitoClient *cognitoidentityprovider.Client
}



// Trigger and TriggerInfo define typed data for updating an Amazon Cognito trigger.
type Trigger int

const (
 PreSignUp Trigger = iota
 UserMigration
 PostAuthentication
```

```
)

type TriggerInfo struct {
 Trigger    Trigger
 HandlerArn *string
}

// UpdateTriggers adds or removes Lambda triggers for a user pool. When a trigger is
 specified with a `nil` value,
// it is removed from the user pool.
func (actor CognitoActions) UpdateTriggers(ctx context.Context, userPoolId string,
 triggers ...TriggerInfo) error {
 output, err := actor.CognitoClient.DescribeUserPool(ctx,
 &cognitoidentityprovider.DescribeUserPoolInput{
  UserPoolId: aws.String(userPoolId),
 })
 if err != nil {
  log.Printf("Couldn't get info about user pool %v. Here's why: %v\n", userPoolId,
 err)
  return err
 }
 lambdaConfig := output.UserPool.LambdaConfig
 for _, trigger := range triggers {
  switch trigger.Trigger {
  case PreSignUp:
   lambdaConfig.PreSignUp = trigger.HandlerArn
  case UserMigration:
   lambdaConfig.UserMigration = trigger.HandlerArn
  case PostAuthentication:
   lambdaConfig.PostAuthentication = trigger.HandlerArn
  }
 }
 _, err = actor.CognitoClient.UpdateUserPool(ctx,
 &cognitoidentityprovider.UpdateUserPoolInput{
  UserPoolId:   aws.String(userPoolId),
  LambdaConfig: lambdaConfig,
 })
 if err != nil {
  log.Printf("Couldn't update user pool %v. Here's why: %v\n", userPoolId, err)
 }
 return err
}
```

```
// SignUp signs up a user with Amazon Cognito.
func (actor CognitoActions) SignUp(ctx context.Context, clientId string, userName
 string, password string, userEmail string) (bool, error) {
 confirmed := false
 output, err := actor.CognitoClient.SignUp(ctx,
 &cognitoidentityprovider.SignUpInput{
  ClientId: aws.String(clientId),
  Password: aws.String(password),
  Username: aws.String(userName),
  UserAttributes: []types.AttributeType{
   {Name: aws.String("email"), Value: aws.String(userEmail)},
  },
 })
 if err != nil {
  var invalidPassword *types.InvalidPasswordException
  if errors.As(err, &invalidPassword) {
   log.Println(*invalidPassword.Message)
  } else {
   log.Printf("Couldn't sign up user %v. Here's why: %v\n", userName, err)
  }
 } else {
  confirmed = output.UserConfirmed
 }
 return confirmed, err
}



// SignIn signs in a user to Amazon Cognito using a username and password
 authentication flow.
func (actor CognitoActions) SignIn(ctx context.Context, clientId string, userName
 string, password string) (*types.AuthenticationResultType, error) {
 var authResult *types.AuthenticationResultType
 output, err := actor.CognitoClient.InitiateAuth(ctx,
 &cognitoidentityprovider.InitiateAuthInput{
  AuthFlow:       "USER_PASSWORD_AUTH",
  ClientId:       aws.String(clientId),
  AuthParameters: map[string]string{"USERNAME": userName, "PASSWORD": password},
 })
 if err != nil {
  var resetRequired *types.PasswordResetRequiredException
  if errors.As(err, &resetRequired) {
   log.Println(*resetRequired.Message)
```

```
  } else {
   log.Printf("Couldn't sign in user %v. Here's why: %v\n", userName, err)
  }
 } else {
  authResult = output.AuthenticationResult
 }
 return authResult, err
}



// ForgotPassword starts a password recovery flow for a user. This flow typically
 sends a confirmation code
// to the user's configured notification destination, such as email.
func (actor CognitoActions) ForgotPassword(ctx context.Context, clientId string,
 userName string) (*types.CodeDeliveryDetailsType, error) {
 output, err := actor.CognitoClient.ForgotPassword(ctx,
 &cognitoidentityprovider.ForgotPasswordInput{
  ClientId: aws.String(clientId),
  Username: aws.String(userName),
 })
 if err != nil {
  log.Printf("Couldn't start password reset for user '%v'. Here;s why: %v\n",
 userName, err)
 }
 return output.CodeDeliveryDetails, err
}



// ConfirmForgotPassword confirms a user with a confirmation code and a new
 password.
func (actor CognitoActions) ConfirmForgotPassword(ctx context.Context, clientId
 string, code string, userName string, password string) error {
 _, err := actor.CognitoClient.ConfirmForgotPassword(ctx,
 &cognitoidentityprovider.ConfirmForgotPasswordInput{
  ClientId:         aws.String(clientId),
  ConfirmationCode: aws.String(code),
  Password:         aws.String(password),
  Username:         aws.String(userName),
 })
 if err != nil {
  var invalidPassword *types.InvalidPasswordException
  if errors.As(err, &invalidPassword) {
```

```
   log.Println(*invalidPassword.Message)
  } else {
   log.Printf("Couldn't confirm user %v. Here's why: %v", userName, err)
  }
 }
 return err
}



// DeleteUser removes a user from the user pool.
func (actor CognitoActions) DeleteUser(ctx context.Context, userAccessToken string)
 error {
 _, err := actor.CognitoClient.DeleteUser(ctx,
 &cognitoidentityprovider.DeleteUserInput{
  AccessToken: aws.String(userAccessToken),
 })
 if err != nil {
  log.Printf("Couldn't delete user. Here's why: %v\n", err)
 }
 return err
}



// AdminCreateUser uses administrator credentials to add a user to a user pool. This
 method leaves the user
// in a state that requires they enter a new password next time they sign in.
func (actor CognitoActions) AdminCreateUser(ctx context.Context, userPoolId string,
 userName string, userEmail string) error {
 _, err := actor.CognitoClient.AdminCreateUser(ctx,
 &cognitoidentityprovider.AdminCreateUserInput{
  UserPoolId:     aws.String(userPoolId),
  Username:       aws.String(userName),
  MessageAction:  types.MessageActionTypeSuppress,
  UserAttributes: []types.AttributeType{{Name: aws.String("email"), Value:
 aws.String(userEmail)}},
 })
 if err != nil {
  var userExists *types.UsernameExistsException
  if errors.As(err, &userExists) {
   log.Printf("User %v already exists in the user pool.", userName)
   err = nil
  } else {
```

```
   log.Printf("Couldn't create user %v. Here's why: %v\n", userName, err)
  }
 }
 return err
}



// AdminSetUserPassword uses administrator credentials to set a password for a user
 without requiring a
// temporary password.
func (actor CognitoActions) AdminSetUserPassword(ctx context.Context, userPoolId
 string, userName string, password string) error {
 _, err := actor.CognitoClient.AdminSetUserPassword(ctx,
 &cognitoidentityprovider.AdminSetUserPasswordInput{
  Password:   aws.String(password),
  UserPoolId: aws.String(userPoolId),
  Username:   aws.String(userName),
  Permanent:  true,
 })
 if err != nil {
  var invalidPassword *types.InvalidPasswordException
  if errors.As(err, &invalidPassword) {
   log.Println(*invalidPassword.Message)
  } else {
   log.Printf("Couldn't set password for user %v. Here's why: %v\n", userName, err)
  }
 }
 return err
}
```

建立包裝 DynamoDB 動作的 struct。

```
import (
 "context"
 "fmt"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/feature/dynamodb/attributevalue"
```

```
 "github.com/aws/aws-sdk-go-v2/service/dynamodb"
 "github.com/aws/aws-sdk-go-v2/service/dynamodb/types"
)

// DynamoActions encapsulates the Amazon Simple Notification Service (Amazon SNS)
 actions
// used in the examples.
type DynamoActions struct {
 DynamoClient *dynamodb.Client
}

// User defines structured user data.
type User struct {
 UserName  string
 UserEmail string
 LastLogin *LoginInfo `dynamodbav:",omitempty"`
}

// LoginInfo defines structured custom login data.
type LoginInfo struct {
 UserPoolId string
 ClientId   string
 Time       string
}

// UserList defines a list of users.
type UserList struct {
 Users []User
}

// UserNameList returns the usernames contained in a UserList as a list of strings.
func (users *UserList) UserNameList() []string {
 names := make([]string, len(users.Users))
 for i := 0; i < len(users.Users); i++ {
  names[i] = users.Users[i].UserName
 }
 return names
}

// PopulateTable adds a set of test users to the table.
func (actor DynamoActions) PopulateTable(ctx context.Context, tableName string)
 error {
 var err error
 var item map[string]types.AttributeValue
```

```
 var writeReqs []types.WriteRequest
 for i := 1; i < 4; i++ {
  item, err = attributevalue.MarshalMap(User{UserName: fmt.Sprintf("test_user_%v",
 i), UserEmail: fmt.Sprintf("test_email_%v@example.com", i)})
  if err != nil {
   log.Printf("Couldn't marshall user into DynamoDB format. Here's why: %v\n", err)
   return err
  }
  writeReqs = append(writeReqs, types.WriteRequest{PutRequest:
 &types.PutRequest{Item: item}})
 }
 _, err = actor.DynamoClient.BatchWriteItem(ctx, &dynamodb.BatchWriteItemInput{
  RequestItems: map[string][]types.WriteRequest{tableName: writeReqs},
 })
 if err != nil {
  log.Printf("Couldn't populate table %v with users. Here's why: %v\n", tableName,
 err)
 }
 return err
}

// Scan scans the table for all items.
func (actor DynamoActions) Scan(ctx context.Context, tableName string) (UserList,
 error) {
 var userList UserList
 output, err := actor.DynamoClient.Scan(ctx, &dynamodb.ScanInput{
  TableName: aws.String(tableName),
 })
 if err != nil {
  log.Printf("Couldn't scan table %v for items. Here's why: %v\n", tableName, err)
 } else {
  err = attributevalue.UnmarshalListOfMaps(output.Items, &userList.Users)
  if err != nil {
   log.Printf("Couldn't unmarshal items into users. Here's why: %v\n", err)
  }
 }
 return userList, err
}

// AddUser adds a user item to a table.
func (actor DynamoActions) AddUser(ctx context.Context, tableName string, user User)
 error {
 userItem, err := attributevalue.MarshalMap(user)
 if err != nil {
```

```
  log.Printf("Couldn't marshall user to item. Here's why: %v\n", err)
 }
 _, err = actor.DynamoClient.PutItem(ctx, &dynamodb.PutItemInput{
  Item:      userItem,
  TableName: aws.String(tableName),
 })
 if err != nil {
  log.Printf("Couldn't put item in table %v. Here's why: %v", tableName, err)
 }
 return err
}
```

建立包裝 CloudWatch Logs 動作的 struct。

```
import (
 "context"
 "fmt"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/cloudwatchlogs"
 "github.com/aws/aws-sdk-go-v2/service/cloudwatchlogs/types"
)

type CloudWatchLogsActions struct {
 CwlClient *cloudwatchlogs.Client
}

// GetLatestLogStream gets the most recent log stream for a Lambda function.
func (actor CloudWatchLogsActions) GetLatestLogStream(ctx context.Context,
 functionName string) (types.LogStream, error) {
 var logStream types.LogStream
 logGroupName := fmt.Sprintf("/aws/lambda/%s", functionName)
 output, err := actor.CwlClient.DescribeLogStreams(ctx,
 &cloudwatchlogs.DescribeLogStreamsInput{
  Descending:   aws.Bool(true),
  Limit:        aws.Int32(1),
  LogGroupName: aws.String(logGroupName),
  OrderBy:      types.OrderByLastEventTime,
 })
```

```
 if err != nil {
  log.Printf("Couldn't get log streams for log group %v. Here's why: %v\n",
 logGroupName, err)
 } else {
  logStream = output.LogStreams[0]
 }
 return logStream, err
}

// GetLogEvents gets the most recent eventCount events from the specified log
 stream.
func (actor CloudWatchLogsActions) GetLogEvents(ctx context.Context, functionName
 string, logStreamName string, eventCount int32) (
 []types.OutputLogEvent, error) {
 var events []types.OutputLogEvent
 logGroupName := fmt.Sprintf("/aws/lambda/%s", functionName)
 output, err := actor.CwlClient.GetLogEvents(ctx, &cloudwatchlogs.GetLogEventsInput{
  LogStreamName: aws.String(logStreamName),
  Limit:         aws.Int32(eventCount),
  LogGroupName:  aws.String(logGroupName),
 })
 if err != nil {
  log.Printf("Couldn't get log event for log stream %v. Here's why: %v\n",
 logStreamName, err)
 } else {
  events = output.Events
 }
 return events, err
}
```

建立包裝 CloudFormation 動作的結構。

```
import (
 "context"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/cloudformation"
)
```

```
// StackOutputs defines a map of outputs from a specific stack.
type StackOutputs map[string]string

type CloudFormationActions struct {
 CfnClient *cloudformation.Client
}

// GetOutputs gets the outputs from a CloudFormation stack and puts them into a
 structured format.
func (actor CloudFormationActions) GetOutputs(ctx context.Context, stackName string)
 StackOutputs {
 output, err := actor.CfnClient.DescribeStacks(ctx,
 &cloudformation.DescribeStacksInput{
  StackName: aws.String(stackName),
 })
 if err != nil || len(output.Stacks) == 0 {
  log.Panicf("Couldn't find a CloudFormation stack named %v. Here's why: %v\n",
 stackName, err)
 }
 stackOutputs := StackOutputs{}
 for _, out := range output.Stacks[0].Outputs {
  stackOutputs[*out.OutputKey] = *out.OutputValue
 }
 return stackOutputs
}
```

清除資源。

```
import (
 "context"
 "log"
 "user_pools_and_lambda_triggers/actions"

 "github.com/awsdocs/aws-doc-sdk-examples/gov2/demotools"
)

// Resources keeps track of AWS resources created during an example and handles
// cleanup when the example finishes.
type Resources struct {
 userPoolId       string
```

```
 userAccessTokens []string
 triggers         []actions.Trigger

 cognitoActor *actions.CognitoActions
 questioner   demotools.IQuestioner
}

func (resources *Resources) init(cognitoActor *actions.CognitoActions, questioner
 demotools.IQuestioner) {
 resources.userAccessTokens = []string{}
 resources.triggers = []actions.Trigger{}
 resources.cognitoActor = cognitoActor
 resources.questioner = questioner
}

// Cleanup deletes all AWS resources created during an example.
func (resources *Resources) Cleanup(ctx context.Context) {
 defer func() {
  if r := recover(); r != nil {
   log.Printf("Something went wrong during cleanup.\n%v\n", r)
   log.Println("Use the AWS Management Console to remove any remaining resources \n"
 +
    "that were created for this scenario.")
  }
 }()

 wantDelete := resources.questioner.AskBool("Do you want to remove all of the AWS
 resources that were created "+
  "during this demo (y/n)?", "y")
 if wantDelete {
  for _, accessToken := range resources.userAccessTokens {
   err := resources.cognitoActor.DeleteUser(ctx, accessToken)
   if err != nil {
    log.Println("Couldn't delete user during cleanup.")
    panic(err)
   }
   log.Println("Deleted user.")
  }
  triggerList := make([]actions.TriggerInfo, len(resources.triggers))
  for i := 0; i < len(resources.triggers); i++ {
   triggerList[i] = actions.TriggerInfo{Trigger: resources.triggers[i], HandlerArn:
 nil}
  }
```

```
  err := resources.cognitoActor.UpdateTriggers(ctx, resources.userPoolId,
 triggerList...)
  if err != nil {
   log.Println("Couldn't update Cognito triggers during cleanup.")
   panic(err)
  }
  log.Println("Removed Cognito triggers from user pool.")
 } else {
  log.Println("Be sure to remove resources when you're done with them to avoid
 unexpected charges!")
 }
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的下列主題。
  - ConfirmForgotPassword
  - DeleteUser
  - ForgotPassword
  - InitiateAuth
  - SignUp
  - UpdateUserPool

進行 Amazon Cognito 使用者身分驗證後，可使用 Lambda 函數撰寫自訂活動資料

下列程式碼範例示範如何在 Amazon Cognito 使用者身分驗證之後，使用 Lambda 函數撰寫自訂活動資料。

- 使用管理員函數將使用者新增至使用者集區。
- 設定使用者集區以呼叫 `PostAuthentication` 觸發條件的 Lambda 函數。
- 將新使用者登入 Amazon Cognito。
- Lambda 函數會將自訂資訊寫入 CloudWatch Logs 和 DynamoDB 資料表。
- 從 DynamoDB 資料表取得並顯示自訂資料，然後清除資源。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，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。

```
import (
 "context"
 "errors"
 "log"
 "strings"
 "user_pools_and_lambda_triggers/actions"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/cognitoidentityprovider"
 "github.com/aws/aws-sdk-go-v2/service/cognitoidentityprovider/types"
 "github.com/awsdocs/aws-doc-sdk-examples/gov2/demotools"
)

// ActivityLog separates the steps of this scenario into individual functions so
 that
// they are simpler to read and understand.
type ActivityLog struct {
 helper       IScenarioHelper
 questioner   demotools.IQuestioner
 resources    Resources
 cognitoActor *actions.CognitoActions
}

// NewActivityLog constructs a new activity log runner.
func NewActivityLog(sdkConfig aws.Config, questioner demotools.IQuestioner, helper
 IScenarioHelper) ActivityLog {
 scenario := ActivityLog{
  helper:       helper,
  questioner:   questioner,
  resources:    Resources{},
  cognitoActor: &actions.CognitoActions{CognitoClient:
 cognitoidentityprovider.NewFromConfig(sdkConfig)},
```

```
 }
 scenario.resources.init(scenario.cognitoActor, questioner)
 return scenario
}

// AddUserToPool selects a user from the known users table and uses administrator
 credentials to add the user to the user pool.
func (runner *ActivityLog) AddUserToPool(ctx context.Context, userPoolId string,
 tableName string) (string, string) {
 log.Println("To facilitate this example, let's add a user to the user pool using
 administrator privileges.")
 users, err := runner.helper.GetKnownUsers(ctx, tableName)
 if err != nil {
  panic(err)
 }
 user := users.Users[0]
 log.Printf("Adding known user %v to the user pool.\n", user.UserName)
 err = runner.cognitoActor.AdminCreateUser(ctx, userPoolId, user.UserName,
 user.UserEmail)
 if err != nil {
  panic(err)
 }
 pwSet := false
 password := runner.questioner.AskPassword("\nEnter a password that has at least
 eight characters, uppercase, lowercase, numbers and symbols.\n"+
  "(the password will not display as you type):", 8)
 for !pwSet {
  log.Printf("\nSetting password for user '%v'.\n", user.UserName)
  err = runner.cognitoActor.AdminSetUserPassword(ctx, userPoolId, user.UserName,
 password)
  if err != nil {
   var invalidPassword *types.InvalidPasswordException
   if errors.As(err, &invalidPassword) {
    password = runner.questioner.AskPassword("\nEnter another password:", 8)
   } else {
    panic(err)
   }
  } else {
   pwSet = true
  }
 }

 log.Println(strings.Repeat("-", 88))
```

```
 return user.UserName, password
}

// AddActivityLogTrigger adds a Lambda handler as an invocation target for the
 PostAuthentication trigger.
func (runner *ActivityLog) AddActivityLogTrigger(ctx context.Context, userPoolId
 string, activityLogArn string) {
 log.Println("Let's add a Lambda function to handle the PostAuthentication trigger
 from Cognito.\n" +
  "This trigger happens after a user is authenticated, and lets your function take
 action, such as logging\n" +
  "the outcome.")
 err := runner.cognitoActor.UpdateTriggers(
  ctx, userPoolId,
  actions.TriggerInfo{Trigger: actions.PostAuthentication, HandlerArn:
 aws.String(activityLogArn)})
 if err != nil {
  panic(err)
 }
 runner.resources.triggers = append(runner.resources.triggers,
 actions.PostAuthentication)
 log.Printf("Lambda function %v added to user pool %v to handle PostAuthentication
 Cognito trigger.\n",
  activityLogArn, userPoolId)

 log.Println(strings.Repeat("-", 88))
}

// SignInUser signs in as the specified user.
func (runner *ActivityLog) SignInUser(ctx context.Context, clientId string, userName
 string, password string) {
 log.Printf("Now we'll sign in user %v and check the results in the logs and the
 DynamoDB table.", userName)
 runner.questioner.Ask("Press Enter when you're ready.")
 authResult, err := runner.cognitoActor.SignIn(ctx, clientId, userName, password)
 if err != nil {
  panic(err)
 }
 log.Println("Sign in successful.",
  "The PostAuthentication Lambda handler writes custom information to CloudWatch
 Logs.")

 runner.resources.userAccessTokens = append(runner.resources.userAccessTokens,
 *authResult.AccessToken)
```

```
}

// GetKnownUserLastLogin gets the login info for a user from the Amazon DynamoDB
 table and displays it.
func (runner *ActivityLog) GetKnownUserLastLogin(ctx context.Context, tableName
 string, userName string) {
 log.Println("The PostAuthentication handler also writes login data to the DynamoDB
 table.")
 runner.questioner.Ask("Press Enter when you're ready to continue.")
 users, err := runner.helper.GetKnownUsers(ctx, tableName)
 if err != nil {
  panic(err)
 }
 for _, user := range users.Users {
  if user.UserName == userName {
   log.Println("The last login info for the user in the known users table is:")
   log.Printf("\t%+v", *user.LastLogin)
  }
 }
 log.Println(strings.Repeat("-", 88))
}

// Run runs the scenario.
func (runner *ActivityLog) Run(ctx context.Context, stackName string) {
 defer func() {
  if r := recover(); r != nil {
   log.Println("Something went wrong with the demo.")
   runner.resources.Cleanup(ctx)
  }
 }()

 log.Println(strings.Repeat("-", 88))
 log.Printf("Welcome\n")

 log.Println(strings.Repeat("-", 88))

 stackOutputs, err := runner.helper.GetStackOutputs(ctx, stackName)
 if err != nil {
  panic(err)
 }
 runner.resources.userPoolId = stackOutputs["UserPoolId"]
 runner.helper.PopulateUserTable(ctx, stackOutputs["TableName"])
 userName, password := runner.AddUserToPool(ctx, stackOutputs["UserPoolId"],
 stackOutputs["TableName"])
```

```
 runner.AddActivityLogTrigger(ctx, stackOutputs["UserPoolId"],
 stackOutputs["ActivityLogFunctionArn"])
 runner.SignInUser(ctx, stackOutputs["UserPoolClientId"], userName, password)
 runner.helper.ListRecentLogEvents(ctx, stackOutputs["ActivityLogFunction"])
 runner.GetKnownUserLastLogin(ctx, stackOutputs["TableName"], userName)

 runner.resources.Cleanup(ctx)

 log.Println(strings.Repeat("-", 88))
 log.Println("Thanks for watching!")
 log.Println(strings.Repeat("-", 88))
}
```

使用 Lambda 函數來處理 PostAuthentication 觸發條件。

```
import (
 "context"
 "fmt"
 "log"
 "os"
 "time"

 "github.com/aws/aws-lambda-go/events"
 "github.com/aws/aws-lambda-go/lambda"
 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/config"
 "github.com/aws/aws-sdk-go-v2/feature/dynamodb/attributevalue"
 "github.com/aws/aws-sdk-go-v2/service/dynamodb"
 dynamodbtypes "github.com/aws/aws-sdk-go-v2/service/dynamodb/types"
)

const TABLE_NAME = "TABLE_NAME"

// LoginInfo defines structured login data that can be marshalled to a DynamoDB
 format.
type LoginInfo struct {
 UserPoolId string `dynamodbav:"UserPoolId"`
 ClientId   string `dynamodbav:"ClientId"`
 Time       string `dynamodbav:"Time"`
```

```
}

// UserInfo defines structured user data that can be marshalled to a DynamoDB
 format.
type UserInfo struct {
 UserName  string    `dynamodbav:"UserName"`
 UserEmail string    `dynamodbav:"UserEmail"`
 LastLogin LoginInfo `dynamodbav:"LastLogin"`
}

// GetKey marshals the user email value to a DynamoDB key format.
func (user UserInfo) GetKey() map[string]dynamodbtypes.AttributeValue {
 userEmail, err := attributevalue.Marshal(user.UserEmail)
 if err != nil {
  panic(err)
 }
 return map[string]dynamodbtypes.AttributeValue{"UserEmail": userEmail}
}

type handler struct {
 dynamoClient *dynamodb.Client
}

// HandleRequest handles the PostAuthentication event by writing custom data to the
 logs and
// to an Amazon DynamoDB table.
func (h *handler) HandleRequest(ctx context.Context,
 event events.CognitoEventUserPoolsPostAuthentication)
 (events.CognitoEventUserPoolsPostAuthentication, error) {
 log.Printf("Received post authentication trigger from %v for user '%v'",
 event.TriggerSource, event.UserName)
 tableName := os.Getenv(TABLE_NAME)
 user := UserInfo{
  UserName:  event.UserName,
  UserEmail: event.Request.UserAttributes["email"],
  LastLogin: LoginInfo{
   UserPoolId: event.UserPoolID,
   ClientId:   event.CallerContext.ClientID,
   Time:       time.Now().Format(time.UnixDate),
  },
 }
 // Write to CloudWatch Logs.
 fmt.Printf("%#v", user)
```

```
 // Also write to an external system. This examples uses DynamoDB to demonstrate.
 userMap, err := attributevalue.MarshalMap(user)
 if err != nil {
  log.Printf("Couldn't marshal to DynamoDB map. Here's why: %v\n", err)
 } else if len(userMap) == 0 {
  log.Printf("User info marshaled to an empty map.")
 } else {
  _, err := h.dynamoClient.PutItem(ctx, &dynamodb.PutItemInput{
   Item:      userMap,
   TableName: aws.String(tableName),
  })
  if err != nil {
   log.Printf("Couldn't write to DynamoDB. Here's why: %v\n", err)
  } else {
   log.Printf("Wrote user info to DynamoDB table %v.\n", tableName)
  }
 }

 return event, nil
}

func main() {
 ctx := context.Background()
 sdkConfig, err := config.LoadDefaultConfig(ctx)
 if err != nil {
  log.Panicln(err)
 }
 h := handler{
  dynamoClient: dynamodb.NewFromConfig(sdkConfig),
 }
 lambda.Start(h.HandleRequest)
}
```

建立執行一般任務的 struct。

```
import (
 "context"
 "log"
 "strings"
 "time"
```

```
 "user_pools_and_lambda_triggers/actions"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/cloudformation"
 "github.com/aws/aws-sdk-go-v2/service/cloudwatchlogs"
 "github.com/aws/aws-sdk-go-v2/service/dynamodb"
 "github.com/awsdocs/aws-doc-sdk-examples/gov2/demotools"
)

// IScenarioHelper defines common functions used by the workflows in this example.
type IScenarioHelper interface {
 Pause(secs int)
 GetStackOutputs(ctx context.Context, stackName string) (actions.StackOutputs,
 error)
 PopulateUserTable(ctx context.Context, tableName string)
 GetKnownUsers(ctx context.Context, tableName string) (actions.UserList, error)
 AddKnownUser(ctx context.Context, tableName string, user actions.User)
 ListRecentLogEvents(ctx context.Context, functionName string)
}

// ScenarioHelper contains AWS wrapper structs used by the workflows in this
 example.
type ScenarioHelper struct {
 questioner  demotools.IQuestioner
 dynamoActor *actions.DynamoActions
 cfnActor    *actions.CloudFormationActions
 cwlActor    *actions.CloudWatchLogsActions
 isTestRun   bool
}

// NewScenarioHelper constructs a new scenario helper.
func NewScenarioHelper(sdkConfig aws.Config, questioner demotools.IQuestioner)
 ScenarioHelper {
 scenario := ScenarioHelper{
  questioner:  questioner,
  dynamoActor: &actions.DynamoActions{DynamoClient:
 dynamodb.NewFromConfig(sdkConfig)},
  cfnActor:    &actions.CloudFormationActions{CfnClient:
 cloudformation.NewFromConfig(sdkConfig)},
  cwlActor:    &actions.CloudWatchLogsActions{CwlClient:
 cloudwatchlogs.NewFromConfig(sdkConfig)},
 }
 return scenario
}
```

```
// Pause waits for the specified number of seconds.
func (helper ScenarioHelper) Pause(secs int) {
 if !helper.isTestRun {
  time.Sleep(time.Duration(secs) * time.Second)
 }
}

// GetStackOutputs gets the outputs from the specified CloudFormation stack in a
 structured format.
func (helper ScenarioHelper) GetStackOutputs(ctx context.Context, stackName string)
 (actions.StackOutputs, error) {
 return helper.cfnActor.GetOutputs(ctx, stackName), nil
}

// PopulateUserTable fills the known user table with example data.
func (helper ScenarioHelper) PopulateUserTable(ctx context.Context, tableName
 string) {
 log.Printf("First, let's add some users to the DynamoDB %v table we'll use for this
 example.\n", tableName)
 err := helper.dynamoActor.PopulateTable(ctx, tableName)
 if err != nil {
  panic(err)
 }
}

// GetKnownUsers gets the users from the known users table in a structured format.
func (helper ScenarioHelper) GetKnownUsers(ctx context.Context, tableName string)
 (actions.UserList, error) {
 knownUsers, err := helper.dynamoActor.Scan(ctx, tableName)
 if err != nil {
  log.Printf("Couldn't get known users from table %v. Here's why: %v\n", tableName,
 err)
 }
 return knownUsers, err
}

// AddKnownUser adds a user to the known users table.
func (helper ScenarioHelper) AddKnownUser(ctx context.Context, tableName string,
 user actions.User) {
 log.Printf("Adding user '%v' with email '%v' to the DynamoDB known users table...
\n",
  user.UserName, user.UserEmail)
 err := helper.dynamoActor.AddUser(ctx, tableName, user)
```

```
 if err != nil {
  panic(err)
 }
}

// ListRecentLogEvents gets the most recent log stream and events for the specified
 Lambda function and displays them.
func (helper ScenarioHelper) ListRecentLogEvents(ctx context.Context, functionName
 string) {
 log.Println("Waiting a few seconds to let Lambda write to CloudWatch Logs...")
 helper.Pause(10)
 log.Println("Okay, let's check the logs to find what's happened recently with your
 Lambda function.")
 logStream, err := helper.cwlActor.GetLatestLogStream(ctx, functionName)
 if err != nil {
  panic(err)
 }
 log.Printf("Getting some recent events from log stream %v\n",
 *logStream.LogStreamName)
 events, err := helper.cwlActor.GetLogEvents(ctx, functionName,
 *logStream.LogStreamName, 10)
 if err != nil {
  panic(err)
 }
 for _, event := range events {
  log.Printf("\t%v", *event.Message)
 }
 log.Println(strings.Repeat("-", 88))
}
```

建立包裝 Amazon Cognito 動作的 struct。

```
import (
 "context"
 "errors"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/cognitoidentityprovider"
 "github.com/aws/aws-sdk-go-v2/service/cognitoidentityprovider/types"
```

```
)

type CognitoActions struct {
 CognitoClient *cognitoidentityprovider.Client
}



// Trigger and TriggerInfo define typed data for updating an Amazon Cognito trigger.
type Trigger int

const (
 PreSignUp Trigger = iota
 UserMigration
 PostAuthentication
)

type TriggerInfo struct {
 Trigger    Trigger
 HandlerArn *string
}

// UpdateTriggers adds or removes Lambda triggers for a user pool. When a trigger is
 specified with a `nil` value,
// it is removed from the user pool.
func (actor CognitoActions) UpdateTriggers(ctx context.Context, userPoolId string,
 triggers ...TriggerInfo) error {
 output, err := actor.CognitoClient.DescribeUserPool(ctx,
 &cognitoidentityprovider.DescribeUserPoolInput{
  UserPoolId: aws.String(userPoolId),
 })
 if err != nil {
  log.Printf("Couldn't get info about user pool %v. Here's why: %v\n", userPoolId,
 err)
  return err
 }
 lambdaConfig := output.UserPool.LambdaConfig
 for _, trigger := range triggers {
  switch trigger.Trigger {
  case PreSignUp:
   lambdaConfig.PreSignUp = trigger.HandlerArn
  case UserMigration:
   lambdaConfig.UserMigration = trigger.HandlerArn
  case PostAuthentication:
```

```
   lambdaConfig.PostAuthentication = trigger.HandlerArn
  }
 }
 _, err = actor.CognitoClient.UpdateUserPool(ctx,
 &cognitoidentityprovider.UpdateUserPoolInput{
  UserPoolId:   aws.String(userPoolId),
  LambdaConfig: lambdaConfig,
 })
 if err != nil {
  log.Printf("Couldn't update user pool %v. Here's why: %v\n", userPoolId, err)
 }
 return err
}



// SignUp signs up a user with Amazon Cognito.
func (actor CognitoActions) SignUp(ctx context.Context, clientId string, userName
 string, password string, userEmail string) (bool, error) {
 confirmed := false
 output, err := actor.CognitoClient.SignUp(ctx,
 &cognitoidentityprovider.SignUpInput{
  ClientId: aws.String(clientId),
  Password: aws.String(password),
  Username: aws.String(userName),
  UserAttributes: []types.AttributeType{
   {Name: aws.String("email"), Value: aws.String(userEmail)},
  },
 })
 if err != nil {
  var invalidPassword *types.InvalidPasswordException
  if errors.As(err, &invalidPassword) {
   log.Println(*invalidPassword.Message)
  } else {
   log.Printf("Couldn't sign up user %v. Here's why: %v\n", userName, err)
  }
 } else {
  confirmed = output.UserConfirmed
 }
 return confirmed, err
}
```

```
// SignIn signs in a user to Amazon Cognito using a username and password
 authentication flow.
func (actor CognitoActions) SignIn(ctx context.Context, clientId string, userName
 string, password string) (*types.AuthenticationResultType, error) {
 var authResult *types.AuthenticationResultType
 output, err := actor.CognitoClient.InitiateAuth(ctx,
 &cognitoidentityprovider.InitiateAuthInput{
  AuthFlow:       "USER_PASSWORD_AUTH",
  ClientId:       aws.String(clientId),
  AuthParameters: map[string]string{"USERNAME": userName, "PASSWORD": password},
 })
 if err != nil {
  var resetRequired *types.PasswordResetRequiredException
  if errors.As(err, &resetRequired) {
   log.Println(*resetRequired.Message)
  } else {
   log.Printf("Couldn't sign in user %v. Here's why: %v\n", userName, err)
  }
 } else {
  authResult = output.AuthenticationResult
 }
 return authResult, err
}



// ForgotPassword starts a password recovery flow for a user. This flow typically
 sends a confirmation code
// to the user's configured notification destination, such as email.
func (actor CognitoActions) ForgotPassword(ctx context.Context, clientId string,
 userName string) (*types.CodeDeliveryDetailsType, error) {
 output, err := actor.CognitoClient.ForgotPassword(ctx,
 &cognitoidentityprovider.ForgotPasswordInput{
  ClientId: aws.String(clientId),
  Username: aws.String(userName),
 })
 if err != nil {
  log.Printf("Couldn't start password reset for user '%v'. Here;s why: %v\n",
 userName, err)
 }
 return output.CodeDeliveryDetails, err
}
```

```
// ConfirmForgotPassword confirms a user with a confirmation code and a new
 password.
func (actor CognitoActions) ConfirmForgotPassword(ctx context.Context, clientId
 string, code string, userName string, password string) error {
 _, err := actor.CognitoClient.ConfirmForgotPassword(ctx,
 &cognitoidentityprovider.ConfirmForgotPasswordInput{
  ClientId:         aws.String(clientId),
  ConfirmationCode: aws.String(code),
  Password:         aws.String(password),
  Username:         aws.String(userName),
 })
 if err != nil {
  var invalidPassword *types.InvalidPasswordException
  if errors.As(err, &invalidPassword) {
   log.Println(*invalidPassword.Message)
  } else {
   log.Printf("Couldn't confirm user %v. Here's why: %v", userName, err)
  }
 }
 return err
}



// DeleteUser removes a user from the user pool.
func (actor CognitoActions) DeleteUser(ctx context.Context, userAccessToken string)
 error {
 _, err := actor.CognitoClient.DeleteUser(ctx,
 &cognitoidentityprovider.DeleteUserInput{
  AccessToken: aws.String(userAccessToken),
 })
 if err != nil {
  log.Printf("Couldn't delete user. Here's why: %v\n", err)
 }
 return err
}



// AdminCreateUser uses administrator credentials to add a user to a user pool. This
 method leaves the user
// in a state that requires they enter a new password next time they sign in.
```

```
func (actor CognitoActions) AdminCreateUser(ctx context.Context, userPoolId string,
 userName string, userEmail string) error {
 _, err := actor.CognitoClient.AdminCreateUser(ctx,
 &cognitoidentityprovider.AdminCreateUserInput{
  UserPoolId:     aws.String(userPoolId),
  Username:       aws.String(userName),
  MessageAction:  types.MessageActionTypeSuppress,
  UserAttributes: []types.AttributeType{{Name: aws.String("email"), Value:
 aws.String(userEmail)}},
 })
 if err != nil {
  var userExists *types.UsernameExistsException
  if errors.As(err, &userExists) {
   log.Printf("User %v already exists in the user pool.", userName)
   err = nil
  } else {
   log.Printf("Couldn't create user %v. Here's why: %v\n", userName, err)
  }
 }
 return err
}



// AdminSetUserPassword uses administrator credentials to set a password for a user
 without requiring a
// temporary password.
func (actor CognitoActions) AdminSetUserPassword(ctx context.Context, userPoolId
 string, userName string, password string) error {
 _, err := actor.CognitoClient.AdminSetUserPassword(ctx,
 &cognitoidentityprovider.AdminSetUserPasswordInput{
  Password:   aws.String(password),
  UserPoolId: aws.String(userPoolId),
  Username:   aws.String(userName),
  Permanent:  true,
 })
 if err != nil {
  var invalidPassword *types.InvalidPasswordException
  if errors.As(err, &invalidPassword) {
   log.Println(*invalidPassword.Message)
  } else {
   log.Printf("Couldn't set password for user %v. Here's why: %v\n", userName, err)
  }
 }
```

```
 return err
}
```

建立包裝 DynamoDB 動作的 struct。

```
import (
 "context"
 "fmt"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/feature/dynamodb/attributevalue"
 "github.com/aws/aws-sdk-go-v2/service/dynamodb"
 "github.com/aws/aws-sdk-go-v2/service/dynamodb/types"
)

// DynamoActions encapsulates the Amazon Simple Notification Service (Amazon SNS)
 actions
// used in the examples.
type DynamoActions struct {
 DynamoClient *dynamodb.Client
}

// User defines structured user data.
type User struct {
 UserName  string
 UserEmail string
 LastLogin *LoginInfo `dynamodbav:",omitempty"`
}

// LoginInfo defines structured custom login data.
type LoginInfo struct {
 UserPoolId string
 ClientId   string
 Time       string
}

// UserList defines a list of users.
type UserList struct {
 Users []User
```

```
}

// UserNameList returns the usernames contained in a UserList as a list of strings.
func (users *UserList) UserNameList() []string {
 names := make([]string, len(users.Users))
 for i := 0; i < len(users.Users); i++ {
  names[i] = users.Users[i].UserName
 }
 return names
}

// PopulateTable adds a set of test users to the table.
func (actor DynamoActions) PopulateTable(ctx context.Context, tableName string)
 error {
 var err error
 var item map[string]types.AttributeValue
 var writeReqs []types.WriteRequest
 for i := 1; i < 4; i++ {
  item, err = attributevalue.MarshalMap(User{UserName: fmt.Sprintf("test_user_%v",
 i), UserEmail: fmt.Sprintf("test_email_%v@example.com", i)})
  if err != nil {
   log.Printf("Couldn't marshall user into DynamoDB format. Here's why: %v\n", err)
   return err
  }
  writeReqs = append(writeReqs, types.WriteRequest{PutRequest:
 &types.PutRequest{Item: item}})
 }
 _, err = actor.DynamoClient.BatchWriteItem(ctx, &dynamodb.BatchWriteItemInput{
  RequestItems: map[string][]types.WriteRequest{tableName: writeReqs},
 })
 if err != nil {
  log.Printf("Couldn't populate table %v with users. Here's why: %v\n", tableName,
 err)
 }
 return err
}

// Scan scans the table for all items.
func (actor DynamoActions) Scan(ctx context.Context, tableName string) (UserList,
 error) {
 var userList UserList
 output, err := actor.DynamoClient.Scan(ctx, &dynamodb.ScanInput{
  TableName: aws.String(tableName),
 })
```

```
 if err != nil {
  log.Printf("Couldn't scan table %v for items. Here's why: %v\n", tableName, err)
 } else {
  err = attributevalue.UnmarshalListOfMaps(output.Items, &userList.Users)
  if err != nil {
   log.Printf("Couldn't unmarshal items into users. Here's why: %v\n", err)
  }
 }
 return userList, err
}

// AddUser adds a user item to a table.
func (actor DynamoActions) AddUser(ctx context.Context, tableName string, user User)
 error {
 userItem, err := attributevalue.MarshalMap(user)
 if err != nil {
  log.Printf("Couldn't marshall user to item. Here's why: %v\n", err)
 }
 _, err = actor.DynamoClient.PutItem(ctx, &dynamodb.PutItemInput{
  Item:      userItem,
  TableName: aws.String(tableName),
 })
 if err != nil {
  log.Printf("Couldn't put item in table %v. Here's why: %v", tableName, err)
 }
 return err
}
```

建立包裝 CloudWatch Logs 動作的 struct。

```
import (
 "context"
 "fmt"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/cloudwatchlogs"
 "github.com/aws/aws-sdk-go-v2/service/cloudwatchlogs/types"
)
```

```
type CloudWatchLogsActions struct {
 CwlClient *cloudwatchlogs.Client
}

// GetLatestLogStream gets the most recent log stream for a Lambda function.
func (actor CloudWatchLogsActions) GetLatestLogStream(ctx context.Context,
 functionName string) (types.LogStream, error) {
 var logStream types.LogStream
 logGroupName := fmt.Sprintf("/aws/lambda/%s", functionName)
 output, err := actor.CwlClient.DescribeLogStreams(ctx,
 &cloudwatchlogs.DescribeLogStreamsInput{
  Descending:   aws.Bool(true),
  Limit:        aws.Int32(1),
  LogGroupName: aws.String(logGroupName),
  OrderBy:      types.OrderByLastEventTime,
 })
 if err != nil {
  log.Printf("Couldn't get log streams for log group %v. Here's why: %v\n",
 logGroupName, err)
 } else {
  logStream = output.LogStreams[0]
 }
 return logStream, err
}

// GetLogEvents gets the most recent eventCount events from the specified log
 stream.
func (actor CloudWatchLogsActions) GetLogEvents(ctx context.Context, functionName
 string, logStreamName string, eventCount int32) (
 []types.OutputLogEvent, error) {
 var events []types.OutputLogEvent
 logGroupName := fmt.Sprintf("/aws/lambda/%s", functionName)
 output, err := actor.CwlClient.GetLogEvents(ctx, &cloudwatchlogs.GetLogEventsInput{
  LogStreamName: aws.String(logStreamName),
  Limit:         aws.Int32(eventCount),
  LogGroupName:  aws.String(logGroupName),
 })
 if err != nil {
  log.Printf("Couldn't get log event for log stream %v. Here's why: %v\n",
 logStreamName, err)
 } else {
  events = output.Events
 }
 return events, err
```

```
}
```

建立包裝 CloudFormation 動作的結構。

```
import (
 "context"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/cloudformation"
)

// StackOutputs defines a map of outputs from a specific stack.
type StackOutputs map[string]string

type CloudFormationActions struct {
 CfnClient *cloudformation.Client
}

// GetOutputs gets the outputs from a CloudFormation stack and puts them into a
 structured format.
func (actor CloudFormationActions) GetOutputs(ctx context.Context, stackName string)
 StackOutputs {
 output, err := actor.CfnClient.DescribeStacks(ctx,
 &cloudformation.DescribeStacksInput{
  StackName: aws.String(stackName),
 })
 if err != nil || len(output.Stacks) == 0 {
  log.Panicf("Couldn't find a CloudFormation stack named %v. Here's why: %v\n",
 stackName, err)
 }
 stackOutputs := StackOutputs{}
 for _, out := range output.Stacks[0].Outputs {
  stackOutputs[*out.OutputKey] = *out.OutputValue
 }
 return stackOutputs
}
```

清除資源。

```
import (
 "context"
 "log"
 "user_pools_and_lambda_triggers/actions"

 "github.com/awsdocs/aws-doc-sdk-examples/gov2/demotools"
)

// Resources keeps track of AWS resources created during an example and handles
// cleanup when the example finishes.
type Resources struct {
 userPoolId       string
 userAccessTokens []string
 triggers         []actions.Trigger

 cognitoActor *actions.CognitoActions
 questioner   demotools.IQuestioner
}

func (resources *Resources) init(cognitoActor *actions.CognitoActions, questioner
 demotools.IQuestioner) {
 resources.userAccessTokens = []string{}
 resources.triggers = []actions.Trigger{}
 resources.cognitoActor = cognitoActor
 resources.questioner = questioner
}

// Cleanup deletes all AWS resources created during an example.
func (resources *Resources) Cleanup(ctx context.Context) {
 defer func() {
  if r := recover(); r != nil {
   log.Printf("Something went wrong during cleanup.\n%v\n", r)
   log.Println("Use the AWS Management Console to remove any remaining resources \n"
 +
    "that were created for this scenario.")
  }
 }()

 wantDelete := resources.questioner.AskBool("Do you want to remove all of the AWS
 resources that were created "+
  "during this demo (y/n)?", "y")
```

```
 if wantDelete {
  for _, accessToken := range resources.userAccessTokens {
   err := resources.cognitoActor.DeleteUser(ctx, accessToken)
   if err != nil {
    log.Println("Couldn't delete user during cleanup.")
    panic(err)
   }
   log.Println("Deleted user.")
  }
  triggerList := make([]actions.TriggerInfo, len(resources.triggers))
  for i := 0; i < len(resources.triggers); i++ {
   triggerList[i] = actions.TriggerInfo{Trigger: resources.triggers[i], HandlerArn:
 nil}
  }
  err := resources.cognitoActor.UpdateTriggers(ctx, resources.userPoolId,
 triggerList...)
  if err != nil {
   log.Println("Couldn't update Cognito triggers during cleanup.")
   panic(err)
  }
  log.Println("Removed Cognito triggers from user pool.")
 } else {
  log.Println("Be sure to remove resources when you're done with them to avoid
 unexpected charges!")
 }
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的下列主題。
  - AdminCreateUser
  - AdminSetUserPassword
  - DeleteUser
  - InitiateAuth
  - UpdateUserPool

# 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。

SDK for Go V2

> **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 Go 連線至 Lambda 函數中的 Amazon RDS 資料庫。

```
/*
Golang v2 code here.
*/

package main

import (
 "context"
 "database/sql"
 "encoding/json"
 "fmt"
 "os"

 "github.com/aws/aws-lambda-go/lambda"
 "github.com/aws/aws-sdk-go-v2/config"
 "github.com/aws/aws-sdk-go-v2/feature/rds/auth"
 _ "github.com/go-sql-driver/mysql"
)

type MyEvent struct {
 Name string `json:"name"`
}

func HandleRequest(event *MyEvent) (map[string]interface{}, error) {
```

```
var dbName string = os.Getenv("DatabaseName")
var dbUser string = os.Getenv("DatabaseUser")
var dbHost string = os.Getenv("DBHost") // Add hostname without https
var dbPort int = os.Getenv("Port")      // Add port number
var dbEndpoint string = fmt.Sprintf("%s:%d", dbHost, dbPort)
var region string = os.Getenv("AWS_REGION")

cfg, err := config.LoadDefaultConfig(context.TODO())
if err != nil {
 panic("configuration error: " + err.Error())
}

authenticationToken, err := auth.BuildAuthToken(
 context.TODO(), dbEndpoint, region, dbUser, cfg.Credentials)
if err != nil {
 panic("failed to create authentication token: " + err.Error())
}

dsn := fmt.Sprintf("%s:%s@tcp(%s)/%s?tls=true&allowCleartextPasswords=true",
 dbUser, authenticationToken, dbEndpoint, dbName,
)

db, err := sql.Open("mysql", dsn)
if err != nil {
 panic(err)
}

defer db.Close()

var sum int
err = db.QueryRow("SELECT ?+? AS sum", 3, 2).Scan(&sum)
if err != nil {
 panic(err)
}
s := fmt.Sprint(sum)
message := fmt.Sprintf("The selected sum is: %s", s)

messageBytes, err := json.Marshal(message)
if err != nil {
 return nil, err
}

messageString := string(messageBytes)
return map[string]interface{}{
```

```
  "statusCode": 200,
  "headers":    map[string]string{"Content-Type": "application/json"},
  "body":       messageString,
 }, nil
}

func main() {
 lambda.Start(HandleRequest)
}
```

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。

SDK for Go V2

> **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 Go 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
package main

import (
 "context"
 "log"

 "github.com/aws/aws-lambda-go/events"
 "github.com/aws/aws-lambda-go/lambda"
)

func handler(ctx context.Context, kinesisEvent events.KinesisEvent) error {
 if len(kinesisEvent.Records) == 0 {
  log.Printf("empty Kinesis event received")
  return nil
```

```
 }

 for _, record := range kinesisEvent.Records {
  log.Printf("processed Kinesis event with EventId: %v", record.EventID)
  recordDataBytes := record.Kinesis.Data
  recordDataText := string(recordDataBytes)
  log.Printf("record data: %v", recordDataText)
  // TODO: Do interesting work based on the new data
 }
 log.Printf("successfully processed %v records", len(kinesisEvent.Records))
 return nil
}

func main() {
 lambda.Start(handler)
}
```

### 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。

SDK for Go V2

> **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 Go 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
package main

import (
 "context"
 "github.com/aws/aws-lambda-go/lambda"
 "github.com/aws/aws-lambda-go/events"
 "fmt"
```

```
)

func HandleRequest(ctx context.Context, event events.DynamoDBEvent) (*string, error)
 {
 if len(event.Records) == 0 {
  return nil, fmt.Errorf("received empty event")
 }

 for _, record := range event.Records {
   LogDynamoDBRecord(record)
 }

 message := fmt.Sprintf("Records processed: %d", len(event.Records))
 return &message, nil
}

func main() {
 lambda.Start(HandleRequest)
}

func LogDynamoDBRecord(record events.DynamoDBEventRecord){
 fmt.Println(record.EventID)
 fmt.Println(record.EventName)
 fmt.Printf("%+v\n", record.Change)
}
```

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。

SDK for Go V2

> **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 Go 搭配 Lambda 使用 Amazon DocumentDB 事件。

```
package main

import (
 "context"
 "encoding/json"
 "fmt"

 "github.com/aws/aws-lambda-go/lambda"
)

type Event struct {
 Events []Record `json:"events"`
}

type Record struct {
 Event struct {
  OperationType string `json:"operationType"`
  NS            struct {
   DB   string `json:"db"`
   Coll string `json:"coll"`
  } `json:"ns"`
  FullDocument interface{} `json:"fullDocument"`
 } `json:"event"`
}

func main() {
 lambda.Start(handler)
}

func handler(ctx context.Context, event Event) (string, error) {
 fmt.Println("Loading function")
 for _, record := range event.Events {
  logDocumentDBEvent(record)
 }

 return "OK", nil
}

func logDocumentDBEvent(record Record) {
 fmt.Printf("Operation type: %s\n", record.Event.OperationType)
 fmt.Printf("db: %s\n", record.Event.NS.DB)
 fmt.Printf("collection: %s\n", record.Event.NS.Coll)
 docBytes, _ := json.MarshalIndent(record.Event.FullDocument, "", "  ")
 fmt.Printf("Full document: %s\n", string(docBytes))
```

```
}
```

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。

SDK for Go V2

> **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 Go 搭配 Lambda 來取用 Amazon MSK 事件。

```
package main

import (
 "encoding/base64"
 "fmt"

 "github.com/aws/aws-lambda-go/events"
 "github.com/aws/aws-lambda-go/lambda"
)

func handler(event events.KafkaEvent) {
 for key, records := range event.Records {
  fmt.Println("Key:", key)

  for _, record := range records {
   fmt.Println("Record:", record)

   decodedValue, _ := base64.StdEncoding.DecodeString(record.Value)
   message := string(decodedValue)
   fmt.Println("Message:", message)
  }
 }
}
```

```
func main() {
 lambda.Start(handler)
}
```

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。

SDK for Go V2

> **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 Go 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
package main

import (
 "context"
 "log"

 "github.com/aws/aws-lambda-go/events"
 "github.com/aws/aws-lambda-go/lambda"
 "github.com/aws/aws-sdk-go-v2/config"
 "github.com/aws/aws-sdk-go-v2/service/s3"
)

func handler(ctx context.Context, s3Event events.S3Event) error {
 sdkConfig, err := config.LoadDefaultConfig(ctx)
 if err != nil {
  log.Printf("failed to load default config: %s", err)
  return err
 }
```

```
 s3Client := s3.NewFromConfig(sdkConfig)

 for _, record := range s3Event.Records {
  bucket := record.S3.Bucket.Name
  key := record.S3.Object.URLDecodedKey
  headOutput, err := s3Client.HeadObject(ctx, &s3.HeadObjectInput{
   Bucket: &bucket,
   Key:    &key,
  })
  if err != nil {
   log.Printf("error getting head of object %s/%s: %s", bucket, key, err)
   return err
  }
  log.Printf("successfully retrieved %s/%s of type %s", bucket, key,
 *headOutput.ContentType)
 }

 return nil
}

func main() {
 lambda.Start(handler)
}
```

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。

SDK for Go V2

> **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 Go 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
```

```
package main

import (
 "context"
 "fmt"

 "github.com/aws/aws-lambda-go/events"
 "github.com/aws/aws-lambda-go/lambda"
)

func handler(ctx context.Context, snsEvent events.SNSEvent) {
 for _, record := range snsEvent.Records {
  processMessage(record)
 }
 fmt.Println("done")
}

func processMessage(record events.SNSEventRecord) {
 message := record.SNS.Message
 fmt.Printf("Processed message: %s\n", message)
 // TODO: Process your record here
}

func main() {
 lambda.Start(handler)
}
```

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。

SDK for Go V2

> **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 Go 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
package integration_sqs_to_lambda

import (
 "fmt"
 "github.com/aws/aws-lambda-go/events"
 "github.com/aws/aws-lambda-go/lambda"
)

func handler(event events.SQSEvent) error {
 for _, record := range event.Records {
  err := processMessage(record)
  if err != nil {
   return err
  }
 }
 fmt.Println("done")
 return nil
}

func processMessage(record events.SQSMessage) error {
 fmt.Printf("Processed message %s\n", record.Body)
 // TODO: Do interesting work based on the new message
 return nil
}

func main() {
 lambda.Start(handler)
}
```

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。

SDK for Go V2

> **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 Go 搭配 Lambda 來報告 Kinesis 批次項目失敗。

```
// Copyright Amazon.com, Inc. or its affiliates. All Rights Reserved.
// SPDX-License-Identifier: Apache-2.0
package main

import (
 "context"
 "fmt"
 "github.com/aws/aws-lambda-go/events"
 "github.com/aws/aws-lambda-go/lambda"
)

func handler(ctx context.Context, kinesisEvent events.KinesisEvent)
 (map[string]interface{}, error) {
 batchItemFailures := []map[string]interface{}{}

 for _, record := range kinesisEvent.Records {
  curRecordSequenceNumber := ""

  // Process your record
  if /* Your record processing condition here */ {
   curRecordSequenceNumber = record.Kinesis.SequenceNumber
  }

  // Add a condition to check if the record processing failed
  if curRecordSequenceNumber != "" {
   batchItemFailures = append(batchItemFailures, map[string]interface{}
{"itemIdentifier": curRecordSequenceNumber})
  }
 }

 kinesisBatchResponse := map[string]interface{}{
  "batchItemFailures": batchItemFailures,
 }
```

```
 return kinesisBatchResponse, nil
}

func main() {
 lambda.Start(handler)
}
```

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。

SDK for Go V2

> **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 Go 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
package main

import (
 "context"
 "github.com/aws/aws-lambda-go/events"
 "github.com/aws/aws-lambda-go/lambda"
)

type BatchItemFailure struct {
 ItemIdentifier string `json:"ItemIdentifier"`
}

type BatchResult struct {
 BatchItemFailures []BatchItemFailure `json:"BatchItemFailures"`
}
```

```
func HandleRequest(ctx context.Context, event events.DynamoDBEvent) (*BatchResult,
 error) {
 var batchItemFailures []BatchItemFailure
 curRecordSequenceNumber := ""

 for _, record := range event.Records {
  // Process your record
  curRecordSequenceNumber = record.Change.SequenceNumber
 }

 if curRecordSequenceNumber != "" {
  batchItemFailures = append(batchItemFailures, BatchItemFailure{ItemIdentifier:
 curRecordSequenceNumber})
 }

 batchResult := BatchResult{
  BatchItemFailures: batchItemFailures,
 }

 return &batchResult, nil
}

func main() {
 lambda.Start(HandleRequest)
}
```

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。

SDK for Go V2

> **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 Go 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
package main

import (
 "context"
 "fmt"
 "github.com/aws/aws-lambda-go/events"
 "github.com/aws/aws-lambda-go/lambda"
)

func handler(ctx context.Context, sqsEvent events.SQSEvent) (map[string]interface{},
 error) {
 batchItemFailures := []map[string]interface{}{}

 for _, message := range sqsEvent.Records {
  if len(message.Body) > 0 {
   // Your message processing condition here
   fmt.Printf("Successfully processed message: %s\n", message.Body)
  } else {
   // Message processing failed
   fmt.Printf("Failed to process message %s\n", message.MessageId)
   batchItemFailures = append(batchItemFailures, map[string]interface{}
{"itemIdentifier": message.MessageId})
  }
 }

 sqsBatchResponse := map[string]interface{}{
  "batchItemFailures": batchItemFailures,
 }
 return sqsBatchResponse, nil
}

func main() {
 lambda.Start(handler)
}
```

## 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

SDK for Go V2

示範如何使用 Go 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

# 使用適用於 Go V2 的 SDK 的 Amazon MSK 範例

下列程式碼範例示範如何使用 適用於 Go 的 AWS SDK V2 搭配 Amazon MSK 來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。

SDK for Go V2

> **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 Go 搭配 Lambda 來取用 Amazon MSK 事件。

```
package main

import (
 "encoding/base64"
 "fmt"

 "github.com/aws/aws-lambda-go/events"
 "github.com/aws/aws-lambda-go/lambda"
)

func handler(event events.KafkaEvent) {
 for key, records := range event.Records {
  fmt.Println("Key:", key)

  for _, record := range records {
   fmt.Println("Record:", record)

   decodedValue, _ := base64.StdEncoding.DecodeString(record.Value)
   message := string(decodedValue)
   fmt.Println("Message:", message)
  }
 }
}

func main() {
 lambda.Start(handler)
}
```

# 使用適用於 Go V2 的 SDK 的 Partner Central 範例

下列程式碼範例示範如何使用 適用於 Go 的 AWS SDK V2 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

### `GetOpportunity`

以下程式碼範例顯示如何使用 `GetOpportunity`。

SDK for Go V2

取得機會。

```
package main

import (
 "context"
 "encoding/json"
 "fmt"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/config"
 "github.com/aws/aws-sdk-go-v2/service/partnercentralselling"
)

func main() {
 config, err := config.LoadDefaultConfig(context.TODO())

 if err != nil {
```

```
 log.Fatal(err)
}

config.Region = "us-east-1"

client := partnercentralselling.NewFromConfig(config)

output, err := client.GetOpportunity(context.TODO(),
&partnercentralselling.GetOpportunityInput{
 Identifier: aws.String("O1111111"),
 Catalog:    aws.String("AWS"),
})

if err != nil {
 log.Fatal(err)
}
log.Println("printing opportuniy...\n")

jsonOutput, err := json.MarshalIndent(output, "", "    ")

fmt.Println(string(jsonOutput))
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的 GetOpportunity。

### `ListOpportunities`

以下程式碼範例顯示如何使用 `ListOpportunities`。

SDK for Go V2

列出機會。

```
package main

import (
 "context"
 "encoding/json"
 "fmt"
 "log"
```

```
 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/config"
 "github.com/aws/aws-sdk-go-v2/service/partnercentralselling"
)

func main() {
 config, err := config.LoadDefaultConfig(context.TODO())

 if err != nil {
  log.Fatal(err)
 }

 config.Region = "us-east-1"

 client := partnercentralselling.NewFromConfig(config)

 output, err := client.ListOpportunities(context.TODO(),
 &partnercentralselling.ListOpportunitiesInput{
  MaxResults: aws.Int32(2),
  Catalog:    aws.String("AWS"),
 })

 if err != nil {
  log.Fatal(err)
 }

 jsonOutput, err := json.MarshalIndent(output, "", "    ")
 fmt.Println(string(jsonOutput))
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的 ListOpportunities。

# 使用適用於 Go V2 的 SDK 的 Amazon RDS 範例

下列程式碼範例示範如何使用 適用於 Go 的 AWS SDK V2 搭配 Amazon RDS 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
- 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。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
package main

import (
 "context"
 "fmt"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/config"
 "github.com/aws/aws-sdk-go-v2/service/rds"
)

// main uses the AWS SDK for Go V2 to create an Amazon Relational Database Service
 (Amazon RDS)
// client and list up to 20 DB instances in your account.
// This example uses the default settings specified in your shared credentials
// and config files.
func main() {
```

```
 ctx := context.Background()
 sdkConfig, err := config.LoadDefaultConfig(ctx)
 if err != nil {
  fmt.Println("Couldn't load default configuration. Have you set up your AWS
 account?")
  fmt.Println(err)
  return
 }
 rdsClient := rds.NewFromConfig(sdkConfig)
 const maxInstances = 20
 fmt.Printf("Let's list up to %v DB instances.\n", maxInstances)
 output, err := rdsClient.DescribeDBInstances(ctx,
  &rds.DescribeDBInstancesInput{MaxRecords: aws.Int32(maxInstances)})
 if err != nil {
  fmt.Printf("Couldn't list DB instances: %v\n", err)
  return
 }
 if len(output.DBInstances) == 0 {
  fmt.Println("No DB instances found.")
 } else {
  for _, instance := range output.DBInstances {
   fmt.Printf("DB instance %v has database %v.\n", *instance.DBInstanceIdentifier,
    *instance.DBName)
  }
 }
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 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。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，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。

```
import (
 "context"
 "fmt"
 "log"
 "sort"
 "strconv"
 "strings"
 "time"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/rds"
 "github.com/aws/aws-sdk-go-v2/service/rds/types"
 "github.com/awsdocs/aws-doc-sdk-examples/gov2/demotools"
 "github.com/awsdocs/aws-doc-sdk-examples/gov2/rds/actions"
 "github.com/google/uuid"
)

// GetStartedInstances is an interactive example that shows you how to use the AWS
 SDK for Go
// with Amazon Relation Database Service (Amazon RDS) to do the following:
//
//  1. Create a custom DB parameter group and set parameter values.
//  2. Create a DB instance that is configured to use the parameter group. The DB
 instance
//     also contains a database.
//  3. Take a snapshot of the DB instance.
//  4. Delete the DB instance and parameter group.
type GetStartedInstances struct {
 sdkConfig  aws.Config
 instances  actions.DbInstances
 questioner demotools.IQuestioner
 helper     IScenarioHelper
```

```
 isTestRun  bool
}

// NewGetStartedInstances constructs a GetStartedInstances instance from a
 configuration.
// It uses the specified config to get an Amazon RDS
// client and create wrappers for the actions used in the scenario.
func NewGetStartedInstances(sdkConfig aws.Config, questioner demotools.IQuestioner,
 helper IScenarioHelper) GetStartedInstances {
 rdsClient := rds.NewFromConfig(sdkConfig)
 return GetStartedInstances{
  sdkConfig:  sdkConfig,
  instances:  actions.DbInstances{RdsClient: rdsClient},
  questioner: questioner,
  helper:     helper,
 }
}

// Run runs the interactive scenario.
func (scenario GetStartedInstances) Run(ctx context.Context, dbEngine string,
 parameterGroupName string,
 instanceName string, dbName string) {
 defer func() {
  if r := recover(); r != nil {
   log.Println("Something went wrong with the demo.")
  }
 }()

 log.Println(strings.Repeat("-", 88))
 log.Println("Welcome to the Amazon Relational Database Service (Amazon RDS) DB
 Instance demo.")
 log.Println(strings.Repeat("-", 88))

 parameterGroup := scenario.CreateParameterGroup(ctx, dbEngine, parameterGroupName)
 scenario.SetUserParameters(ctx, parameterGroupName)
 instance := scenario.CreateInstance(ctx, instanceName, dbEngine, dbName,
 parameterGroup)
 scenario.DisplayConnection(instance)
 scenario.CreateSnapshot(ctx, instance)
 scenario.Cleanup(ctx, instance, parameterGroup)

 log.Println(strings.Repeat("-", 88))
 log.Println("Thanks for watching!")
 log.Println(strings.Repeat("-", 88))
```

```
}

// CreateParameterGroup shows how to get available engine versions for a specified
// database engine and create a DB parameter group that is compatible with a
// selected engine family.
func (scenario GetStartedInstances) CreateParameterGroup(ctx context.Context,
 dbEngine string,
 parameterGroupName string) *types.DBParameterGroup {

 log.Printf("Checking for an existing DB parameter group named %v.\n",
  parameterGroupName)
 parameterGroup, err := scenario.instances.GetParameterGroup(ctx,
 parameterGroupName)
 if err != nil {
  panic(err)
 }
 if parameterGroup == nil {
  log.Printf("Getting available database engine versions for %v.\n", dbEngine)
  engineVersions, err := scenario.instances.GetEngineVersions(ctx, dbEngine, "")
  if err != nil {
   panic(err)
  }

  familySet := map[string]struct{}{}
  for _, family := range engineVersions {
   familySet[*family.DBParameterGroupFamily] = struct{}{}
  }
  var families []string
  for family := range familySet {
   families = append(families, family)
  }
  sort.Strings(families)
  familyIndex := scenario.questioner.AskChoice("Which family do you want to use?\n",
 families)
  log.Println("Creating a DB parameter group.")
  _, err = scenario.instances.CreateParameterGroup(
   ctx, parameterGroupName, families[familyIndex], "Example parameter group.")
  if err != nil {
   panic(err)
  }
  parameterGroup, err = scenario.instances.GetParameterGroup(ctx,
 parameterGroupName)
  if err != nil {
   panic(err)
```

```
  }
 }
 log.Printf("Parameter group %v:\n", *parameterGroup.DBParameterGroupFamily)
 log.Printf("\tName: %v\n", *parameterGroup.DBParameterGroupName)
 log.Printf("\tARN: %v\n", *parameterGroup.DBParameterGroupArn)
 log.Printf("\tFamily: %v\n", *parameterGroup.DBParameterGroupFamily)
 log.Printf("\tDescription: %v\n", *parameterGroup.Description)
 log.Println(strings.Repeat("-", 88))
 return parameterGroup
}

// SetUserParameters shows how to get the parameters contained in a custom parameter
// group and update some of the parameter values in the group.
func (scenario GetStartedInstances) SetUserParameters(ctx context.Context,
 parameterGroupName string) {
 log.Println("Let's set some parameter values in your parameter group.")
 dbParameters, err := scenario.instances.GetParameters(ctx, parameterGroupName, "")
 if err != nil {
  panic(err)
 }
 var updateParams []types.Parameter
 for _, dbParam := range dbParameters {
  if strings.HasPrefix(*dbParam.ParameterName, "auto_increment") &&
   *dbParam.IsModifiable && *dbParam.DataType == "integer" {
   log.Printf("The %v parameter is described as:\n\t%v",
    *dbParam.ParameterName, *dbParam.Description)
   rangeSplit := strings.Split(*dbParam.AllowedValues, "-")
   lower, _ := strconv.Atoi(rangeSplit[0])
   upper, _ := strconv.Atoi(rangeSplit[1])
   newValue := scenario.questioner.AskInt(
    fmt.Sprintf("Enter a value between %v and %v:", lower, upper),
    demotools.InIntRange{Lower: lower, Upper: upper})
   dbParam.ParameterValue = aws.String(strconv.Itoa(newValue))
   updateParams = append(updateParams, dbParam)
  }
 }
 err = scenario.instances.UpdateParameters(ctx, parameterGroupName, updateParams)
 if err != nil {
  panic(err)
 }
 log.Println("To get a list of parameters that you set previously, specify a source
 of 'user'.")
 userParameters, err := scenario.instances.GetParameters(ctx, parameterGroupName,
 "user")
```

```
 if err != nil {
  panic(err)
 }
 log.Println("Here are the parameters you set:")
 for _, param := range userParameters {
  log.Printf("\t%v: %v\n", *param.ParameterName, *param.ParameterValue)
 }
 log.Println(strings.Repeat("-", 88))
}

// CreateInstance shows how to create a DB instance that contains a database of a
// specified type. The database is also configured to use a custom DB parameter
 group.
func (scenario GetStartedInstances) CreateInstance(ctx context.Context, instanceName
 string, dbEngine string,
 dbName string, parameterGroup *types.DBParameterGroup) *types.DBInstance {

 log.Println("Checking for an existing DB instance.")
 instance, err := scenario.instances.GetInstance(ctx, instanceName)
 if err != nil {
  panic(err)
 }
 if instance == nil {
  adminUsername := scenario.questioner.Ask(
   "Enter an administrator username for the database: ", demotools.NotEmpty{})
  adminPassword := scenario.questioner.AskPassword(
   "Enter a password for the administrator (at least 8 characters): ", 7)
  engineVersions, err := scenario.instances.GetEngineVersions(ctx, dbEngine,
   *parameterGroup.DBParameterGroupFamily)
  if err != nil {
   panic(err)
  }
  var engineChoices []string
  for _, engine := range engineVersions {
   engineChoices = append(engineChoices, *engine.EngineVersion)
  }
  engineIndex := scenario.questioner.AskChoice(
   "The available engines for your parameter group are:\n", engineChoices)
  engineSelection := engineVersions[engineIndex]
  instOpts, err := scenario.instances.GetOrderableInstances(ctx,
 *engineSelection.Engine,
   *engineSelection.EngineVersion)
  if err != nil {
   panic(err)
```

```
 }
 optSet := map[string]struct{}{}
 for _, opt := range instOpts {
  if strings.Contains(*opt.DBInstanceClass, "micro") {
   optSet[*opt.DBInstanceClass] = struct{}{}
  }
 }
 var optChoices []string
 for opt := range optSet {
  optChoices = append(optChoices, opt)
 }
 sort.Strings(optChoices)
 optIndex := scenario.questioner.AskChoice(
  "The available micro DB instance classes for your database engine are:\n",
optChoices)
 storageType := "standard"
 allocatedStorage := int32(5)
 log.Printf("Creating a DB instance named %v and database %v.\n"+
  "The DB instance is configured to use your custom parameter group %v,\n"+
  "selected engine %v,\n"+
  "selected DB instance class %v,"+
  "and %v GiB of %v storage.\n"+
  "This typically takes several minutes.",
  instanceName, dbName, *parameterGroup.DBParameterGroupName,
*engineSelection.EngineVersion,
  optChoices[optIndex], allocatedStorage, storageType)
 instance, err = scenario.instances.CreateInstance(
  ctx, instanceName, dbName, *engineSelection.Engine,
*engineSelection.EngineVersion,
  *parameterGroup.DBParameterGroupName, optChoices[optIndex], storageType,
  allocatedStorage, adminUsername, adminPassword)
 if err != nil {
  panic(err)
 }
 for *instance.DBInstanceStatus != "available" {
  scenario.helper.Pause(30)
  instance, err = scenario.instances.GetInstance(ctx, instanceName)
  if err != nil {
   panic(err)
  }
 }
 log.Println("Instance created and available.")
}
log.Println("Instance data:")
```

```
 log.Printf("\tDBInstanceIdentifier: %v\n", *instance.DBInstanceIdentifier)
 log.Printf("\tARN: %v\n", *instance.DBInstanceArn)
 log.Printf("\tStatus: %v\n", *instance.DBInstanceStatus)
 log.Printf("\tEngine: %v\n", *instance.Engine)
 log.Printf("\tEngine version: %v\n", *instance.EngineVersion)
 log.Println(strings.Repeat("-", 88))
 return instance
}

// DisplayConnection displays connection information about a DB instance and tips
// on how to connect to it.
func (scenario GetStartedInstances) DisplayConnection(instance *types.DBInstance) {
 log.Println(
  "You can now connect to your database by using your favorite MySQL client.\n" +
   "One way to connect is by using the 'mysql' shell on an Amazon EC2 instance\n" +
   "that is running in the same VPC as your DB instance. Pass the endpoint,\n" +
   "port, and administrator username to 'mysql'. Then, enter your password\n" +
   "when prompted:")
 log.Printf("\n\tmysql -h %v -P %v -u %v -p\n",
  *instance.Endpoint.Address, instance.Endpoint.Port, *instance.MasterUsername)
 log.Println("For more information, see the User Guide for RDS:\n" +
  "\thttps://docs.aws.amazon.com/AmazonRDS/latest/UserGuide/
CHAP_GettingStarted.CreatingConnecting.MySQL.html#CHAP_GettingStarted.Connecting.MySQL")
 log.Println(strings.Repeat("-", 88))
}

// CreateSnapshot shows how to create a DB instance snapshot and wait until it's
 available.
func (scenario GetStartedInstances) CreateSnapshot(ctx context.Context, instance
 *types.DBInstance) {
 if scenario.questioner.AskBool(
  "Do you want to create a snapshot of your DB instance (y/n)? ", "y") {
  snapshotId := fmt.Sprintf("%v-%v", *instance.DBInstanceIdentifier,
 scenario.helper.UniqueId())
  log.Printf("Creating a snapshot named %v. This typically takes a few minutes.\n",
 snapshotId)
  snapshot, err := scenario.instances.CreateSnapshot(ctx,
 *instance.DBInstanceIdentifier, snapshotId)
  if err != nil {
   panic(err)
  }
  for *snapshot.Status != "available" {
   scenario.helper.Pause(30)
   snapshot, err = scenario.instances.GetSnapshot(ctx, snapshotId)
```

```
   if err != nil {
    panic(err)
   }
  }
  log.Println("Snapshot data:")
  log.Printf("\tDBSnapshotIdentifier: %v\n", *snapshot.DBSnapshotIdentifier)
  log.Printf("\tARN: %v\n", *snapshot.DBSnapshotArn)
  log.Printf("\tStatus: %v\n", *snapshot.Status)
  log.Printf("\tEngine: %v\n", *snapshot.Engine)
  log.Printf("\tEngine version: %v\n", *snapshot.EngineVersion)
  log.Printf("\tDBInstanceIdentifier: %v\n", *snapshot.DBInstanceIdentifier)
  log.Printf("\tSnapshotCreateTime: %v\n", *snapshot.SnapshotCreateTime)
  log.Println(strings.Repeat("-", 88))
 }
}

// Cleanup shows how to clean up a DB instance and DB parameter group.
// Before the DB parameter group can be deleted, all associated DB instances must
 first be deleted.
func (scenario GetStartedInstances) Cleanup(
 ctx context.Context, instance *types.DBInstance, parameterGroup
 *types.DBParameterGroup) {

 if scenario.questioner.AskBool(
  "\nDo you want to delete the database instance and parameter group (y/n)? ", "y")
 {
  log.Printf("Deleting database instance %v.\n", *instance.DBInstanceIdentifier)
  err := scenario.instances.DeleteInstance(ctx, *instance.DBInstanceIdentifier)
  if err != nil {
   panic(err)
  }
  log.Println(
   "Waiting for the DB instance to delete. This typically takes several minutes.")
  for instance != nil {
   scenario.helper.Pause(30)
   instance, err = scenario.instances.GetInstance(ctx,
 *instance.DBInstanceIdentifier)
   if err != nil {
    panic(err)
   }
  }
  log.Printf("Deleting parameter group %v.", *parameterGroup.DBParameterGroupName)
  err = scenario.instances.DeleteParameterGroup(ctx,
 *parameterGroup.DBParameterGroupName)
```

```
  if err != nil {
   panic(err)
  }
 }
}

// IScenarioHelper abstracts the function from a scenario so that it
// can be mocked for unit testing.
type IScenarioHelper interface {
 Pause(secs int)
 UniqueId() string
}
type ScenarioHelper struct{}

// Pause waits for the specified number of seconds.
func (helper ScenarioHelper) Pause(secs int) {
 time.Sleep(time.Duration(secs) * time.Second)
}

// UniqueId returns a new UUID.
func (helper ScenarioHelper) UniqueId() string {
 return uuid.New().String()
}
```

定義案例所呼叫的函數以管理 Amazon RDS 動作。

```
import (
 "context"
 "errors"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/rds"
 "github.com/aws/aws-sdk-go-v2/service/rds/types"
)

type DbInstances struct {
 RdsClient *rds.Client
}
```

```
// GetParameterGroup gets a DB parameter group by name.
func (instances *DbInstances) GetParameterGroup(ctx context.Context,
 parameterGroupName string) (
 *types.DBParameterGroup, error) {
 output, err := instances.RdsClient.DescribeDBParameterGroups(
  ctx, &rds.DescribeDBParameterGroupsInput{
   DBParameterGroupName: aws.String(parameterGroupName),
  })
 if err != nil {
  var notFoundError *types.DBParameterGroupNotFoundFault
  if errors.As(err, &notFoundError) {
   log.Printf("Parameter group %v does not exist.\n", parameterGroupName)
   err = nil
  } else {
   log.Printf("Error getting parameter group %v: %v\n", parameterGroupName, err)
  }
  return nil, err
 } else {
  return &output.DBParameterGroups[0], err
 }
}



// CreateParameterGroup creates a DB parameter group that is based on the specified
// parameter group family.
func (instances *DbInstances) CreateParameterGroup(
 ctx context.Context, parameterGroupName string, parameterGroupFamily string,
 description string) (
 *types.DBParameterGroup, error) {

 output, err := instances.RdsClient.CreateDBParameterGroup(ctx,
  &rds.CreateDBParameterGroupInput{
   DBParameterGroupName:   aws.String(parameterGroupName),
   DBParameterGroupFamily: aws.String(parameterGroupFamily),
   Description:            aws.String(description),
  })
 if err != nil {
  log.Printf("Couldn't create parameter group %v: %v\n", parameterGroupName, err)
  return nil, err
 } else {
  return output.DBParameterGroup, err
 }
```

```
}



// DeleteParameterGroup deletes the named DB parameter group.
func (instances *DbInstances) DeleteParameterGroup(ctx context.Context,
 parameterGroupName string) error {
 _, err := instances.RdsClient.DeleteDBParameterGroup(ctx,
  &rds.DeleteDBParameterGroupInput{
   DBParameterGroupName: aws.String(parameterGroupName),
  })
 if err != nil {
  log.Printf("Couldn't delete parameter group %v: %v\n", parameterGroupName, err)
  return err
 } else {
  return nil
 }
}



// GetParameters gets the parameters that are contained in a DB parameter group.
func (instances *DbInstances) GetParameters(ctx context.Context, parameterGroupName
 string, source string) (
 []types.Parameter, error) {

 var output *rds.DescribeDBParametersOutput
 var params []types.Parameter
 var err error
 parameterPaginator := rds.NewDescribeDBParametersPaginator(instances.RdsClient,
  &rds.DescribeDBParametersInput{
   DBParameterGroupName: aws.String(parameterGroupName),
   Source:               aws.String(source),
  })
 for parameterPaginator.HasMorePages() {
  output, err = parameterPaginator.NextPage(ctx)
  if err != nil {
   log.Printf("Couldn't get parameters for %v: %v\n", parameterGroupName, err)
   break
  } else {
   params = append(params, output.Parameters...)
  }
 }
 return params, err
```

```
}



// UpdateParameters updates parameters in a named DB parameter group.
func (instances *DbInstances) UpdateParameters(ctx context.Context,
 parameterGroupName string, params []types.Parameter) error {
 _, err := instances.RdsClient.ModifyDBParameterGroup(ctx,
  &rds.ModifyDBParameterGroupInput{
   DBParameterGroupName: aws.String(parameterGroupName),
   Parameters:           params,
  })
 if err != nil {
  log.Printf("Couldn't update parameters in %v: %v\n", parameterGroupName, err)
  return err
 } else {
  return nil
 }
}



// CreateSnapshot creates a snapshot of a DB instance.
func (instances *DbInstances) CreateSnapshot(ctx context.Context, instanceName
 string, snapshotName string) (
 *types.DBSnapshot, error) {
 output, err := instances.RdsClient.CreateDBSnapshot(ctx,
 &rds.CreateDBSnapshotInput{
  DBInstanceIdentifier: aws.String(instanceName),
  DBSnapshotIdentifier: aws.String(snapshotName),
 })
 if err != nil {
  log.Printf("Couldn't create snapshot %v: %v\n", snapshotName, err)
  return nil, err
 } else {
  return output.DBSnapshot, nil
 }
}



// GetSnapshot gets a DB instance snapshot.
func (instances *DbInstances) GetSnapshot(ctx context.Context, snapshotName string)
 (*types.DBSnapshot, error) {
```

```
 output, err := instances.RdsClient.DescribeDBSnapshots(ctx,
  &rds.DescribeDBSnapshotsInput{
   DBSnapshotIdentifier: aws.String(snapshotName),
  })
 if err != nil {
  log.Printf("Couldn't get snapshot %v: %v\n", snapshotName, err)
  return nil, err
 } else {
  return &output.DBSnapshots[0], nil
 }
}



// CreateInstance creates a DB instance.
func (instances *DbInstances) CreateInstance(ctx context.Context, instanceName
 string, dbName string,
 dbEngine string, dbEngineVersion string, parameterGroupName string, dbInstanceClass
 string,
 storageType string, allocatedStorage int32, adminName string, adminPassword string)
 (
 *types.DBInstance, error) {
 output, err := instances.RdsClient.CreateDBInstance(ctx,
 &rds.CreateDBInstanceInput{
  DBInstanceIdentifier: aws.String(instanceName),
  DBName:               aws.String(dbName),
  DBParameterGroupName: aws.String(parameterGroupName),
  Engine:               aws.String(dbEngine),
  EngineVersion:        aws.String(dbEngineVersion),
  DBInstanceClass:      aws.String(dbInstanceClass),
  StorageType:          aws.String(storageType),
  AllocatedStorage:     aws.Int32(allocatedStorage),
  MasterUsername:       aws.String(adminName),
  MasterUserPassword:   aws.String(adminPassword),
 })
 if err != nil {
  log.Printf("Couldn't create instance %v: %v\n", instanceName, err)
  return nil, err
 } else {
  return output.DBInstance, nil
 }
}
```

```
// GetInstance gets data about a DB instance.
func (instances *DbInstances) GetInstance(ctx context.Context, instanceName string)
 (
 *types.DBInstance, error) {
 output, err := instances.RdsClient.DescribeDBInstances(ctx,
  &rds.DescribeDBInstancesInput{
   DBInstanceIdentifier: aws.String(instanceName),
  })
 if err != nil {
  var notFoundError *types.DBInstanceNotFoundFault
  if errors.As(err, &notFoundError) {
   log.Printf("DB instance %v does not exist.\n", instanceName)
   err = nil
  } else {
   log.Printf("Couldn't get instance %v: %v\n", instanceName, err)
  }
  return nil, err
 } else {
  return &output.DBInstances[0], nil
 }
}



// DeleteInstance deletes a DB instance.
func (instances *DbInstances) DeleteInstance(ctx context.Context, instanceName
 string) error {
 _, err := instances.RdsClient.DeleteDBInstance(ctx, &rds.DeleteDBInstanceInput{
  DBInstanceIdentifier:   aws.String(instanceName),
  SkipFinalSnapshot:      aws.Bool(true),
  DeleteAutomatedBackups: aws.Bool(true),
 })
 if err != nil {
  log.Printf("Couldn't delete instance %v: %v\n", instanceName, err)
  return err
 } else {
  return nil
 }
}
```

```
// GetEngineVersions gets database engine versions that are available for the
 specified engine
// and parameter group family.
func (instances *DbInstances) GetEngineVersions(ctx context.Context, engine string,
 parameterGroupFamily string) (
 []types.DBEngineVersion, error) {
 output, err := instances.RdsClient.DescribeDBEngineVersions(ctx,
  &rds.DescribeDBEngineVersionsInput{
   Engine:                 aws.String(engine),
   DBParameterGroupFamily: aws.String(parameterGroupFamily),
  })
 if err != nil {
  log.Printf("Couldn't get engine versions for %v: %v\n", engine, err)
  return nil, err
 } else {
  return output.DBEngineVersions, nil
 }
}



// GetOrderableInstances uses a paginator to get DB instance options that can be
 used to create DB instances that are
// compatible with a set of specifications.
func (instances *DbInstances) GetOrderableInstances(ctx context.Context, engine
 string, engineVersion string) (
 []types.OrderableDBInstanceOption, error) {

 var output *rds.DescribeOrderableDBInstanceOptionsOutput
 var instanceOptions []types.OrderableDBInstanceOption
 var err error
 orderablePaginator :=
 rds.NewDescribeOrderableDBInstanceOptionsPaginator(instances.RdsClient,
  &rds.DescribeOrderableDBInstanceOptionsInput{
   Engine:        aws.String(engine),
   EngineVersion: aws.String(engineVersion),
  })
 for orderablePaginator.HasMorePages() {
  output, err = orderablePaginator.NextPage(ctx)
  if err != nil {
   log.Printf("Couldn't get orderable DB instance options: %v\n", err)
   break
  } else {
   instanceOptions = append(instanceOptions, output.OrderableDBInstanceOptions...)
```

```
  }
 }
 return instanceOptions, err
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 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`。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "context"
 "errors"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/rds"
 "github.com/aws/aws-sdk-go-v2/service/rds/types"
)

type DbInstances struct {
 RdsClient *rds.Client
}



// CreateInstance creates a DB instance.
func (instances *DbInstances) CreateInstance(ctx context.Context, instanceName
 string, dbName string,
 dbEngine string, dbEngineVersion string, parameterGroupName string, dbInstanceClass
 string,
 storageType string, allocatedStorage int32, adminName string, adminPassword string)
 (
 *types.DBInstance, error) {
 output, err := instances.RdsClient.CreateDBInstance(ctx,
 &rds.CreateDBInstanceInput{
  DBInstanceIdentifier: aws.String(instanceName),
  DBName:               aws.String(dbName),
  DBParameterGroupName: aws.String(parameterGroupName),
  Engine:               aws.String(dbEngine),
  EngineVersion:        aws.String(dbEngineVersion),
  DBInstanceClass:      aws.String(dbInstanceClass),
  StorageType:          aws.String(storageType),
  AllocatedStorage:     aws.Int32(allocatedStorage),
  MasterUsername:       aws.String(adminName),
  MasterUserPassword:   aws.String(adminPassword),
 })
 if err != nil {
  log.Printf("Couldn't create instance %v: %v\n", instanceName, err)
  return nil, err
 } else {
  return output.DBInstance, nil
 }
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的 CreateDBInstance。

### `CreateDBParameterGroup`

以下程式碼範例顯示如何使用 `CreateDBParameterGroup`。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "context"
 "errors"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/rds"
 "github.com/aws/aws-sdk-go-v2/service/rds/types"
)

type DbInstances struct {
 RdsClient *rds.Client
}



// CreateParameterGroup creates a DB parameter group that is based on the specified
// parameter group family.
func (instances *DbInstances) CreateParameterGroup(
 ctx context.Context, parameterGroupName string, parameterGroupFamily string,
 description string) (
 *types.DBParameterGroup, error) {
```

```
 output, err := instances.RdsClient.CreateDBParameterGroup(ctx,
  &rds.CreateDBParameterGroupInput{
   DBParameterGroupName:   aws.String(parameterGroupName),
   DBParameterGroupFamily: aws.String(parameterGroupFamily),
   Description:            aws.String(description),
  })
 if err != nil {
  log.Printf("Couldn't create parameter group %v: %v\n", parameterGroupName, err)
  return nil, err
 } else {
  return output.DBParameterGroup, err
 }
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的 CreateDBParameterGroup。

### `CreateDBSnapshot`

以下程式碼範例顯示如何使用 `CreateDBSnapshot`。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "context"
 "errors"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/rds"
 "github.com/aws/aws-sdk-go-v2/service/rds/types"
)
```

```
type DbInstances struct {
 RdsClient *rds.Client
}



// CreateSnapshot creates a snapshot of a DB instance.
func (instances *DbInstances) CreateSnapshot(ctx context.Context, instanceName
 string, snapshotName string) (
 *types.DBSnapshot, error) {
 output, err := instances.RdsClient.CreateDBSnapshot(ctx,
 &rds.CreateDBSnapshotInput{
  DBInstanceIdentifier: aws.String(instanceName),
  DBSnapshotIdentifier: aws.String(snapshotName),
 })
 if err != nil {
  log.Printf("Couldn't create snapshot %v: %v\n", snapshotName, err)
  return nil, err
 } else {
  return output.DBSnapshot, nil
 }
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的 CreateDBSnapshot。

### `DeleteDBInstance`

以下程式碼範例顯示如何使用 `DeleteDBInstance`。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "context"
 "errors"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/rds"
 "github.com/aws/aws-sdk-go-v2/service/rds/types"
)

type DbInstances struct {
 RdsClient *rds.Client
}



// DeleteInstance deletes a DB instance.
func (instances *DbInstances) DeleteInstance(ctx context.Context, instanceName
 string) error {
 _, err := instances.RdsClient.DeleteDBInstance(ctx, &rds.DeleteDBInstanceInput{
  DBInstanceIdentifier:   aws.String(instanceName),
  SkipFinalSnapshot:      aws.Bool(true),
  DeleteAutomatedBackups: aws.Bool(true),
 })
 if err != nil {
  log.Printf("Couldn't delete instance %v: %v\n", instanceName, err)
  return err
 } else {
  return nil
 }
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的 DeleteDBInstance。

### DeleteDBParameterGroup

以下程式碼範例顯示如何使用 DeleteDBParameterGroup。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "context"
 "errors"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/rds"
 "github.com/aws/aws-sdk-go-v2/service/rds/types"
)

type DbInstances struct {
 RdsClient *rds.Client
}



// DeleteParameterGroup deletes the named DB parameter group.
func (instances *DbInstances) DeleteParameterGroup(ctx context.Context,
 parameterGroupName string) error {
 _, err := instances.RdsClient.DeleteDBParameterGroup(ctx,
  &rds.DeleteDBParameterGroupInput{
   DBParameterGroupName: aws.String(parameterGroupName),
  })
 if err != nil {
  log.Printf("Couldn't delete parameter group %v: %v\n", parameterGroupName, err)
  return err
 } else {
  return nil
 }
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的 DeleteDBParameterGroup。

### `DescribeDBEngineVersions`

以下程式碼範例顯示如何使用 `DescribeDBEngineVersions`。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "context"
 "errors"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/rds"
 "github.com/aws/aws-sdk-go-v2/service/rds/types"
)

type DbInstances struct {
 RdsClient *rds.Client
}



// GetEngineVersions gets database engine versions that are available for the
 specified engine
// and parameter group family.
func (instances *DbInstances) GetEngineVersions(ctx context.Context, engine string,
 parameterGroupFamily string) (
 []types.DBEngineVersion, error) {
 output, err := instances.RdsClient.DescribeDBEngineVersions(ctx,
  &rds.DescribeDBEngineVersionsInput{
   Engine:                 aws.String(engine),
   DBParameterGroupFamily: aws.String(parameterGroupFamily),
```

```
  })
 if err != nil {
  log.Printf("Couldn't get engine versions for %v: %v\n", engine, err)
  return nil, err
 } else {
  return output.DBEngineVersions, nil
 }
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的 DescribeDBEngineVersions。

### `DescribeDBInstances`

以下程式碼範例顯示如何使用 `DescribeDBInstances`。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "context"
 "errors"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/rds"
 "github.com/aws/aws-sdk-go-v2/service/rds/types"
)

type DbInstances struct {
 RdsClient *rds.Client
}
```

```
// GetInstance gets data about a DB instance.
func (instances *DbInstances) GetInstance(ctx context.Context, instanceName string)
 (
 *types.DBInstance, error) {
 output, err := instances.RdsClient.DescribeDBInstances(ctx,
  &rds.DescribeDBInstancesInput{
   DBInstanceIdentifier: aws.String(instanceName),
  })
 if err != nil {
  var notFoundError *types.DBInstanceNotFoundFault
  if errors.As(err, &notFoundError) {
   log.Printf("DB instance %v does not exist.\n", instanceName)
   err = nil
  } else {
   log.Printf("Couldn't get instance %v: %v\n", instanceName, err)
  }
  return nil, err
 } else {
  return &output.DBInstances[0], nil
 }
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的 DescribeDBInstances。

### `DescribeDBParameterGroups`

以下程式碼範例顯示如何使用 `DescribeDBParameterGroups`。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "context"
 "errors"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/rds"
 "github.com/aws/aws-sdk-go-v2/service/rds/types"
)

type DbInstances struct {
 RdsClient *rds.Client
}



// GetParameterGroup gets a DB parameter group by name.
func (instances *DbInstances) GetParameterGroup(ctx context.Context,
 parameterGroupName string) (
 *types.DBParameterGroup, error) {
 output, err := instances.RdsClient.DescribeDBParameterGroups(
  ctx, &rds.DescribeDBParameterGroupsInput{
   DBParameterGroupName: aws.String(parameterGroupName),
  })
 if err != nil {
  var notFoundError *types.DBParameterGroupNotFoundFault
  if errors.As(err, &notFoundError) {
   log.Printf("Parameter group %v does not exist.\n", parameterGroupName)
   err = nil
  } else {
   log.Printf("Error getting parameter group %v: %v\n", parameterGroupName, err)
  }
  return nil, err
 } else {
  return &output.DBParameterGroups[0], err
 }
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的 DescribeDBParameterGroups。

### `DescribeDBParameters`

以下程式碼範例顯示如何使用 `DescribeDBParameters`。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "context"
 "errors"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/rds"
 "github.com/aws/aws-sdk-go-v2/service/rds/types"
)

type DbInstances struct {
 RdsClient *rds.Client
}



// GetParameters gets the parameters that are contained in a DB parameter group.
func (instances *DbInstances) GetParameters(ctx context.Context, parameterGroupName
 string, source string) (
 []types.Parameter, error) {

 var output *rds.DescribeDBParametersOutput
 var params []types.Parameter
 var err error
 parameterPaginator := rds.NewDescribeDBParametersPaginator(instances.RdsClient,
  &rds.DescribeDBParametersInput{
   DBParameterGroupName: aws.String(parameterGroupName),
   Source:               aws.String(source),
  })
 for parameterPaginator.HasMorePages() {
```

```
  output, err = parameterPaginator.NextPage(ctx)
  if err != nil {
   log.Printf("Couldn't get parameters for %v: %v\n", parameterGroupName, err)
   break
  } else {
   params = append(params, output.Parameters...)
  }
 }
 return params, err
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的 DescribeDBParameters。

### `DescribeDBSnapshots`

以下程式碼範例顯示如何使用 `DescribeDBSnapshots`。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "context"
 "errors"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/rds"
 "github.com/aws/aws-sdk-go-v2/service/rds/types"
)

type DbInstances struct {
 RdsClient *rds.Client
```

```
}



// GetSnapshot gets a DB instance snapshot.
func (instances *DbInstances) GetSnapshot(ctx context.Context, snapshotName string)
 (*types.DBSnapshot, error) {
 output, err := instances.RdsClient.DescribeDBSnapshots(ctx,
  &rds.DescribeDBSnapshotsInput{
   DBSnapshotIdentifier: aws.String(snapshotName),
  })
 if err != nil {
  log.Printf("Couldn't get snapshot %v: %v\n", snapshotName, err)
  return nil, err
 } else {
  return &output.DBSnapshots[0], nil
 }
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的 DescribeDBSnapshots。

### `DescribeOrderableDBInstanceOptions`

以下程式碼範例顯示如何使用 `DescribeOrderableDBInstanceOptions`。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "context"
 "errors"
 "log"
```

```
 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/rds"
 "github.com/aws/aws-sdk-go-v2/service/rds/types"
)

type DbInstances struct {
 RdsClient *rds.Client
}



// GetOrderableInstances uses a paginator to get DB instance options that can be
 used to create DB instances that are
// compatible with a set of specifications.
func (instances *DbInstances) GetOrderableInstances(ctx context.Context, engine
 string, engineVersion string) (
 []types.OrderableDBInstanceOption, error) {

 var output *rds.DescribeOrderableDBInstanceOptionsOutput
 var instanceOptions []types.OrderableDBInstanceOption
 var err error
 orderablePaginator :=
 rds.NewDescribeOrderableDBInstanceOptionsPaginator(instances.RdsClient,
  &rds.DescribeOrderableDBInstanceOptionsInput{
   Engine:        aws.String(engine),
   EngineVersion: aws.String(engineVersion),
  })
 for orderablePaginator.HasMorePages() {
  output, err = orderablePaginator.NextPage(ctx)
  if err != nil {
   log.Printf("Couldn't get orderable DB instance options: %v\n", err)
   break
  } else {
   instanceOptions = append(instanceOptions, output.OrderableDBInstanceOptions...)
  }
 }
 return instanceOptions, err
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的 DescribeOrderableDBInstanceOptions。

### `ModifyDBParameterGroup`

以下程式碼範例顯示如何使用 `ModifyDBParameterGroup`。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "context"
 "errors"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/rds"
 "github.com/aws/aws-sdk-go-v2/service/rds/types"
)

type DbInstances struct {
 RdsClient *rds.Client
}



// UpdateParameters updates parameters in a named DB parameter group.
func (instances *DbInstances) UpdateParameters(ctx context.Context,
 parameterGroupName string, params []types.Parameter) error {
 _, err := instances.RdsClient.ModifyDBParameterGroup(ctx,
  &rds.ModifyDBParameterGroupInput{
   DBParameterGroupName: aws.String(parameterGroupName),
   Parameters:           params,
  })
 if err != nil {
  log.Printf("Couldn't update parameters in %v: %v\n", parameterGroupName, err)
  return err
 } else {
  return nil
 }
```

```
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的 ModifyDBParameterGroup。

## 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。

SDK for Go V2

> **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 Go 連線至 Lambda 函數中的 Amazon RDS 資料庫。

```
/*
Golang v2 code here.
*/

package main

import (
 "context"
 "database/sql"
 "encoding/json"
 "fmt"
 "os"

 "github.com/aws/aws-lambda-go/lambda"
 "github.com/aws/aws-sdk-go-v2/config"
 "github.com/aws/aws-sdk-go-v2/feature/rds/auth"
 _ "github.com/go-sql-driver/mysql"
```

```
)

type MyEvent struct {
 Name string `json:"name"`
}

func HandleRequest(event *MyEvent) (map[string]interface{}, error) {

 var dbName string = os.Getenv("DatabaseName")
 var dbUser string = os.Getenv("DatabaseUser")
 var dbHost string = os.Getenv("DBHost") // Add hostname without https
 var dbPort int = os.Getenv("Port")      // Add port number
 var dbEndpoint string = fmt.Sprintf("%s:%d", dbHost, dbPort)
 var region string = os.Getenv("AWS_REGION")

 cfg, err := config.LoadDefaultConfig(context.TODO())
 if err != nil {
  panic("configuration error: " + err.Error())
 }

 authenticationToken, err := auth.BuildAuthToken(
  context.TODO(), dbEndpoint, region, dbUser, cfg.Credentials)
 if err != nil {
  panic("failed to create authentication token: " + err.Error())
 }

 dsn := fmt.Sprintf("%s:%s@tcp(%s)/%s?tls=true&allowCleartextPasswords=true",
  dbUser, authenticationToken, dbEndpoint, dbName,
 )

 db, err := sql.Open("mysql", dsn)
 if err != nil {
  panic(err)
 }

 defer db.Close()

 var sum int
 err = db.QueryRow("SELECT ?+? AS sum", 3, 2).Scan(&sum)
 if err != nil {
  panic(err)
 }
 s := fmt.Sprint(sum)
 message := fmt.Sprintf("The selected sum is: %s", s)
```

```
 messageBytes, err := json.Marshal(message)
 if err != nil {
  return nil, err
 }

 messageString := string(messageBytes)
 return map[string]interface{}{
  "statusCode": 200,
  "headers":    map[string]string{"Content-Type": "application/json"},
  "body":       messageString,
 }, nil
}

func main() {
 lambda.Start(HandleRequest)
}
```

# 使用適用於 Go V2 的 SDK 的 Amazon Redshift 範例

下列程式碼範例示範如何使用 適用於 Go 的 AWS SDK V2 搭配 Amazon Redshift 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 Amazon Redshift

下列程式碼範例說明如何開始使用 Amazon Redshift。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
package main

import (
 "context"
 "fmt"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/config"
 "github.com/aws/aws-sdk-go-v2/service/redshift"
)

// main uses the AWS SDK for Go V2 to create a Redshift client
// and list up to 10 clusters in your account.
// This example uses the default settings specified in your shared credentials
// and config files.
func main() {
 ctx := context.Background()
 sdkConfig, err := config.LoadDefaultConfig(ctx)
 if err != nil {
  fmt.Println("Couldn't load default configuration. Have you set up your AWS
 account?")
  fmt.Println(err)
  return
 }
 redshiftClient := redshift.NewFromConfig(sdkConfig)
 count := 20
 fmt.Printf("Let's list up to %v clusters for your account.\n", count)
```

```
 result, err := redshiftClient.DescribeClusters(ctx,
 &redshift.DescribeClustersInput{
  MaxRecords: aws.Int32(int32(count)),
 })
 if err != nil {
  fmt.Printf("Couldn't list clusters for your account. Here's why: %v\n", err)
  return
 }
 if len(result.Clusters) == 0 {
  fmt.Println("You don't have any clusters!")
  return
 }
 for _, cluster := range result.Clusters {
  fmt.Printf("\t%v : %v\n", *cluster.ClusterIdentifier, *cluster.ClusterStatus)
 }
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的 DescribeClusters。

## 基本概念

了解基本概念

以下程式碼範例顯示做法：

- 建立 Redshift 叢集。
- 列出叢集中的資料庫。
- 建立名為 Movies 的資料表。
- 填入 Movies 資料表。
- 依年份查詢 Movies 資料表。
- 修改 Redshift 叢集。
- 刪除 Amazon Redshift 叢集。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
package scenarios

import (
 "context"
 "encoding/json"
 "errors"
 "fmt"
 "log"
 "math/rand"
 "strings"
 "time"

 "github.com/aws/aws-sdk-go-v2/aws"
 redshift_types "github.com/aws/aws-sdk-go-v2/service/redshift/types"
 redshiftdata_types "github.com/aws/aws-sdk-go-v2/service/redshiftdata/types"
 "github.com/aws/aws-sdk-go-v2/service/secretsmanager"
 "github.com/awsdocs/aws-doc-sdk-examples/gov2/demotools"
 "github.com/awsdocs/aws-doc-sdk-examples/gov2/redshift/actions"

 "github.com/aws/aws-sdk-go-v2/service/redshift"
 "github.com/aws/aws-sdk-go-v2/service/redshiftdata"
)

// IScenarioHelper abstracts input and wait functions from a scenario so that they
// can be mocked for unit testing.
type IScenarioHelper interface {
 GetName() string
}

const rMax = 100000

type ScenarioHelper struct {
 Prefix string
```

```
 Random *rand.Rand
}

// GetName returns a unique name formed of a prefix and a random number.
func (helper ScenarioHelper) GetName() string {
 return fmt.Sprintf("%v%v", helper.Prefix, helper.Random.Intn(rMax))
}

// RedshiftBasicsScenario separates the steps of this scenario into individual
 functions so that
// they are simpler to read and understand.
type RedshiftBasicsScenario struct {
 sdkConfig         aws.Config
 helper            IScenarioHelper
 questioner        demotools.IQuestioner
 pauser            demotools.IPausable
 filesystem        demotools.IFileSystem
 redshiftActor     *actions.RedshiftActions
 redshiftDataActor *actions.RedshiftDataActions
 secretsmanager    *SecretsManager
}

// SecretsManager is used to retrieve username and password information from a
 secure service.
type SecretsManager struct {
 SecretsManagerClient *secretsmanager.Client
}

// RedshiftBasics constructs a new Redshift Basics runner.
func RedshiftBasics(sdkConfig aws.Config, questioner demotools.IQuestioner, pauser
 demotools.IPausable, filesystem demotools.IFileSystem, helper IScenarioHelper)
 RedshiftBasicsScenario {
 scenario := RedshiftBasicsScenario{
  sdkConfig:         sdkConfig,
  helper:            helper,
  questioner:        questioner,
  pauser:            pauser,
  filesystem:        filesystem,
  secretsmanager:    &SecretsManager{SecretsManagerClient:
 secretsmanager.NewFromConfig(sdkConfig)},
  redshiftActor:     &actions.RedshiftActions{RedshiftClient:
 redshift.NewFromConfig(sdkConfig)},
  redshiftDataActor: &actions.RedshiftDataActions{RedshiftDataClient:
 redshiftdata.NewFromConfig(sdkConfig)},
```

```
 }
 return scenario
}


// Movie makes it easier to use Movie objects given in json format.
type Movie struct {
 ID    int    `json:"id"`
 Title string `json:"title"`
 Year  int    `json:"year"`
}


// User makes it easier to get the User data back from SecretsManager and use it
 later.
type User struct {
 Username string `json:"userName"`
 Password string `json:"userPassword"`
}

// Run runs the RedshiftBasics interactive example that shows you how to use Amazon
// Redshift and how to interact with its common endpoints.
//
// 0. Retrieve username and password information to access Redshift.
// 1. Create a cluster.
// 2. Wait for the cluster to become available.
// 3. List the available databases in the region.
// 4. Create a table named "Movies" in the "dev" database.
// 5. Populate the movies table from the "movies.json" file.
// 6. Query the movies table by year.
// 7. Modify the cluster's maintenance window.
// 8. Optionally clean up all resources created during this demo.
//
// This example creates an Amazon Redshift service client from the specified
 sdkConfig so that
// you can replace it with a mocked or stubbed config for unit testing.
//
// It uses a questioner from the `demotools` package to get input during the
 example.
// This package can be found in the ..\..\demotools folder of this repo.
func (runner *RedshiftBasicsScenario) Run(ctx context.Context) {

 user := User{}
 secretId := "s3express/basics/secrets"
```

```
clusterId := "demo-cluster-1"
maintenanceWindow := "wed:07:30-wed:08:00"
databaseName := "dev"
tableName := "Movies"
fileName := "Movies.json"
nodeType := "ra3.xlplus"
clusterType := "single-node"

defer func() {
 if r := recover(); r != nil {
  log.Println("Something went wrong with the demo.")
  _, isMock := runner.questioner.(*demotools.MockQuestioner)
  if isMock || runner.questioner.AskBool("Do you want to see the full error message
(y/n)?", "y") {
   log.Println(r)
  }
  runner.cleanUpResources(ctx, clusterId, databaseName, tableName, user.Username,
runner.questioner)
 }
}()

// Retrieve the userName and userPassword from SecretsManager
output, err := runner.secretsmanager.SecretsManagerClient.GetSecretValue(ctx,
&secretsmanager.GetSecretValueInput{
 SecretId: aws.String(secretId),
})
if err != nil {
 log.Printf("There was a problem getting the secret value: %s", err)
 log.Printf("Please make sure to create a secret named 's3express/basics/secrets'
with keys of 'userName' and 'userPassword'.")
 panic(err)
}

err = json.Unmarshal([]byte(*output.SecretString), &user)
if err != nil {
 log.Printf("There was a problem parsing the secret value from JSON: %s", err)
 panic(err)
}

// Create the Redshift cluster
_, err = runner.redshiftActor.CreateCluster(ctx, clusterId, user.Username,
user.Password, nodeType, clusterType, true)
if err != nil {
 var clusterAlreadyExistsFault *redshift_types.ClusterAlreadyExistsFault
```

```
 if errors.As(err, &clusterAlreadyExistsFault) {
  log.Println("Cluster already exists. Continuing.")
 } else {
  log.Println("Error creating cluster.")
  panic(err)
 }
}

// Wait for the cluster to become available
waiter := redshift.NewClusterAvailableWaiter(runner.redshiftActor.RedshiftClient)
err = waiter.Wait(ctx, &redshift.DescribeClustersInput{
 ClusterIdentifier: aws.String(clusterId),
}, 5*time.Minute)
if err != nil {
 log.Println("An error occurred waiting for the cluster.")
 panic(err)
}

// Get some info about the cluster
describeOutput, err := runner.redshiftActor.DescribeClusters(ctx, clusterId)
if err != nil {
 log.Println("Something went wrong trying to get information about the cluster.")
 panic(err)
}
log.Println("Here's some information about the cluster.")
log.Printf("The cluster's status is %s", *describeOutput.Clusters[0].ClusterStatus)
log.Printf("The cluster was created at %s",
*describeOutput.Clusters[0].ClusterCreateTime)

// List databases
log.Println("List databases in", clusterId)
runner.questioner.Ask("Press Enter to continue...")
err = runner.redshiftDataActor.ListDatabases(ctx, clusterId, databaseName,
user.Username)
if err != nil {
 log.Printf("Failed to list databases: %v\n", err)
 panic(err)
}

// Create the "Movies" table
log.Println("Now you will create a table named " + tableName + ".")
runner.questioner.Ask("Press Enter to continue...")
err = nil
```

```
 result, err := runner.redshiftDataActor.CreateTable(ctx, clusterId, databaseName,
 tableName, user.Username, runner.pauser, []string{"title VARCHAR(256)", "year
 INT"})
 if err != nil {
  log.Printf("Failed to create table: %v\n", err)
  panic(err)
 }

 describeInput := redshiftdata.DescribeStatementInput{
  Id: result.Id,
 }
 query := actions.RedshiftQuery{
  Context: ctx,
  Input:   describeInput,
  Result:  result,
 }
 err = runner.redshiftDataActor.WaitForQueryStatus(query, runner.pauser, true)
 if err != nil {
  log.Printf("Failed to execute query: %v\n", err)
  panic(err)
 }
 log.Printf("Successfully executed query\n")

 // Populate the "Movies" table
 runner.PopulateMoviesTable(ctx, clusterId, databaseName, tableName, user.Username,
 fileName)

 // Query the "Movies" table by year
 log.Println("Query the Movies table by year.")
 year := runner.questioner.AskInt(
  fmt.Sprintf("Enter a value between %v and %v:", 2012, 2014),
  demotools.InIntRange{Lower: 2012, Upper: 2014})
 runner.QueryMoviesByYear(ctx, clusterId, databaseName, tableName, user.Username,
 year)

 // Modify the cluster's maintenance window
 runner.redshiftActor.ModifyCluster(ctx, clusterId, maintenanceWindow)

 // Delete the Redshift cluster if confirmed
 runner.cleanUpResources(ctx, clusterId, databaseName, tableName, user.Username,
 runner.questioner)

 log.Println("Thanks for watching!")
}
```

```
// cleanUpResources asks the user if they would like to delete each resource created
 during the scenario, from most
// impactful to least impactful. If any choice to delete is made, further deletion
 attempts are skipped.
func (runner *RedshiftBasicsScenario) cleanUpResources(ctx context.Context,
 clusterId string, databaseName string, tableName string, userName string,
 questioner demotools.IQuestioner) {
 deleted := false
 var err error = nil
 if questioner.AskBool("Do you want to delete the entire cluster? This will clean up
 all resources. (y/n)", "y") {
  deleted, err = runner.redshiftActor.DeleteCluster(ctx, clusterId)
  if err != nil {
   log.Printf("Error deleting cluster: %v", err)
  }
 }
 if !deleted && questioner.AskBool("Do you want to delete the dev table? This will
 clean up all inserted records but keep your cluster intact. (y/n)", "y") {
  deleted, err = runner.redshiftDataActor.DeleteTable(ctx, clusterId, databaseName,
 tableName, userName)
  if err != nil {
   log.Printf("Error deleting movies table: %v", err)
  }
 }
 if !deleted && questioner.AskBool("Do you want to delete all rows in the Movies
 table? This will clean up all inserted records but keep your cluster and table
 intact. (y/n)", "y") {
  deleted, err = runner.redshiftDataActor.DeleteDataRows(ctx, clusterId,
 databaseName, tableName, userName, runner.pauser)
  if err != nil {
   log.Printf("Error deleting data rows: %v", err)
  }
 }
 if !deleted {
  log.Print("Please manually delete any unwanted resources.")
 }
}


// loadMoviesFromJSON takes the <fileName> file and populates a slice of Movie
 objects.
func (runner *RedshiftBasicsScenario) loadMoviesFromJSON(fileName string, filesystem
 demotools.IFileSystem) ([]Movie, error) {
```

```
 file, err := filesystem.OpenFile("../../resources/sample_files/" + fileName)
 if err != nil {
  return nil, err
 }
 defer filesystem.CloseFile(file)

 var movies []Movie
 err = json.NewDecoder(file).Decode(&movies)
 if err != nil {
  return nil, err
 }

 return movies, nil
}



// PopulateMoviesTable reads data from the <fileName> file and inserts records into
 the "Movies" table.
func (runner *RedshiftBasicsScenario) PopulateMoviesTable(ctx context.Context,
 clusterId string, databaseName string, tableName string, userName string, fileName
 string) {
 log.Println("Populate the " + tableName + " table using the " + fileName + "
 file.")
 numRecords := runner.questioner.AskInt(
  fmt.Sprintf("Enter a value between %v and %v:", 10, 100),
  demotools.InIntRange{Lower: 10, Upper: 100})

 movies, err := runner.loadMoviesFromJSON(fileName, runner.filesystem)
 if err != nil {
  log.Printf("Failed to load movies from JSON: %v\n", err)
  panic(err)
 }

 var sqlStatements []string

 for i, movie := range movies {
  if i >= numRecords {
   break
  }

  sqlStatement := fmt.Sprintf(`INSERT INTO %s (title, year) VALUES ('%s', %d);`,
   tableName,
```

```
    strings.Replace(movie.Title, "'", "''", -1), // Double any single quotes to
  escape them
    movie.Year)

  sqlStatements = append(sqlStatements, sqlStatement)
 }

 input := &redshiftdata.BatchExecuteStatementInput{
  ClusterIdentifier: aws.String(clusterId),
  Database:          aws.String(databaseName),
  DbUser:            aws.String(userName),
  Sqls:              sqlStatements,
 }

 result, err := runner.redshiftDataActor.ExecuteBatchStatement(ctx, *input)
 if err != nil {
  log.Printf("Failed to execute batch statement: %v\n", err)
  panic(err)
 }

 describeInput := redshiftdata.DescribeStatementInput{
  Id: result.Id,
 }

 query := actions.RedshiftQuery{
  Context: ctx,
  Result:  result,
  Input:   describeInput,
 }
 err = runner.redshiftDataActor.WaitForQueryStatus(query, runner.pauser, true)
 if err != nil {
  log.Printf("Failed to execute batch insert query: %v\n", err)
  return
 }
 log.Printf("Successfully executed batch statement\n")

 log.Printf("%d records were added to the Movies table.\n", numRecords)
}



// QueryMoviesByYear retrieves only movies from the "Movies" table which match the
 given year.
```

```
func (runner *RedshiftBasicsScenario) QueryMoviesByYear(ctx context.Context,
 clusterId string, databaseName string, tableName string, userName string, year int)
 {

 sqlStatement := fmt.Sprintf(`SELECT title FROM %s WHERE year = %d;`, tableName,
 year)

 input := &redshiftdata.ExecuteStatementInput{
  ClusterIdentifier: aws.String(clusterId),
  Database:          aws.String(databaseName),
  DbUser:            aws.String(userName),
  Sql:               aws.String(sqlStatement),
 }

 result, err := runner.redshiftDataActor.ExecuteStatement(ctx, *input)
 if err != nil {
  log.Printf("Failed to query movies: %v\n", err)
  panic(err)
 }

 log.Println("The identifier of the statement is ", *result.Id)

 describeInput := redshiftdata.DescribeStatementInput{
  Id: result.Id,
 }

 query := actions.RedshiftQuery{
  Context: ctx,
  Input:   describeInput,
  Result:  result,
 }
 err = runner.redshiftDataActor.WaitForQueryStatus(query, runner.pauser, true)
 if err != nil {
  log.Printf("Failed to execute query: %v\n", err)
  panic(err)
 }
 log.Printf("Successfully executed query\n")

 getResultOutput, err := runner.redshiftDataActor.GetStatementResult(ctx,
 *result.Id)
 if err != nil {
  log.Printf("Failed to query movies: %v\n", err)
  panic(err)
 }
```

```
 for _, row := range getResultOutput.Records {
  for _, col := range row {
   title, ok := col.(*redshiftdata_types.FieldMemberStringValue)
   if !ok {
    log.Println("Failed to parse the field")
   } else {
    log.Printf("The Movie title field is %s\n", title.Value)
   }
  }
 }
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的下列主題。
  - CreateCluster
  - DescribeClusters
  - DescribeStatement
  - ExecuteStatement
  - GetStatementResult
  - ListDatabasesPaginator
  - ModifyCluster

## 動作

### `CreateCluster`

以下程式碼範例顯示如何使用 `CreateCluster`。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "context"
 "errors"
 "log"
 "time"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/redshift"
 "github.com/aws/aws-sdk-go-v2/service/redshift/types"
)



// RedshiftActions wraps Redshift service actions.
type RedshiftActions struct {
 RedshiftClient *redshift.Client
}



// CreateCluster sends a request to create a cluster with the given clusterId using
 the provided credentials.
func (actor RedshiftActions) CreateCluster(ctx context.Context, clusterId string,
 userName string, userPassword string, nodeType string, clusterType string,
 publiclyAccessible bool) (*redshift.CreateClusterOutput, error) {
 // Create a new Redshift cluster
 input := &redshift.CreateClusterInput{
  ClusterIdentifier:  aws.String(clusterId),
  MasterUserPassword: aws.String(userPassword),
  MasterUsername:     aws.String(userName),
  NodeType:           aws.String(nodeType),
  ClusterType:        aws.String(clusterType),
  PubliclyAccessible: aws.Bool(publiclyAccessible),
 }
 var opErr *types.ClusterAlreadyExistsFault
 output, err := actor.RedshiftClient.CreateCluster(ctx, input)
 if err != nil && errors.As(err, &opErr) {
  log.Println("Cluster already exists")
  return nil, nil
 } else if err != nil {
  log.Printf("Failed to create Redshift cluster: %v\n", err)
  return nil, err
```

```
 }

 log.Printf("Created cluster %s\n", *output.Cluster.ClusterIdentifier)
 return output, nil
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的 CreateCluster。

### `DeleteCluster`

以下程式碼範例顯示如何使用 `DeleteCluster`。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "context"
 "errors"
 "log"
 "time"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/redshift"
 "github.com/aws/aws-sdk-go-v2/service/redshift/types"
)



// RedshiftActions wraps Redshift service actions.
type RedshiftActions struct {
 RedshiftClient *redshift.Client
}
```

```
// DeleteCluster deletes the given cluster.
func (actor RedshiftActions) DeleteCluster(ctx context.Context, clusterId string)
 (bool, error) {
 input := redshift.DeleteClusterInput{
  ClusterIdentifier:        aws.String(clusterId),
  SkipFinalClusterSnapshot: aws.Bool(true),
 }
 _, err := actor.RedshiftClient.DeleteCluster(ctx, &input)
 var opErr *types.ClusterNotFoundFault
 if err != nil && errors.As(err, &opErr) {
  log.Println("Cluster was not found. Where could it be?")
  return false, err
 } else if err != nil {
  log.Printf("Failed to delete Redshift cluster: %v\n", err)
  return false, err
 }
 waiter := redshift.NewClusterDeletedWaiter(actor.RedshiftClient)
 err = waiter.Wait(ctx, &redshift.DescribeClustersInput{
  ClusterIdentifier: aws.String(clusterId),
 }, 5*time.Minute)
 if err != nil {
  log.Printf("Wait time exceeded for deleting cluster, continuing: %v\n", err)
 }
 log.Printf("The cluster %s was deleted\n", clusterId)
 return true, nil
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的 DeleteCluster。

### `DescribeClusters`

以下程式碼範例顯示如何使用 `DescribeClusters`。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "context"
 "errors"
 "log"
 "time"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/redshift"
 "github.com/aws/aws-sdk-go-v2/service/redshift/types"
)



// RedshiftActions wraps Redshift service actions.
type RedshiftActions struct {
 RedshiftClient *redshift.Client
}



// DescribeClusters returns information about the given cluster.
func (actor RedshiftActions) DescribeClusters(ctx context.Context, clusterId string)
 (*redshift.DescribeClustersOutput, error) {
 input, err := actor.RedshiftClient.DescribeClusters(ctx,
 &redshift.DescribeClustersInput{
  ClusterIdentifier: aws.String(clusterId),
 })
 var opErr *types.AccessToClusterDeniedFault
 if errors.As(err, &opErr) {
  println("Access to cluster denied.")
  panic(err)
 } else if err != nil {
  println("Failed to describe Redshift clusters.")
  return nil, err
 }
 return input, nil
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的 DescribeClusters。

### `ModifyCluster`

以下程式碼範例顯示如何使用 `ModifyCluster`。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "context"
 "errors"
 "log"
 "time"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/redshift"
 "github.com/aws/aws-sdk-go-v2/service/redshift/types"
)



// RedshiftActions wraps Redshift service actions.
type RedshiftActions struct {
 RedshiftClient *redshift.Client
}



// ModifyCluster sets the preferred maintenance window for the given cluster.
func (actor RedshiftActions) ModifyCluster(ctx context.Context, clusterId string,
 maintenanceWindow string) *redshift.ModifyClusterOutput {
 // Modify the cluster's maintenance window
 input := &redshift.ModifyClusterInput{
  ClusterIdentifier:          aws.String(clusterId),
  PreferredMaintenanceWindow: aws.String(maintenanceWindow),
 }

 var opErr *types.InvalidClusterStateFault
```

```
 output, err := actor.RedshiftClient.ModifyCluster(ctx, input)
 if err != nil && errors.As(err, &opErr) {
  log.Println("Cluster is in an invalid state.")
  panic(err)
 } else if err != nil {
  log.Printf("Failed to modify Redshift cluster: %v\n", err)
  panic(err)
 }

 log.Printf("The cluster was successfully modified and now has %s as the maintenance
 window\n", *output.Cluster.PreferredMaintenanceWindow)
 return output
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的 ModifyCluster。

# 使用適用於 Go V2 的 SDK 的 Amazon S3 範例

下列程式碼範例示範如何使用 適用於 Go 的 AWS SDK V2 搭配 Amazon S3 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。

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 S3

下列程式碼範例示範如何開始使用 Amazon S3。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
package main

import (
 "context"
 "errors"
 "fmt"

 "github.com/aws/aws-sdk-go-v2/config"
 "github.com/aws/aws-sdk-go-v2/service/s3"
 "github.com/aws/smithy-go"
)

// main uses the AWS SDK for Go V2 to create an Amazon Simple Storage Service
// (Amazon S3) client and list up to 10 buckets in your account.
// This example uses the default settings specified in your shared credentials
// and config files.
func main() {
 ctx := context.Background()
 sdkConfig, err := config.LoadDefaultConfig(ctx)
 if err != nil {
  fmt.Println("Couldn't load default configuration. Have you set up your AWS
 account?")
  fmt.Println(err)
  return
 }
 s3Client := s3.NewFromConfig(sdkConfig)
 count := 10
```

```
 fmt.Printf("Let's list up to %v buckets for your account.\n", count)
 result, err := s3Client.ListBuckets(ctx, &s3.ListBucketsInput{})
 if err != nil {
  var ae smithy.APIError
  if errors.As(err, &ae) && ae.ErrorCode() == "AccessDenied" {
   fmt.Println("You don't have permission to list buckets for this account.")
  } else {
   fmt.Printf("Couldn't list buckets for your account. Here's why: %v\n", err)
  }
  return
 }
 if len(result.Buckets) == 0 {
  fmt.Println("You don't have any buckets!")
 } else {
  if count > len(result.Buckets) {
   count = len(result.Buckets)
  }
  for _, bucket := range result.Buckets[:count] {
   fmt.Printf("\t%v\n", *bucket.Name)
  }
 }
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的 ListBuckets。

# 基本概念

了解基本概念

以下程式碼範例顯示做法：

- 建立儲存貯體並上傳檔案到該儲存貯體。
- 從儲存貯體下載物件。
- 將物件複製至儲存貯體中的子文件夾。
- 列出儲存貯體中的物件。
- 刪除儲存貯體物件和該儲存貯體。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

定義包裝案例所使用之儲存貯體和物件動作的結構。

```
import (
 "bytes"
 "context"
 "errors"
 "fmt"
 "io"
 "log"
 "os"
 "time"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/feature/s3/manager"
 "github.com/aws/aws-sdk-go-v2/service/s3"
 "github.com/aws/aws-sdk-go-v2/service/s3/types"
 "github.com/aws/smithy-go"
)

// BucketBasics encapsulates the Amazon Simple Storage Service (Amazon S3) actions
// used in the examples.
// It contains S3Client, an Amazon S3 service client that is used to perform bucket
// and object actions.
type BucketBasics struct {
 S3Client *s3.Client
}



// ListBuckets lists the buckets in the current account.
func (basics BucketBasics) ListBuckets(ctx context.Context) ([]types.Bucket, error)
 {
 var err error
 var output *s3.ListBucketsOutput
```

```
 var buckets []types.Bucket
 bucketPaginator := s3.NewListBucketsPaginator(basics.S3Client,
 &s3.ListBucketsInput{})
 for bucketPaginator.HasMorePages() {
  output, err = bucketPaginator.NextPage(ctx)
  if err != nil {
   var apiErr smithy.APIError
   if errors.As(err, &apiErr) && apiErr.ErrorCode() == "AccessDenied" {
    fmt.Println("You don't have permission to list buckets for this account.")
    err = apiErr
   } else {
    log.Printf("Couldn't list buckets for your account. Here's why: %v\n", err)
   }
   break
  } else {
   buckets = append(buckets, output.Buckets...)
  }
 }
 return buckets, err
}



// BucketExists checks whether a bucket exists in the current account.
func (basics BucketBasics) BucketExists(ctx context.Context, bucketName string)
 (bool, error) {
 _, err := basics.S3Client.HeadBucket(ctx, &s3.HeadBucketInput{
  Bucket: aws.String(bucketName),
 })
 exists := true
 if err != nil {
  var apiError smithy.APIError
  if errors.As(err, &apiError) {
   switch apiError.(type) {
   case *types.NotFound:
    log.Printf("Bucket %v is available.\n", bucketName)
    exists = false
    err = nil
   default:
    log.Printf("Either you don't have access to bucket %v or another error occurred.
 "+
     "Here's what happened: %v\n", bucketName, err)
   }
  }
```

```
 } else {
  log.Printf("Bucket %v exists and you already own it.", bucketName)
 }

 return exists, err
}



// CreateBucket creates a bucket with the specified name in the specified Region.
func (basics BucketBasics) CreateBucket(ctx context.Context, name string, region
 string) error {
 _, err := basics.S3Client.CreateBucket(ctx, &s3.CreateBucketInput{
  Bucket: aws.String(name),
  CreateBucketConfiguration: &types.CreateBucketConfiguration{
   LocationConstraint: types.BucketLocationConstraint(region),
  },
 })
 if err != nil {
  var owned *types.BucketAlreadyOwnedByYou
  var exists *types.BucketAlreadyExists
  if errors.As(err, &owned) {
   log.Printf("You already own bucket %s.\n", name)
   err = owned
  } else if errors.As(err, &exists) {
   log.Printf("Bucket %s already exists.\n", name)
   err = exists
  }
 } else {
  err = s3.NewBucketExistsWaiter(basics.S3Client).Wait(
   ctx, &s3.HeadBucketInput{Bucket: aws.String(name)}, time.Minute)
  if err != nil {
   log.Printf("Failed attempt to wait for bucket %s to exist.\n", name)
  }
 }
 return err
}



// UploadFile reads from a file and puts the data into an object in a bucket.
func (basics BucketBasics) UploadFile(ctx context.Context, bucketName string,
 objectKey string, fileName string) error {
 file, err := os.Open(fileName)
```

```
 if err != nil {
  log.Printf("Couldn't open file %v to upload. Here's why: %v\n", fileName, err)
 } else {
  defer file.Close()
  _, err = basics.S3Client.PutObject(ctx, &s3.PutObjectInput{
   Bucket: aws.String(bucketName),
   Key:    aws.String(objectKey),
   Body:   file,
  })
  if err != nil {
   var apiErr smithy.APIError
   if errors.As(err, &apiErr) && apiErr.ErrorCode() == "EntityTooLarge" {
    log.Printf("Error while uploading object to %s. The object is too large.\n"+
     "To upload objects larger than 5GB, use the S3 console (160GB max)\n"+
     "or the multipart upload API (5TB max).", bucketName)
   } else {
    log.Printf("Couldn't upload file %v to %v:%v. Here's why: %v\n",
     fileName, bucketName, objectKey, err)
   }
  } else {
   err = s3.NewObjectExistsWaiter(basics.S3Client).Wait(
    ctx, &s3.HeadObjectInput{Bucket: aws.String(bucketName), Key:
 aws.String(objectKey)}, time.Minute)
   if err != nil {
    log.Printf("Failed attempt to wait for object %s to exist.\n", objectKey)
   }
  }
 }
 return err
}



// UploadLargeObject uses an upload manager to upload data to an object in a bucket.
// The upload manager breaks large data into parts and uploads the parts
 concurrently.
func (basics BucketBasics) UploadLargeObject(ctx context.Context, bucketName string,
 objectKey string, largeObject []byte) error {
 largeBuffer := bytes.NewReader(largeObject)
 var partMiBs int64 = 10
 uploader := manager.NewUploader(basics.S3Client, func(u *manager.Uploader) {
  u.PartSize = partMiBs * 1024 * 1024
 })
 _, err := uploader.Upload(ctx, &s3.PutObjectInput{
```

```
  Bucket: aws.String(bucketName),
  Key:    aws.String(objectKey),
  Body:   largeBuffer,
 })
 if err != nil {
  var apiErr smithy.APIError
  if errors.As(err, &apiErr) && apiErr.ErrorCode() == "EntityTooLarge" {
   log.Printf("Error while uploading object to %s. The object is too large.\n"+
    "The maximum size for a multipart upload is 5TB.", bucketName)
  } else {
   log.Printf("Couldn't upload large object to %v:%v. Here's why: %v\n",
    bucketName, objectKey, err)
  }
 } else {
  err = s3.NewObjectExistsWaiter(basics.S3Client).Wait(
   ctx, &s3.HeadObjectInput{Bucket: aws.String(bucketName), Key:
 aws.String(objectKey)}, time.Minute)
  if err != nil {
   log.Printf("Failed attempt to wait for object %s to exist.\n", objectKey)
  }
 }

 return err
}



// DownloadFile gets an object from a bucket and stores it in a local file.
func (basics BucketBasics) DownloadFile(ctx context.Context, bucketName string,
 objectKey string, fileName string) error {
 result, err := basics.S3Client.GetObject(ctx, &s3.GetObjectInput{
  Bucket: aws.String(bucketName),
  Key:    aws.String(objectKey),
 })
 if err != nil {
  var noKey *types.NoSuchKey
  if errors.As(err, &noKey) {
   log.Printf("Can't get object %s from bucket %s. No such key exists.\n",
 objectKey, bucketName)
   err = noKey
  } else {
   log.Printf("Couldn't get object %v:%v. Here's why: %v\n", bucketName, objectKey,
 err)
  }
```

```
  return err
 }
 defer result.Body.Close()
 file, err := os.Create(fileName)
 if err != nil {
  log.Printf("Couldn't create file %v. Here's why: %v\n", fileName, err)
  return err
 }
 defer file.Close()
 body, err := io.ReadAll(result.Body)
 if err != nil {
  log.Printf("Couldn't read object body from %v. Here's why: %v\n", objectKey, err)
 }
 _, err = file.Write(body)
 return err
}



// DownloadLargeObject uses a download manager to download an object from a bucket.
// The download manager gets the data in parts and writes them to a buffer until all
 of
// the data has been downloaded.
func (basics BucketBasics) DownloadLargeObject(ctx context.Context, bucketName
 string, objectKey string) ([]byte, error) {
 var partMiBs int64 = 10
 downloader := manager.NewDownloader(basics.S3Client, func(d *manager.Downloader) {
  d.PartSize = partMiBs * 1024 * 1024
 })
 buffer := manager.NewWriteAtBuffer([]byte{})
 _, err := downloader.Download(ctx, buffer, &s3.GetObjectInput{
  Bucket: aws.String(bucketName),
  Key:    aws.String(objectKey),
 })
 if err != nil {
  log.Printf("Couldn't download large object from %v:%v. Here's why: %v\n",
   bucketName, objectKey, err)
 }
 return buffer.Bytes(), err
}



// CopyToFolder copies an object in a bucket to a subfolder in the same bucket.
```

```
func (basics BucketBasics) CopyToFolder(ctx context.Context, bucketName string,
 objectKey string, folderName string) error {
 objectDest := fmt.Sprintf("%v/%v", folderName, objectKey)
 _, err := basics.S3Client.CopyObject(ctx, &s3.CopyObjectInput{
  Bucket:     aws.String(bucketName),
  CopySource: aws.String(fmt.Sprintf("%v/%v", bucketName, objectKey)),
  Key:        aws.String(objectDest),
 })
 if err != nil {
  var notActive *types.ObjectNotInActiveTierError
  if errors.As(err, &notActive) {
   log.Printf("Couldn't copy object %s from %s because the object isn't in the
 active tier.\n",
    objectKey, bucketName)
   err = notActive
  }
 } else {
  err = s3.NewObjectExistsWaiter(basics.S3Client).Wait(
   ctx, &s3.HeadObjectInput{Bucket: aws.String(bucketName), Key:
 aws.String(objectDest)}, time.Minute)
  if err != nil {
   log.Printf("Failed attempt to wait for object %s to exist.\n", objectDest)
  }
 }
 return err
}



// CopyToBucket copies an object in a bucket to another bucket.
func (basics BucketBasics) CopyToBucket(ctx context.Context, sourceBucket string,
 destinationBucket string, objectKey string) error {
 _, err := basics.S3Client.CopyObject(ctx, &s3.CopyObjectInput{
  Bucket:     aws.String(destinationBucket),
  CopySource: aws.String(fmt.Sprintf("%v/%v", sourceBucket, objectKey)),
  Key:        aws.String(objectKey),
 })
 if err != nil {
  var notActive *types.ObjectNotInActiveTierError
  if errors.As(err, &notActive) {
   log.Printf("Couldn't copy object %s from %s because the object isn't in the
 active tier.\n",
    objectKey, sourceBucket)
   err = notActive
```

```
  }
 } else {
  err = s3.NewObjectExistsWaiter(basics.S3Client).Wait(
   ctx, &s3.HeadObjectInput{Bucket: aws.String(destinationBucket), Key:
 aws.String(objectKey)}, time.Minute)
  if err != nil {
   log.Printf("Failed attempt to wait for object %s to exist.\n", objectKey)
  }
 }
 return err
}



// ListObjects lists the objects in a bucket.
func (basics BucketBasics) ListObjects(ctx context.Context, bucketName string)
 ([]types.Object, error) {
 var err error
 var output *s3.ListObjectsV2Output
 input := &s3.ListObjectsV2Input{
  Bucket: aws.String(bucketName),
 }
 var objects []types.Object
 objectPaginator := s3.NewListObjectsV2Paginator(basics.S3Client, input)
 for objectPaginator.HasMorePages() {
  output, err = objectPaginator.NextPage(ctx)
  if err != nil {
   var noBucket *types.NoSuchBucket
   if errors.As(err, &noBucket) {
    log.Printf("Bucket %s does not exist.\n", bucketName)
    err = noBucket
   }
   break
  } else {
   objects = append(objects, output.Contents...)
  }
 }
 return objects, err
}



// DeleteObjects deletes a list of objects from a bucket.
```

```
func (basics BucketBasics) DeleteObjects(ctx context.Context, bucketName string,
 objectKeys []string) error {
 var objectIds []types.ObjectIdentifier
 for _, key := range objectKeys {
  objectIds = append(objectIds, types.ObjectIdentifier{Key: aws.String(key)})
 }
 output, err := basics.S3Client.DeleteObjects(ctx, &s3.DeleteObjectsInput{
  Bucket: aws.String(bucketName),
  Delete: &types.Delete{Objects: objectIds, Quiet: aws.Bool(true)},
 })
 if err != nil || len(output.Errors) > 0 {
  log.Printf("Error deleting objects from bucket %s.\n", bucketName)
  if err != nil {
   var noBucket *types.NoSuchBucket
   if errors.As(err, &noBucket) {
    log.Printf("Bucket %s does not exist.\n", bucketName)
    err = noBucket
   }
  } else if len(output.Errors) > 0 {
   for _, outErr := range output.Errors {
    log.Printf("%s: %s\n", *outErr.Key, *outErr.Message)
   }
   err = fmt.Errorf("%s", *output.Errors[0].Message)
  }
 } else {
  for _, delObjs := range output.Deleted {
   err = s3.NewObjectNotExistsWaiter(basics.S3Client).Wait(
    ctx, &s3.HeadObjectInput{Bucket: aws.String(bucketName), Key: delObjs.Key},
 time.Minute)
   if err != nil {
    log.Printf("Failed attempt to wait for object %s to be deleted.\n",
 *delObjs.Key)
   } else {
    log.Printf("Deleted %s.\n", *delObjs.Key)
   }
  }
 }
 return err
}



// DeleteBucket deletes a bucket. The bucket must be empty or an error is returned.
```

```
func (basics BucketBasics) DeleteBucket(ctx context.Context, bucketName string)
 error {
 _, err := basics.S3Client.DeleteBucket(ctx, &s3.DeleteBucketInput{
  Bucket: aws.String(bucketName)})
 if err != nil {
  var noBucket *types.NoSuchBucket
  if errors.As(err, &noBucket) {
   log.Printf("Bucket %s does not exist.\n", bucketName)
   err = noBucket
  } else {
   log.Printf("Couldn't delete bucket %v. Here's why: %v\n", bucketName, err)
  }
 } else {
  err = s3.NewBucketNotExistsWaiter(basics.S3Client).Wait(
   ctx, &s3.HeadBucketInput{Bucket: aws.String(bucketName)}, time.Minute)
  if err != nil {
   log.Printf("Failed attempt to wait for bucket %s to be deleted.\n", bucketName)
  } else {
   log.Printf("Deleted %s.\n", bucketName)
  }
 }
 return err
}
```

執行互動式情境，示範如何使用 S3 儲存貯體和物件。

```
import (
 "context"
 "fmt"
 "log"
 "os"
 "strings"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/s3"
 "github.com/awsdocs/aws-doc-sdk-examples/gov2/demotools"
 "github.com/awsdocs/aws-doc-sdk-examples/gov2/s3/actions"
)

// RunGetStartedScenario is an interactive example that shows you how to use Amazon
```

```
// Simple Storage Service (Amazon S3) to create an S3 bucket and use it to store
 objects.
//
// 1. Create a bucket.
// 2. Upload a local file to the bucket.
// 3. Download an object to a local file.
// 4. Copy an object to a different folder in the bucket.
// 5. List objects in the bucket.
// 6. Delete all objects in the bucket.
// 7. Delete the bucket.
//
// This example creates an Amazon S3 service client from the specified sdkConfig so
 that
// you can replace it with a mocked or stubbed config for unit testing.
//
// It uses a questioner from the `demotools` package to get input during the
 example.
// This package can be found in the ..\..\demotools folder of this repo.
func RunGetStartedScenario(ctx context.Context, sdkConfig aws.Config, questioner
 demotools.IQuestioner) {
 defer func() {
  if r := recover(); r != nil {
   log.Println("Something went wrong with the demo.")
   _, isMock := questioner.(*demotools.MockQuestioner)
   if isMock || questioner.AskBool("Do you want to see the full error message (y/
n)?", "y") {
    log.Println(r)
   }
  }
 }()

 log.Println(strings.Repeat("-", 88))
 log.Println("Welcome to the Amazon S3 getting started demo.")
 log.Println(strings.Repeat("-", 88))

 s3Client := s3.NewFromConfig(sdkConfig)
 bucketBasics := actions.BucketBasics{S3Client: s3Client}

 count := 10
 log.Printf("Let's list up to %v buckets for your account:", count)
 buckets, err := bucketBasics.ListBuckets(ctx)
 if err != nil {
  panic(err)
 }
```

```
if len(buckets) == 0 {
 log.Println("You don't have any buckets!")
} else {
 if count > len(buckets) {
  count = len(buckets)
 }
 for _, bucket := range buckets[:count] {
  log.Printf("\t%v\n", *bucket.Name)
 }
}

bucketName := questioner.Ask("Let's create a bucket. Enter a name for your
bucket:",
 demotools.NotEmpty{})
bucketExists, err := bucketBasics.BucketExists(ctx, bucketName)
if err != nil {
 panic(err)
}
if !bucketExists {
 err = bucketBasics.CreateBucket(ctx, bucketName, sdkConfig.Region)
 if err != nil {
  panic(err)
 } else {
  log.Println("Bucket created.")
 }
}
log.Println(strings.Repeat("-", 88))

fmt.Println("Let's upload a file to your bucket.")
smallFile := questioner.Ask("Enter the path to a file you want to upload:",
 demotools.NotEmpty{})
const smallKey = "doc-example-key"
err = bucketBasics.UploadFile(ctx, bucketName, smallKey, smallFile)
if err != nil {
 panic(err)
}
log.Printf("Uploaded %v as %v.\n", smallFile, smallKey)
log.Println(strings.Repeat("-", 88))

log.Printf("Let's download %v to a file.", smallKey)
downloadFileName := questioner.Ask("Enter a name for the downloaded file:",
demotools.NotEmpty{})
err = bucketBasics.DownloadFile(ctx, bucketName, smallKey, downloadFileName)
if err != nil {
```

```
 panic(err)
}
log.Printf("File %v downloaded.", downloadFileName)
log.Println(strings.Repeat("-", 88))

log.Printf("Let's copy %v to a folder in the same bucket.", smallKey)
folderName := questioner.Ask("Enter a folder name: ", demotools.NotEmpty{})
err = bucketBasics.CopyToFolder(ctx, bucketName, smallKey, folderName)
if err != nil {
 panic(err)
}
log.Printf("Copied %v to %v/%v.\n", smallKey, folderName, smallKey)
log.Println(strings.Repeat("-", 88))

log.Println("Let's list the objects in your bucket.")
questioner.Ask("Press Enter when you're ready.")
objects, err := bucketBasics.ListObjects(ctx, bucketName)
if err != nil {
 panic(err)
}
log.Printf("Found %v objects.\n", len(objects))
var objKeys []string
for _, object := range objects {
 objKeys = append(objKeys, *object.Key)
 log.Printf("\t%v\n", *object.Key)
}
log.Println(strings.Repeat("-", 88))

if questioner.AskBool("Do you want to delete your bucket and all of its "+
 "contents? (y/n)", "y") {
 log.Println("Deleting objects.")
 err = bucketBasics.DeleteObjects(ctx, bucketName, objKeys)
 if err != nil {
  panic(err)
 }
 log.Println("Deleting bucket.")
 err = bucketBasics.DeleteBucket(ctx, bucketName)
 if err != nil {
  panic(err)
 }
 log.Printf("Deleting downloaded file %v.\n", downloadFileName)
 err = os.Remove(downloadFileName)
 if err != nil {
  panic(err)
```

```
  }
 } else {
  log.Println("Okay. Don't forget to delete objects from your bucket to avoid
 charges.")
 }
 log.Println(strings.Repeat("-", 88))

 log.Println("Thanks for watching!")
 log.Println(strings.Repeat("-", 88))
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的下列主題。
  - CopyObject
  - CreateBucket
  - DeleteBucket
  - DeleteObjects
  - GetObject
  - ListObjectsV2
  - PutObject

## 動作

### `CopyObject`

以下程式碼範例顯示如何使用 `CopyObject`。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
```

```
 "bytes"
 "context"
 "errors"
 "fmt"
 "io"
 "log"
 "os"
 "time"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/feature/s3/manager"
 "github.com/aws/aws-sdk-go-v2/service/s3"
 "github.com/aws/aws-sdk-go-v2/service/s3/types"
 "github.com/aws/smithy-go"
)

// BucketBasics encapsulates the Amazon Simple Storage Service (Amazon S3) actions
// used in the examples.
// It contains S3Client, an Amazon S3 service client that is used to perform bucket
// and object actions.
type BucketBasics struct {
 S3Client *s3.Client
}



// CopyToBucket copies an object in a bucket to another bucket.
func (basics BucketBasics) CopyToBucket(ctx context.Context, sourceBucket string,
 destinationBucket string, objectKey string) error {
 _, err := basics.S3Client.CopyObject(ctx, &s3.CopyObjectInput{
  Bucket:     aws.String(destinationBucket),
  CopySource: aws.String(fmt.Sprintf("%v/%v", sourceBucket, objectKey)),
  Key:        aws.String(objectKey),
 })
 if err != nil {
  var notActive *types.ObjectNotInActiveTierError
  if errors.As(err, &notActive) {
   log.Printf("Couldn't copy object %s from %s because the object isn't in the
 active tier.\n",
    objectKey, sourceBucket)
   err = notActive
  }
 } else {
  err = s3.NewObjectExistsWaiter(basics.S3Client).Wait(
```

```
    ctx, &s3.HeadObjectInput{Bucket: aws.String(destinationBucket), Key:
  aws.String(objectKey)}, time.Minute)
   if err != nil {
    log.Printf("Failed attempt to wait for object %s to exist.\n", objectKey)
   }
  }
  return err
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的 CopyObject。

### `CreateBucket`

以下程式碼範例顯示如何使用 `CreateBucket`。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

使用預設組態建立儲存貯體。

```
import (
 "bytes"
 "context"
 "errors"
 "fmt"
 "io"
 "log"
 "os"
 "time"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/feature/s3/manager"
 "github.com/aws/aws-sdk-go-v2/service/s3"
 "github.com/aws/aws-sdk-go-v2/service/s3/types"
```

```
 "github.com/aws/smithy-go"
)

// BucketBasics encapsulates the Amazon Simple Storage Service (Amazon S3) actions
// used in the examples.
// It contains S3Client, an Amazon S3 service client that is used to perform bucket
// and object actions.
type BucketBasics struct {
 S3Client *s3.Client
}



// CreateBucket creates a bucket with the specified name in the specified Region.
func (basics BucketBasics) CreateBucket(ctx context.Context, name string, region
 string) error {
 _, err := basics.S3Client.CreateBucket(ctx, &s3.CreateBucketInput{
  Bucket: aws.String(name),
  CreateBucketConfiguration: &types.CreateBucketConfiguration{
   LocationConstraint: types.BucketLocationConstraint(region),
  },
 })
 if err != nil {
  var owned *types.BucketAlreadyOwnedByYou
  var exists *types.BucketAlreadyExists
  if errors.As(err, &owned) {
   log.Printf("You already own bucket %s.\n", name)
   err = owned
  } else if errors.As(err, &exists) {
   log.Printf("Bucket %s already exists.\n", name)
   err = exists
  }
 } else {
  err = s3.NewBucketExistsWaiter(basics.S3Client).Wait(
   ctx, &s3.HeadBucketInput{Bucket: aws.String(name)}, time.Minute)
  if err != nil {
   log.Printf("Failed attempt to wait for bucket %s to exist.\n", name)
  }
 }
 return err
}
```

**建立具有物件鎖定的儲存貯體，並等待其出現。**

```
import (
 "bytes"
 "context"
 "errors"
 "fmt"
 "log"
 "time"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/feature/s3/manager"
 "github.com/aws/aws-sdk-go-v2/service/s3"
 "github.com/aws/aws-sdk-go-v2/service/s3/types"
 "github.com/aws/smithy-go"
)

// S3Actions wraps S3 service actions.
type S3Actions struct {
 S3Client  *s3.Client
 S3Manager *manager.Uploader
}



// CreateBucketWithLock creates a new S3 bucket with optional object locking enabled
// and waits for the bucket to exist before returning.
func (actor S3Actions) CreateBucketWithLock(ctx context.Context, bucket string,
 region string, enableObjectLock bool) (string, error) {
 input := &s3.CreateBucketInput{
  Bucket: aws.String(bucket),
  CreateBucketConfiguration: &types.CreateBucketConfiguration{
   LocationConstraint: types.BucketLocationConstraint(region),
  },
 }

 if enableObjectLock {
  input.ObjectLockEnabledForBucket = aws.Bool(true)
 }

 _, err := actor.S3Client.CreateBucket(ctx, input)
 if err != nil {
  var owned *types.BucketAlreadyOwnedByYou
```

```
  var exists *types.BucketAlreadyExists
  if errors.As(err, &owned) {
   log.Printf("You already own bucket %s.\n", bucket)
   err = owned
  } else if errors.As(err, &exists) {
   log.Printf("Bucket %s already exists.\n", bucket)
   err = exists
  }
 } else {
  err = s3.NewBucketExistsWaiter(actor.S3Client).Wait(
   ctx, &s3.HeadBucketInput{Bucket: aws.String(bucket)}, time.Minute)
  if err != nil {
   log.Printf("Failed attempt to wait for bucket %s to exist.\n", bucket)
  }
 }

 return bucket, err
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的 CreateBucket。

### `DeleteBucket`

以下程式碼範例顯示如何使用 `DeleteBucket`。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "bytes"
 "context"
 "errors"
 "fmt"
 "io"
```

```
 "log"
 "os"
 "time"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/feature/s3/manager"
 "github.com/aws/aws-sdk-go-v2/service/s3"
 "github.com/aws/aws-sdk-go-v2/service/s3/types"
 "github.com/aws/smithy-go"
)

// BucketBasics encapsulates the Amazon Simple Storage Service (Amazon S3) actions
// used in the examples.
// It contains S3Client, an Amazon S3 service client that is used to perform bucket
// and object actions.
type BucketBasics struct {
 S3Client *s3.Client
}



// DeleteBucket deletes a bucket. The bucket must be empty or an error is returned.
func (basics BucketBasics) DeleteBucket(ctx context.Context, bucketName string)
 error {
 _, err := basics.S3Client.DeleteBucket(ctx, &s3.DeleteBucketInput{
  Bucket: aws.String(bucketName)})
 if err != nil {
  var noBucket *types.NoSuchBucket
  if errors.As(err, &noBucket) {
   log.Printf("Bucket %s does not exist.\n", bucketName)
   err = noBucket
  } else {
   log.Printf("Couldn't delete bucket %v. Here's why: %v\n", bucketName, err)
  }
 } else {
  err = s3.NewBucketNotExistsWaiter(basics.S3Client).Wait(
   ctx, &s3.HeadBucketInput{Bucket: aws.String(bucketName)}, time.Minute)
  if err != nil {
   log.Printf("Failed attempt to wait for bucket %s to be deleted.\n", bucketName)
  } else {
   log.Printf("Deleted %s.\n", bucketName)
  }
 }
 return err
```

```
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的 DeleteBucket。

### `DeleteObject`

以下程式碼範例顯示如何使用 `DeleteObject`。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "bytes"
 "context"
 "errors"
 "fmt"
 "log"
 "time"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/feature/s3/manager"
 "github.com/aws/aws-sdk-go-v2/service/s3"
 "github.com/aws/aws-sdk-go-v2/service/s3/types"
 "github.com/aws/smithy-go"
)

// S3Actions wraps S3 service actions.
type S3Actions struct {
 S3Client  *s3.Client
 S3Manager *manager.Uploader
}
```

```
// DeleteObject deletes an object from a bucket.
func (actor S3Actions) DeleteObject(ctx context.Context, bucket string, key string,
 versionId string, bypassGovernance bool) (bool, error) {
 deleted := false
 input := &s3.DeleteObjectInput{
  Bucket: aws.String(bucket),
  Key:    aws.String(key),
 }
 if versionId != "" {
  input.VersionId = aws.String(versionId)
 }
 if bypassGovernance {
  input.BypassGovernanceRetention = aws.Bool(true)
 }
 _, err := actor.S3Client.DeleteObject(ctx, input)
 if err != nil {
  var noKey *types.NoSuchKey
  var apiErr *smithy.GenericAPIError
  if errors.As(err, &noKey) {
   log.Printf("Object %s does not exist in %s.\n", key, bucket)
   err = noKey
  } else if errors.As(err, &apiErr) {
   switch apiErr.ErrorCode() {
   case "AccessDenied":
    log.Printf("Access denied: cannot delete object %s from %s.\n", key, bucket)
    err = nil
   case "InvalidArgument":
    if bypassGovernance {
     log.Printf("You cannot specify bypass governance on a bucket without lock
enabled.")
     err = nil
    }
   }
  }
 } else {
  err = s3.NewObjectNotExistsWaiter(actor.S3Client).Wait(
   ctx, &s3.HeadObjectInput{Bucket: aws.String(bucket), Key: aws.String(key)},
time.Minute)
  if err != nil {
   log.Printf("Failed attempt to wait for object %s in bucket %s to be deleted.\n",
key, bucket)
  } else {
   deleted = true
  }
```

```
 }
 return deleted, err
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的 DeleteObject。

### `DeleteObjects`

以下程式碼範例顯示如何使用 `DeleteObjects`。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "bytes"
 "context"
 "errors"
 "fmt"
 "log"
 "time"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/feature/s3/manager"
 "github.com/aws/aws-sdk-go-v2/service/s3"
 "github.com/aws/aws-sdk-go-v2/service/s3/types"
 "github.com/aws/smithy-go"
)

// S3Actions wraps S3 service actions.
type S3Actions struct {
 S3Client  *s3.Client
 S3Manager *manager.Uploader
}
```

```
// DeleteObjects deletes a list of objects from a bucket.
func (actor S3Actions) DeleteObjects(ctx context.Context, bucket string, objects
 []types.ObjectIdentifier, bypassGovernance bool) error {
 if len(objects) == 0 {
  return nil
 }

 input := s3.DeleteObjectsInput{
  Bucket: aws.String(bucket),
  Delete: &types.Delete{
   Objects: objects,
   Quiet:   aws.Bool(true),
  },
 }
 if bypassGovernance {
  input.BypassGovernanceRetention = aws.Bool(true)
 }
 delOut, err := actor.S3Client.DeleteObjects(ctx, &input)
 if err != nil || len(delOut.Errors) > 0 {
  log.Printf("Error deleting objects from bucket %s.\n", bucket)
  if err != nil {
   var noBucket *types.NoSuchBucket
   if errors.As(err, &noBucket) {
    log.Printf("Bucket %s does not exist.\n", bucket)
    err = noBucket
   }
  } else if len(delOut.Errors) > 0 {
   for _, outErr := range delOut.Errors {
    log.Printf("%s: %s\n", *outErr.Key, *outErr.Message)
   }
   err = fmt.Errorf("%s", *delOut.Errors[0].Message)
  }
 } else {
  for _, delObjs := range delOut.Deleted {
   err = s3.NewObjectNotExistsWaiter(actor.S3Client).Wait(
    ctx, &s3.HeadObjectInput{Bucket: aws.String(bucket), Key: delObjs.Key},
 time.Minute)
   if err != nil {
    log.Printf("Failed attempt to wait for object %s to be deleted.\n",
 *delObjs.Key)
   } else {
    log.Printf("Deleted %s.\n", *delObjs.Key)
```

```
    }
   }
  }
  return err
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的 DeleteObjects。

### `GetObject`

以下程式碼範例顯示如何使用 `GetObject`。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "bytes"
 "context"
 "errors"
 "fmt"
 "io"
 "log"
 "os"
 "time"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/feature/s3/manager"
 "github.com/aws/aws-sdk-go-v2/service/s3"
 "github.com/aws/aws-sdk-go-v2/service/s3/types"
 "github.com/aws/smithy-go"
)

// BucketBasics encapsulates the Amazon Simple Storage Service (Amazon S3) actions
// used in the examples.
```

```
// It contains S3Client, an Amazon S3 service client that is used to perform bucket
// and object actions.
type BucketBasics struct {
 S3Client *s3.Client
}



// DownloadFile gets an object from a bucket and stores it in a local file.
func (basics BucketBasics) DownloadFile(ctx context.Context, bucketName string,
 objectKey string, fileName string) error {
 result, err := basics.S3Client.GetObject(ctx, &s3.GetObjectInput{
  Bucket: aws.String(bucketName),
  Key:    aws.String(objectKey),
 })
 if err != nil {
  var noKey *types.NoSuchKey
  if errors.As(err, &noKey) {
   log.Printf("Can't get object %s from bucket %s. No such key exists.\n",
 objectKey, bucketName)
   err = noKey
  } else {
   log.Printf("Couldn't get object %v:%v. Here's why: %v\n", bucketName, objectKey,
 err)
  }
  return err
 }
 defer result.Body.Close()
 file, err := os.Create(fileName)
 if err != nil {
  log.Printf("Couldn't create file %v. Here's why: %v\n", fileName, err)
  return err
 }
 defer file.Close()
 body, err := io.ReadAll(result.Body)
 if err != nil {
  log.Printf("Couldn't read object body from %v. Here's why: %v\n", objectKey, err)
 }
 _, err = file.Write(body)
 return err
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的 GetObject。

### `GetObjectLegalHold`

以下程式碼範例顯示如何使用 `GetObjectLegalHold`。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "bytes"
 "context"
 "errors"
 "fmt"
 "log"
 "time"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/feature/s3/manager"
 "github.com/aws/aws-sdk-go-v2/service/s3"
 "github.com/aws/aws-sdk-go-v2/service/s3/types"
 "github.com/aws/smithy-go"
)

// S3Actions wraps S3 service actions.
type S3Actions struct {
 S3Client  *s3.Client
 S3Manager *manager.Uploader
}



// GetObjectLegalHold retrieves the legal hold status for an S3 object.
func (actor S3Actions) GetObjectLegalHold(ctx context.Context, bucket string, key
 string, versionId string) (*types.ObjectLockLegalHoldStatus, error) {
 var status *types.ObjectLockLegalHoldStatus
```

```
 input := &s3.GetObjectLegalHoldInput{
  Bucket:    aws.String(bucket),
  Key:       aws.String(key),
  VersionId: aws.String(versionId),
 }

 output, err := actor.S3Client.GetObjectLegalHold(ctx, input)
 if err != nil {
  var noSuchKeyErr *types.NoSuchKey
  var apiErr *smithy.GenericAPIError
  if errors.As(err, &noSuchKeyErr) {
   log.Printf("Object %s does not exist in bucket %s.\n", key, bucket)
   err = noSuchKeyErr
  } else if errors.As(err, &apiErr) {
   switch apiErr.ErrorCode() {
   case "NoSuchObjectLockConfiguration":
    log.Printf("Object %s does not have an object lock configuration.\n", key)
    err = nil
   case "InvalidRequest":
    log.Printf("Bucket %s does not have an object lock configuration.\n", bucket)
    err = nil
   }
  }
 } else {
  status = &output.LegalHold.Status
 }

 return status, err
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的 GetObjectLegalHold。

### GetObjectLockConfiguration

以下程式碼範例顯示如何使用 GetObjectLockConfiguration。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "bytes"
 "context"
 "errors"
 "fmt"
 "log"
 "time"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/feature/s3/manager"
 "github.com/aws/aws-sdk-go-v2/service/s3"
 "github.com/aws/aws-sdk-go-v2/service/s3/types"
 "github.com/aws/smithy-go"
)

// S3Actions wraps S3 service actions.
type S3Actions struct {
 S3Client  *s3.Client
 S3Manager *manager.Uploader
}



// GetObjectLockConfiguration retrieves the object lock configuration for an S3
 bucket.
func (actor S3Actions) GetObjectLockConfiguration(ctx context.Context, bucket
 string) (*types.ObjectLockConfiguration, error) {
 var lockConfig *types.ObjectLockConfiguration
 input := &s3.GetObjectLockConfigurationInput{
  Bucket: aws.String(bucket),
 }

 output, err := actor.S3Client.GetObjectLockConfiguration(ctx, input)
```

```
 if err != nil {
  var noBucket *types.NoSuchBucket
  var apiErr *smithy.GenericAPIError
  if errors.As(err, &noBucket) {
   log.Printf("Bucket %s does not exist.\n", bucket)
   err = noBucket
  } else if errors.As(err, &apiErr) && apiErr.ErrorCode() ==
 "ObjectLockConfigurationNotFoundError" {
   log.Printf("Bucket %s does not have an object lock configuration.\n", bucket)
   err = nil
  }
 } else {
  lockConfig = output.ObjectLockConfiguration
 }

 return lockConfig, err
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的 GetObjectLockConfiguration。

### `GetObjectRetention`

以下程式碼範例顯示如何使用 `GetObjectRetention`。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "bytes"
 "context"
 "errors"
 "fmt"
```

```
 "log"
 "time"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/feature/s3/manager"
 "github.com/aws/aws-sdk-go-v2/service/s3"
 "github.com/aws/aws-sdk-go-v2/service/s3/types"
 "github.com/aws/smithy-go"
)

// S3Actions wraps S3 service actions.
type S3Actions struct {
 S3Client  *s3.Client
 S3Manager *manager.Uploader
}



// GetObjectRetention retrieves the object retention configuration for an S3 object.
func (actor S3Actions) GetObjectRetention(ctx context.Context, bucket string, key
 string) (*types.ObjectLockRetention, error) {
 var retention *types.ObjectLockRetention
 input := &s3.GetObjectRetentionInput{
  Bucket: aws.String(bucket),
  Key:    aws.String(key),
 }

 output, err := actor.S3Client.GetObjectRetention(ctx, input)
 if err != nil {
  var noKey *types.NoSuchKey
  var apiErr *smithy.GenericAPIError
  if errors.As(err, &noKey) {
   log.Printf("Object %s does not exist in bucket %s.\n", key, bucket)
   err = noKey
  } else if errors.As(err, &apiErr) {
   switch apiErr.ErrorCode() {
   case "NoSuchObjectLockConfiguration":
    err = nil
   case "InvalidRequest":
    log.Printf("Bucket %s does not have locking enabled.", bucket)
    err = nil
   }
  }
 } else {
```

```
  retention = output.Retention
 }

 return retention, err
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的 GetObjectRetention。

### `HeadBucket`

以下程式碼範例顯示如何使用 `HeadBucket`。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "bytes"
 "context"
 "errors"
 "fmt"
 "io"
 "log"
 "os"
 "time"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/feature/s3/manager"
 "github.com/aws/aws-sdk-go-v2/service/s3"
 "github.com/aws/aws-sdk-go-v2/service/s3/types"
 "github.com/aws/smithy-go"
)

// BucketBasics encapsulates the Amazon Simple Storage Service (Amazon S3) actions
// used in the examples.
```

```
// It contains S3Client, an Amazon S3 service client that is used to perform bucket
// and object actions.
type BucketBasics struct {
 S3Client *s3.Client
}



// BucketExists checks whether a bucket exists in the current account.
func (basics BucketBasics) BucketExists(ctx context.Context, bucketName string)
 (bool, error) {
 _, err := basics.S3Client.HeadBucket(ctx, &s3.HeadBucketInput{
  Bucket: aws.String(bucketName),
 })
 exists := true
 if err != nil {
  var apiError smithy.APIError
  if errors.As(err, &apiError) {
   switch apiError.(type) {
   case *types.NotFound:
    log.Printf("Bucket %v is available.\n", bucketName)
    exists = false
    err = nil
   default:
    log.Printf("Either you don't have access to bucket %v or another error occurred.
 "+
     "Here's what happened: %v\n", bucketName, err)
   }
  }
 } else {
  log.Printf("Bucket %v exists and you already own it.", bucketName)
 }

 return exists, err
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的 HeadBucket。

### `ListBuckets`

以下程式碼範例顯示如何使用 `ListBuckets`。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "bytes"
 "context"
 "errors"
 "fmt"
 "io"
 "log"
 "os"
 "time"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/feature/s3/manager"
 "github.com/aws/aws-sdk-go-v2/service/s3"
 "github.com/aws/aws-sdk-go-v2/service/s3/types"
 "github.com/aws/smithy-go"
)

// BucketBasics encapsulates the Amazon Simple Storage Service (Amazon S3) actions
// used in the examples.
// It contains S3Client, an Amazon S3 service client that is used to perform bucket
// and object actions.
type BucketBasics struct {
 S3Client *s3.Client
}



// ListBuckets lists the buckets in the current account.
func (basics BucketBasics) ListBuckets(ctx context.Context) ([]types.Bucket, error)
 {
 var err error
 var output *s3.ListBucketsOutput
 var buckets []types.Bucket
```

```
 bucketPaginator := s3.NewListBucketsPaginator(basics.S3Client,
 &s3.ListBucketsInput{})
 for bucketPaginator.HasMorePages() {
  output, err = bucketPaginator.NextPage(ctx)
  if err != nil {
   var apiErr smithy.APIError
   if errors.As(err, &apiErr) && apiErr.ErrorCode() == "AccessDenied" {
    fmt.Println("You don't have permission to list buckets for this account.")
    err = apiErr
   } else {
    log.Printf("Couldn't list buckets for your account. Here's why: %v\n", err)
   }
   break
  } else {
   buckets = append(buckets, output.Buckets...)
  }
 }
 return buckets, err
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的 ListBuckets。

### `ListObjectVersions`

以下程式碼範例顯示如何使用 `ListObjectVersions`。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "bytes"
 "context"
 "errors"
 "fmt"
```

```
 "log"
 "time"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/feature/s3/manager"
 "github.com/aws/aws-sdk-go-v2/service/s3"
 "github.com/aws/aws-sdk-go-v2/service/s3/types"
 "github.com/aws/smithy-go"
)

// S3Actions wraps S3 service actions.
type S3Actions struct {
 S3Client  *s3.Client
 S3Manager *manager.Uploader
}



// ListObjectVersions lists all versions of all objects in a bucket.
func (actor S3Actions) ListObjectVersions(ctx context.Context, bucket string)
 ([]types.ObjectVersion, error) {
 var err error
 var output *s3.ListObjectVersionsOutput
 var versions []types.ObjectVersion
 input := &s3.ListObjectVersionsInput{Bucket: aws.String(bucket)}
 versionPaginator := s3.NewListObjectVersionsPaginator(actor.S3Client, input)
 for versionPaginator.HasMorePages() {
  output, err = versionPaginator.NextPage(ctx)
  if err != nil {
   var noBucket *types.NoSuchBucket
   if errors.As(err, &noBucket) {
    log.Printf("Bucket %s does not exist.\n", bucket)
    err = noBucket
   }
   break
  } else {
   versions = append(versions, output.Versions...)
  }
 }
 return versions, err
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的 ListObjectVersions。

### `ListObjectsV2`

以下程式碼範例顯示如何使用 `ListObjectsV2`。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "bytes"
 "context"
 "errors"
 "fmt"
 "io"
 "log"
 "os"
 "time"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/feature/s3/manager"
 "github.com/aws/aws-sdk-go-v2/service/s3"
 "github.com/aws/aws-sdk-go-v2/service/s3/types"
 "github.com/aws/smithy-go"
)

// BucketBasics encapsulates the Amazon Simple Storage Service (Amazon S3) actions
// used in the examples.
// It contains S3Client, an Amazon S3 service client that is used to perform bucket
// and object actions.
type BucketBasics struct {
 S3Client *s3.Client
}
```

```
// ListObjects lists the objects in a bucket.
func (basics BucketBasics) ListObjects(ctx context.Context, bucketName string)
 ([]types.Object, error) {
 var err error
 var output *s3.ListObjectsV2Output
 input := &s3.ListObjectsV2Input{
  Bucket: aws.String(bucketName),
 }
 var objects []types.Object
 objectPaginator := s3.NewListObjectsV2Paginator(basics.S3Client, input)
 for objectPaginator.HasMorePages() {
  output, err = objectPaginator.NextPage(ctx)
  if err != nil {
   var noBucket *types.NoSuchBucket
   if errors.As(err, &noBucket) {
    log.Printf("Bucket %s does not exist.\n", bucketName)
    err = noBucket
   }
   break
  } else {
   objects = append(objects, output.Contents...)
  }
 }
 return objects, err
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的 ListObjectsV2。

### `PutObject`

以下程式碼範例顯示如何使用 `PutObject`。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

使用低階 API 將物件放入儲存貯體。

```
import (
 "bytes"
 "context"
 "errors"
 "fmt"
 "io"
 "log"
 "os"
 "time"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/feature/s3/manager"
 "github.com/aws/aws-sdk-go-v2/service/s3"
 "github.com/aws/aws-sdk-go-v2/service/s3/types"
 "github.com/aws/smithy-go"
)

// BucketBasics encapsulates the Amazon Simple Storage Service (Amazon S3) actions
// used in the examples.
// It contains S3Client, an Amazon S3 service client that is used to perform bucket
// and object actions.
type BucketBasics struct {
 S3Client *s3.Client
}



// UploadFile reads from a file and puts the data into an object in a bucket.
func (basics BucketBasics) UploadFile(ctx context.Context, bucketName string,
 objectKey string, fileName string) error {
 file, err := os.Open(fileName)
 if err != nil {
  log.Printf("Couldn't open file %v to upload. Here's why: %v\n", fileName, err)
 } else {
  defer file.Close()
  _, err = basics.S3Client.PutObject(ctx, &s3.PutObjectInput{
   Bucket: aws.String(bucketName),
   Key:    aws.String(objectKey),
   Body:   file,
  })
  if err != nil {
```

```
   var apiErr smithy.APIError
   if errors.As(err, &apiErr) && apiErr.ErrorCode() == "EntityTooLarge" {
    log.Printf("Error while uploading object to %s. The object is too large.\n"+
     "To upload objects larger than 5GB, use the S3 console (160GB max)\n"+
     "or the multipart upload API (5TB max).", bucketName)
   } else {
    log.Printf("Couldn't upload file %v to %v:%v. Here's why: %v\n",
     fileName, bucketName, objectKey, err)
   }
  } else {
   err = s3.NewObjectExistsWaiter(basics.S3Client).Wait(
    ctx, &s3.HeadObjectInput{Bucket: aws.String(bucketName), Key:
 aws.String(objectKey)}, time.Minute)
   if err != nil {
    log.Printf("Failed attempt to wait for object %s to exist.\n", objectKey)
   }
  }
 }
 return err
}
```

使用傳輸管理員將物件上傳至儲存貯體。

```
import (
 "bytes"
 "context"
 "errors"
 "fmt"
 "log"
 "time"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/feature/s3/manager"
 "github.com/aws/aws-sdk-go-v2/service/s3"
 "github.com/aws/aws-sdk-go-v2/service/s3/types"
 "github.com/aws/smithy-go"
)

// S3Actions wraps S3 service actions.
type S3Actions struct {
```

```
 S3Client  *s3.Client
 S3Manager *manager.Uploader
}



// UploadObject uses the S3 upload manager to upload an object to a bucket.
func (actor S3Actions) UploadObject(ctx context.Context, bucket string, key string,
 contents string) (string, error) {
 var outKey string
 input := &s3.PutObjectInput{
  Bucket:            aws.String(bucket),
  Key:               aws.String(key),
  Body:              bytes.NewReader([]byte(contents)),
  ChecksumAlgorithm: types.ChecksumAlgorithmSha256,
 }
 output, err := actor.S3Manager.Upload(ctx, input)
 if err != nil {
  var noBucket *types.NoSuchBucket
  if errors.As(err, &noBucket) {
   log.Printf("Bucket %s does not exist.\n", bucket)
   err = noBucket
  }
 } else {
  err := s3.NewObjectExistsWaiter(actor.S3Client).Wait(ctx, &s3.HeadObjectInput{
   Bucket: aws.String(bucket),
   Key:    aws.String(key),
  }, time.Minute)
  if err != nil {
   log.Printf("Failed attempt to wait for object %s to exist in %s.\n", key, bucket)
  } else {
   outKey = *output.Key
  }
 }
 return outKey, err
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的 PutObject。

### PutObjectLegalHold

以下程式碼範例顯示如何使用 PutObjectLegalHold。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "bytes"
 "context"
 "errors"
 "fmt"
 "log"
 "time"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/feature/s3/manager"
 "github.com/aws/aws-sdk-go-v2/service/s3"
 "github.com/aws/aws-sdk-go-v2/service/s3/types"
 "github.com/aws/smithy-go"
)

// S3Actions wraps S3 service actions.
type S3Actions struct {
 S3Client  *s3.Client
 S3Manager *manager.Uploader
}



// PutObjectLegalHold sets the legal hold configuration for an S3 object.
func (actor S3Actions) PutObjectLegalHold(ctx context.Context, bucket string, key
 string, versionId string, legalHoldStatus types.ObjectLockLegalHoldStatus) error {
 input := &s3.PutObjectLegalHoldInput{
  Bucket: aws.String(bucket),
  Key:    aws.String(key),
  LegalHold: &types.ObjectLockLegalHold{
```

```
    Status: legalHoldStatus,
   },
  }
  if versionId != "" {
   input.VersionId = aws.String(versionId)
  }

  _, err := actor.S3Client.PutObjectLegalHold(ctx, input)
  if err != nil {
   var noKey *types.NoSuchKey
   if errors.As(err, &noKey) {
    log.Printf("Object %s does not exist in bucket %s.\n", key, bucket)
    err = noKey
   }
  }

  return err
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的 PutObjectLegalHold。

### `PutObjectLockConfiguration`

以下程式碼範例顯示如何使用 `PutObjectLockConfiguration`。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，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。

```
import (
 "bytes"
 "context"
 "errors"
```

```
 "fmt"
 "log"
 "time"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/feature/s3/manager"
 "github.com/aws/aws-sdk-go-v2/service/s3"
 "github.com/aws/aws-sdk-go-v2/service/s3/types"
 "github.com/aws/smithy-go"
)

// S3Actions wraps S3 service actions.
type S3Actions struct {
 S3Client  *s3.Client
 S3Manager *manager.Uploader
}



// EnableObjectLockOnBucket enables object locking on an existing bucket.
func (actor S3Actions) EnableObjectLockOnBucket(ctx context.Context, bucket string)
 error {
 // Versioning must be enabled on the bucket before object locking is enabled.
 verInput := &s3.PutBucketVersioningInput{
  Bucket: aws.String(bucket),
  VersioningConfiguration: &types.VersioningConfiguration{
   MFADelete: types.MFADeleteDisabled,
   Status:    types.BucketVersioningStatusEnabled,
  },
 }
 _, err := actor.S3Client.PutBucketVersioning(ctx, verInput)
 if err != nil {
  var noBucket *types.NoSuchBucket
  if errors.As(err, &noBucket) {
   log.Printf("Bucket %s does not exist.\n", bucket)
   err = noBucket
  }
  return err
 }

 input := &s3.PutObjectLockConfigurationInput{
  Bucket: aws.String(bucket),
  ObjectLockConfiguration: &types.ObjectLockConfiguration{
   ObjectLockEnabled: types.ObjectLockEnabledEnabled,
```

```
  },
 }
 _, err = actor.S3Client.PutObjectLockConfiguration(ctx, input)
 if err != nil {
  var noBucket *types.NoSuchBucket
  if errors.As(err, &noBucket) {
   log.Printf("Bucket %s does not exist.\n", bucket)
   err = noBucket
  }
 }

 return err
}
```

設定儲存貯體的預設保留期間。

```
import (
 "bytes"
 "context"
 "errors"
 "fmt"
 "log"
 "time"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/feature/s3/manager"
 "github.com/aws/aws-sdk-go-v2/service/s3"
 "github.com/aws/aws-sdk-go-v2/service/s3/types"
 "github.com/aws/smithy-go"
)

// S3Actions wraps S3 service actions.
type S3Actions struct {
 S3Client  *s3.Client
 S3Manager *manager.Uploader
}
```

```
// ModifyDefaultBucketRetention modifies the default retention period of an existing
 bucket.
func (actor S3Actions) ModifyDefaultBucketRetention(
 ctx context.Context, bucket string, lockMode types.ObjectLockEnabled,
 retentionPeriod int32, retentionMode types.ObjectLockRetentionMode) error {

 input := &s3.PutObjectLockConfigurationInput{
  Bucket: aws.String(bucket),
  ObjectLockConfiguration: &types.ObjectLockConfiguration{
   ObjectLockEnabled: lockMode,
   Rule: &types.ObjectLockRule{
    DefaultRetention: &types.DefaultRetention{
     Days: aws.Int32(retentionPeriod),
     Mode: retentionMode,
    },
   },
  },
 }
 _, err := actor.S3Client.PutObjectLockConfiguration(ctx, input)
 if err != nil {
  var noBucket *types.NoSuchBucket
  if errors.As(err, &noBucket) {
   log.Printf("Bucket %s does not exist.\n", bucket)
   err = noBucket
  }
 }

 return err
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的 PutObjectLockConfiguration。

### PutObjectRetention

以下程式碼範例顯示如何使用 PutObjectRetention。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "bytes"
 "context"
 "errors"
 "fmt"
 "log"
 "time"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/feature/s3/manager"
 "github.com/aws/aws-sdk-go-v2/service/s3"
 "github.com/aws/aws-sdk-go-v2/service/s3/types"
 "github.com/aws/smithy-go"
)

// S3Actions wraps S3 service actions.
type S3Actions struct {
 S3Client  *s3.Client
 S3Manager *manager.Uploader
}



// PutObjectRetention sets the object retention configuration for an S3 object.
func (actor S3Actions) PutObjectRetention(ctx context.Context, bucket string, key
 string, retentionMode types.ObjectLockRetentionMode, retentionPeriodDays int32)
 error {
 input := &s3.PutObjectRetentionInput{
  Bucket: aws.String(bucket),
  Key:    aws.String(key),
  Retention: &types.ObjectLockRetention{
   Mode:            retentionMode,
   RetainUntilDate: aws.Time(time.Now().AddDate(0, 0, int(retentionPeriodDays))),
```

```
  },
  BypassGovernanceRetention: aws.Bool(true),
 }

 _, err := actor.S3Client.PutObjectRetention(ctx, input)
 if err != nil {
  var noKey *types.NoSuchKey
  if errors.As(err, &noKey) {
   log.Printf("Object %s does not exist in bucket %s.\n", key, bucket)
   err = noKey
  }
 }

 return err
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的 PutObjectRetention。

## 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。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，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 S3 預先簽章動作的函數。

```
import (
 "context"
 "log"
 "time"
```

```
 "github.com/aws/aws-sdk-go-v2/aws"
 v4 "github.com/aws/aws-sdk-go-v2/aws/signer/v4"
 "github.com/aws/aws-sdk-go-v2/service/s3"
)

// Presigner encapsulates the Amazon Simple Storage Service (Amazon S3) presign
 actions
// used in the examples.
// It contains PresignClient, a client that is used to presign requests to Amazon
 S3.
// Presigned requests contain temporary credentials and can be made from any HTTP
 client.
type Presigner struct {
 PresignClient *s3.PresignClient
}



// GetObject makes a presigned request that can be used to get an object from a
 bucket.
// The presigned request is valid for the specified number of seconds.
func (presigner Presigner) GetObject(
 ctx context.Context, bucketName string, objectKey string, lifetimeSecs int64)
 (*v4.PresignedHTTPRequest, error) {
 request, err := presigner.PresignClient.PresignGetObject(ctx, &s3.GetObjectInput{
  Bucket: aws.String(bucketName),
  Key:    aws.String(objectKey),
 }, func(opts *s3.PresignOptions) {
  opts.Expires = time.Duration(lifetimeSecs * int64(time.Second))
 })
 if err != nil {
  log.Printf("Couldn't get a presigned request to get %v:%v. Here's why: %v\n",
   bucketName, objectKey, err)
 }
 return request, err
}



// PutObject makes a presigned request that can be used to put an object in a
 bucket.
// The presigned request is valid for the specified number of seconds.
func (presigner Presigner) PutObject(
```

```
 ctx context.Context, bucketName string, objectKey string, lifetimeSecs int64)
 (*v4.PresignedHTTPRequest, error) {
 request, err := presigner.PresignClient.PresignPutObject(ctx, &s3.PutObjectInput{
  Bucket: aws.String(bucketName),
  Key:    aws.String(objectKey),
 }, func(opts *s3.PresignOptions) {
  opts.Expires = time.Duration(lifetimeSecs * int64(time.Second))
 })
 if err != nil {
  log.Printf("Couldn't get a presigned request to put %v:%v. Here's why: %v\n",
   bucketName, objectKey, err)
 }
 return request, err
}



// DeleteObject makes a presigned request that can be used to delete an object from
 a bucket.
func (presigner Presigner) DeleteObject(ctx context.Context, bucketName string,
 objectKey string) (*v4.PresignedHTTPRequest, error) {
 request, err := presigner.PresignClient.PresignDeleteObject(ctx,
 &s3.DeleteObjectInput{
  Bucket: aws.String(bucketName),
  Key:    aws.String(objectKey),
 })
 if err != nil {
  log.Printf("Couldn't get a presigned request to delete object %v. Here's why: %v
\n", objectKey, err)
 }
 return request, err
}



func (presigner Presigner) PresignPostObject(ctx context.Context, bucketName string,
 objectKey string, lifetimeSecs int64) (*s3.PresignedPostRequest, error) {
 request, err := presigner.PresignClient.PresignPostObject(ctx, &s3.PutObjectInput{
  Bucket: aws.String(bucketName),
  Key:    aws.String(objectKey),
 }, func(options *s3.PresignPostOptions) {
  options.Expires = time.Duration(lifetimeSecs) * time.Second
 })
 if err != nil {
```

```
  log.Printf("Couldn't get a presigned post request to put %v:%v. Here's why: %v\n",
 bucketName, objectKey, err)
 }
 return request, nil
}
```

執行互動式範例，產生並使用預先簽章的 URL 來上傳、下載和刪除 S3 物件。

```
import (
 "bytes"
 "context"
 "io"
 "log"
 "mime/multipart"
 "net/http"
 "os"
 "strings"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/s3"
 "github.com/awsdocs/aws-doc-sdk-examples/gov2/demotools"
 "github.com/awsdocs/aws-doc-sdk-examples/gov2/s3/actions"
)



// RunPresigningScenario is an interactive example that shows you how to get
 presigned
// HTTP requests that you can use to move data into and out of Amazon Simple Storage
// Service (Amazon S3). The presigned requests contain temporary credentials and can
// be used by an HTTP client.
//
// 1. Get a presigned request to put an object in a bucket.
// 2. Use the net/http package to use the presigned request to upload a local file
 to the bucket.
// 3. Get a presigned request to get an object from a bucket.
// 4. Use the net/http package to use the presigned request to download the object
 to a local file.
// 5. Get a presigned request to delete an object from a bucket.
```

```
// 6. Use the net/http package to use the presigned request to delete the object.
//
// This example creates an Amazon S3 presign client from the specified sdkConfig so
 that
// you can replace it with a mocked or stubbed config for unit testing.
//
// It uses a questioner from the `demotools` package to get input during the
 example.
// This package can be found in the ..\..\demotools folder of this repo.
//
// It uses an IHttpRequester interface to abstract HTTP requests so they can be
 mocked
// during testing.
func RunPresigningScenario(ctx context.Context, sdkConfig aws.Config, questioner
 demotools.IQuestioner, httpRequester IHttpRequester) {
 defer func() {
  if r := recover(); r != nil {
   log.Println("Something went wrong with the demo.")
   _, isMock := questioner.(*demotools.MockQuestioner)
   if isMock || questioner.AskBool("Do you want to see the full error message (y/
n)?", "y") {
    log.Println(r)
   }
  }
 }()

 log.Println(strings.Repeat("-", 88))
 log.Println("Welcome to the Amazon S3 presigning demo.")
 log.Println(strings.Repeat("-", 88))

 s3Client := s3.NewFromConfig(sdkConfig)
 bucketBasics := actions.BucketBasics{S3Client: s3Client}
 presignClient := s3.NewPresignClient(s3Client)
 presigner := actions.Presigner{PresignClient: presignClient}

 bucketName := questioner.Ask("We'll need a bucket. Enter a name for a bucket "+
  "you own or one you want to create:", demotools.NotEmpty{})
 bucketExists, err := bucketBasics.BucketExists(ctx, bucketName)
 if err != nil {
  panic(err)
 }
 if !bucketExists {
  err = bucketBasics.CreateBucket(ctx, bucketName, sdkConfig.Region)
  if err != nil {
```

```
  panic(err)
 } else {
  log.Println("Bucket created.")
 }
}
log.Println(strings.Repeat("-", 88))

log.Printf("Let's presign a request to upload a file to your bucket.")
uploadFilename := questioner.Ask("Enter the path to a file you want to upload:",
 demotools.NotEmpty{})
uploadKey := questioner.Ask("What would you like to name the uploaded object?",
 demotools.NotEmpty{})
uploadFile, err := os.Open(uploadFilename)
if err != nil {
 panic(err)
}
defer uploadFile.Close()
presignedPutRequest, err := presigner.PutObject(ctx, bucketName, uploadKey, 60)
if err != nil {
 panic(err)
}
log.Printf("Got a presigned %v request to URL:\n\t%v\n",
presignedPutRequest.Method,
 presignedPutRequest.URL)
log.Println("Using net/http to send the request...")
info, err := uploadFile.Stat()
if err != nil {
 panic(err)
}
putResponse, err := httpRequester.Put(presignedPutRequest.URL, info.Size(),
uploadFile)
if err != nil {
 panic(err)
}
log.Printf("%v object %v with presigned URL returned %v.",
presignedPutRequest.Method,
 uploadKey, putResponse.StatusCode)
log.Println(strings.Repeat("-", 88))

log.Printf("Let's presign a request to download the object.")
questioner.Ask("Press Enter when you're ready.")
presignedGetRequest, err := presigner.GetObject(ctx, bucketName, uploadKey, 60)
if err != nil {
 panic(err)
```

```
}
log.Printf("Got a presigned %v request to URL:\n\t%v\n",
presignedGetRequest.Method,
 presignedGetRequest.URL)
log.Println("Using net/http to send the request...")
getResponse, err := httpRequester.Get(presignedGetRequest.URL)
if err != nil {
 panic(err)
}
log.Printf("%v object %v with presigned URL returned %v.",
presignedGetRequest.Method,
 uploadKey, getResponse.StatusCode)
defer getResponse.Body.Close()
downloadBody, err := io.ReadAll(getResponse.Body)
if err != nil {
 panic(err)
}
log.Printf("Downloaded %v bytes. Here are the first 100 of them:\n",
len(downloadBody))
log.Println(strings.Repeat("-", 88))
log.Println(string(downloadBody[:100]))
log.Println(strings.Repeat("-", 88))

log.Println("Now we'll create a new request to put the same object using a
presigned post request")
questioner.Ask("Press Enter when you're ready.")
presignPostRequest, err := presigner.PresignPostObject(ctx, bucketName, uploadKey,
60)
if err != nil {
 panic(err)
}
log.Printf("Got a presigned post request to url %v with values %v\n",
presignPostRequest.URL, presignPostRequest.Values)
log.Println("Using net/http multipart to send the request...")
uploadFile, err = os.Open(uploadFilename)
if err != nil {
 panic(err)
}
defer uploadFile.Close()
multiPartResponse, err := sendMultipartRequest(presignPostRequest.URL,
presignPostRequest.Values, uploadFile, uploadKey, httpRequester)
if err != nil {
 panic(err)
}
```

```
 log.Printf("Presign post object %v with presigned URL returned %v.", uploadKey,
 multiPartResponse.StatusCode)

 log.Println("Let's presign a request to delete the object.")
 questioner.Ask("Press Enter when you're ready.")
 presignedDelRequest, err := presigner.DeleteObject(ctx, bucketName, uploadKey)
 if err != nil {
  panic(err)
 }
 log.Printf("Got a presigned %v request to URL:\n\t%v\n",
 presignedDelRequest.Method,
  presignedDelRequest.URL)
 log.Println("Using net/http to send the request...")
 delResponse, err := httpRequester.Delete(presignedDelRequest.URL)
 if err != nil {
  panic(err)
 }
 log.Printf("%v object %v with presigned URL returned %v.\n",
 presignedDelRequest.Method,
  uploadKey, delResponse.StatusCode)
 log.Println(strings.Repeat("-", 88))

 log.Println("Thanks for watching!")
 log.Println(strings.Repeat("-", 88))
}
```

定義範例用來提出 HTTP 請求的 HTTP 請求包裝函式。

```
// IHttpRequester abstracts HTTP requests into an interface so it can be mocked
 during
// unit testing.
type IHttpRequester interface {
 Get(url string) (resp *http.Response, err error)
 Post(url, contentType string, body io.Reader) (resp *http.Response, err error)
 Put(url string, contentLength int64, body io.Reader) (resp *http.Response, err
 error)
 Delete(url string) (resp *http.Response, err error)
}
```

```
// HttpRequester uses the net/http package to make HTTP requests during the
 scenario.
type HttpRequester struct{}

func (httpReq HttpRequester) Get(url string) (resp *http.Response, err error) {
 return http.Get(url)
}
func (httpReq HttpRequester) Post(url, contentType string, body io.Reader) (resp
 *http.Response, err error) {
 postRequest, err := http.NewRequest("POST", url, body)
 if err != nil {
  return nil, err
 }
 postRequest.Header.Set("Content-Type", contentType)
 return http.DefaultClient.Do(postRequest)
}

func (httpReq HttpRequester) Put(url string, contentLength int64, body io.Reader)
 (resp *http.Response, err error) {
 putRequest, err := http.NewRequest("PUT", url, body)
 if err != nil {
  return nil, err
 }
 putRequest.ContentLength = contentLength
 return http.DefaultClient.Do(putRequest)
}
func (httpReq HttpRequester) Delete(url string) (resp *http.Response, err error) {
 delRequest, err := http.NewRequest("DELETE", url, nil)
 if err != nil {
  return nil, err
 }
 return http.DefaultClient.Do(delRequest)
}
```

### 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。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，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。

```
import (
 "context"
 "fmt"
 "log"
 "strings"

 "s3_object_lock/actions"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/feature/s3/manager"
 "github.com/aws/aws-sdk-go-v2/service/s3"
 "github.com/aws/aws-sdk-go-v2/service/s3/types"
 "github.com/awsdocs/aws-doc-sdk-examples/gov2/demotools"
)

// ObjectLockScenario contains the steps to run the S3 Object Lock workflow.
type ObjectLockScenario struct {
 questioner demotools.IQuestioner
 resources  Resources
 s3Actions  *actions.S3Actions
 sdkConfig  aws.Config
}

// NewObjectLockScenario constructs a new ObjectLockScenario instance.
func NewObjectLockScenario(sdkConfig aws.Config, questioner demotools.IQuestioner)
 ObjectLockScenario {
 scenario := ObjectLockScenario{
  questioner: questioner,
  resources:  Resources{},
  s3Actions:  &actions.S3Actions{S3Client: s3.NewFromConfig(sdkConfig)},
  sdkConfig:  sdkConfig,
 }
```

```
 scenario.s3Actions.S3Manager = manager.NewUploader(scenario.s3Actions.S3Client)
 scenario.resources.init(scenario.s3Actions, questioner)
 return scenario
}

type nameLocked struct {
 name   string
 locked bool
}

var createInfo = []nameLocked{
 {"standard-bucket", false},
 {"lock-bucket", true},
 {"retention-bucket", false},
}

// CreateBuckets creates the S3 buckets required for the workflow.
func (scenario *ObjectLockScenario) CreateBuckets(ctx context.Context) {
 log.Println("Let's create some S3 buckets to use for this workflow.")
 success := false
 for !success {
  prefix := scenario.questioner.Ask(
   "This example creates three buckets. Enter a prefix to name your buckets
 (remember bucket names must be globally unique):")

  for _, info := range createInfo {
   log.Println(fmt.Sprintf("%s.%s", prefix, info.name))
   bucketName, err := scenario.s3Actions.CreateBucketWithLock(ctx, fmt.Sprintf("%s.
%s", prefix, info.name), scenario.sdkConfig.Region, info.locked)
   if err != nil {
    switch err.(type) {
    case *types.BucketAlreadyExists, *types.BucketAlreadyOwnedByYou:
     log.Printf("Couldn't create bucket %s.\n", bucketName)
    default:
     panic(err)
    }
    break
   }
   scenario.resources.demoBuckets[info.name] = &DemoBucket{
    name:       bucketName,
    objectKeys: []string{},
   }
   log.Printf("Created bucket %s.\n", bucketName)
  }
```

```
  if len(scenario.resources.demoBuckets) < len(createInfo) {
   scenario.resources.deleteBuckets(ctx)
  } else {
   success = true
  }
 }

 log.Println("S3 buckets created.")
 log.Println(strings.Repeat("-", 88))
}

// EnableLockOnBucket enables object locking on an existing bucket.
func (scenario *ObjectLockScenario) EnableLockOnBucket(ctx context.Context) {
 log.Println("\nA bucket can be configured to use object locking.")
 scenario.questioner.Ask("Press Enter to continue.")

 var err error
 bucket := scenario.resources.demoBuckets["retention-bucket"]
 err = scenario.s3Actions.EnableObjectLockOnBucket(ctx, bucket.name)
 if err != nil {
  switch err.(type) {
  case *types.NoSuchBucket:
   log.Printf("Couldn't enable object locking on bucket %s.\n", bucket.name)
  default:
   panic(err)
  }
 } else {
  log.Printf("Object locking enabled on bucket %s.", bucket.name)
 }

 log.Println(strings.Repeat("-", 88))
}

// SetDefaultRetentionPolicy sets a default retention governance policy on a bucket.
func (scenario *ObjectLockScenario) SetDefaultRetentionPolicy(ctx context.Context) {
 log.Println("\nA bucket can be configured to use object locking with a default
 retention period.")

 bucket := scenario.resources.demoBuckets["retention-bucket"]
 retentionPeriod := scenario.questioner.AskInt("Enter the default retention period
 in days: ")
```

```
 err := scenario.s3Actions.ModifyDefaultBucketRetention(ctx,
 bucket.name, types.ObjectLockEnabledEnabled, int32(retentionPeriod),
 types.ObjectLockRetentionModeGovernance)
 if err != nil {
  switch err.(type) {
  case *types.NoSuchBucket:
   log.Printf("Couldn't configure a default retention period on bucket %s.\n",
 bucket.name)
  default:
   panic(err)
  }
 } else {
  log.Printf("Default retention policy set on bucket %s with %d day retention
 period.", bucket.name, retentionPeriod)
  bucket.retentionEnabled = true
 }

 log.Println(strings.Repeat("-", 88))
}

// UploadTestObjects uploads test objects to the S3 buckets.
func (scenario *ObjectLockScenario) UploadTestObjects(ctx context.Context) {
 log.Println("Uploading test objects to S3 buckets.")

 for _, info := range createInfo {
  bucket := scenario.resources.demoBuckets[info.name]
  for i := 0; i < 2; i++ {
   key, err := scenario.s3Actions.UploadObject(ctx, bucket.name,
 fmt.Sprintf("example-%d", i),
    fmt.Sprintf("Example object content #%d in bucket %s.", i, bucket.name))
   if err != nil {
    switch err.(type) {
    case *types.NoSuchBucket:
     log.Printf("Couldn't upload %s to bucket %s.\n", key, bucket.name)
    default:
     panic(err)
    }
   } else {
    log.Printf("Uploaded %s to bucket %s.\n", key, bucket.name)
    bucket.objectKeys = append(bucket.objectKeys, key)
   }
  }
 }
```

```
 scenario.questioner.Ask("Test objects uploaded. Press Enter to continue.")
 log.Println(strings.Repeat("-", 88))
}

// SetObjectLockConfigurations sets object lock configurations on the test objects.
func (scenario *ObjectLockScenario) SetObjectLockConfigurations(ctx context.Context)
 {
 log.Println("Now let's set object lock configurations on individual objects.")

 buckets := []*DemoBucket{scenario.resources.demoBuckets["lock-bucket"],
 scenario.resources.demoBuckets["retention-bucket"]}
 for _, bucket := range buckets {
  for index, objKey := range bucket.objectKeys {
   switch index {
   case 0:
    if scenario.questioner.AskBool(fmt.Sprintf("\nDo you want to add a legal hold to
 %s in %s (y/n)? ", objKey, bucket.name), "y") {
     err := scenario.s3Actions.PutObjectLegalHold(ctx, bucket.name, objKey, "",
 types.ObjectLockLegalHoldStatusOn)
     if err != nil {
      switch err.(type) {
      case *types.NoSuchKey:
       log.Printf("Couldn't set legal hold on %s.\n", objKey)
      default:
       panic(err)
      }
     } else {
      log.Printf("Legal hold set on %s.\n", objKey)
     }
    }
   case 1:
    q := fmt.Sprintf("\nDo you want to add a 1 day Governance retention period to %s
 in %s?\n"+
     "Reminder: Only a user with the s3:BypassGovernanceRetention permission is able
 to delete this object\n"+
     "or its bucket until the retention period has expired. (y/n) ", objKey,
 bucket.name)
    if scenario.questioner.AskBool(q, "y") {
     err := scenario.s3Actions.PutObjectRetention(ctx, bucket.name, objKey,
 types.ObjectLockRetentionModeGovernance, 1)
     if err != nil {
      switch err.(type) {
      case *types.NoSuchKey:
```

```
       log.Printf("Couldn't set retention period on %s in %s.\n", objKey,
 bucket.name)
      default:
       panic(err)
      }
     } else {
      log.Printf("Retention period set to 1 for %s.", objKey)
      bucket.retentionEnabled = true
     }
    }
   }
  }
 }
 log.Println(strings.Repeat("-", 88))
}

const (
 ListAll = iota
 DeleteObject
 DeleteRetentionObject
 OverwriteObject
 ViewRetention
 ViewLegalHold
 Finish
)

// InteractWithObjects allows the user to interact with the objects and test the
 object lock configurations.
func (scenario *ObjectLockScenario) InteractWithObjects(ctx context.Context) {
 log.Println("Now you can interact with the objects to explore the object lock
 configurations.")
 interactiveChoices := []string{
  "List all objects and buckets.",
  "Attempt to delete an object.",
  "Attempt to delete an object with retention period bypass.",
  "Attempt to overwrite a file.",
  "View the retention settings for an object.",
  "View the legal hold settings for an object.",
  "Finish the workflow."}

 choice := ListAll
 for choice != Finish {
  objList := scenario.GetAllObjects(ctx)
  objChoices := scenario.makeObjectChoiceList(objList)
```

```
 choice = scenario.questioner.AskChoice("Choose an action from the menu:\n",
interactiveChoices)
 switch choice {
 case ListAll:
  log.Println("The current objects in the example buckets are:")
  for _, objChoice := range objChoices {
   log.Println("\t", objChoice)
  }
 case DeleteObject, DeleteRetentionObject:
  objChoice := scenario.questioner.AskChoice("Enter the number of the object to
delete:\n", objChoices)
  obj := objList[objChoice]
  deleted, err := scenario.s3Actions.DeleteObject(ctx, obj.bucket, obj.key,
obj.versionId, choice == DeleteRetentionObject)
  if err != nil {
   switch err.(type) {
   case *types.NoSuchKey:
    log.Println("Nothing to delete.")
   default:
    panic(err)
   }
  } else if deleted {
   log.Printf("Object %s deleted.\n", obj.key)
  }
 case OverwriteObject:
  objChoice := scenario.questioner.AskChoice("Enter the number of the object to
overwrite:\n", objChoices)
  obj := objList[objChoice]
  _, err := scenario.s3Actions.UploadObject(ctx, obj.bucket, obj.key,
fmt.Sprintf("New content in object %s.", obj.key))
  if err != nil {
   switch err.(type) {
   case *types.NoSuchBucket:
    log.Println("Couldn't upload to nonexistent bucket.")
   default:
    panic(err)
   }
  } else {
   log.Printf("Uploaded new content to object %s.\n", obj.key)
  }
 case ViewRetention:
  objChoice := scenario.questioner.AskChoice("Enter the number of the object to
view:\n", objChoices)
  obj := objList[objChoice]
```

```
   retention, err := scenario.s3Actions.GetObjectRetention(ctx, obj.bucket, obj.key)
   if err != nil {
    switch err.(type) {
    case *types.NoSuchKey:
     log.Printf("Can't get retention configuration for %s.\n", obj.key)
    default:
     panic(err)
    }
   } else if retention != nil {
    log.Printf("Object %s has retention mode %s until %v.\n", obj.key,
 retention.Mode, retention.RetainUntilDate)
   } else {
    log.Printf("Object %s does not have object retention configured.\n", obj.key)
   }
  case ViewLegalHold:
   objChoice := scenario.questioner.AskChoice("Enter the number of the object to
 view:\n", objChoices)
   obj := objList[objChoice]
   legalHold, err := scenario.s3Actions.GetObjectLegalHold(ctx, obj.bucket, obj.key,
 obj.versionId)
   if err != nil {
    switch err.(type) {
    case *types.NoSuchKey:
     log.Printf("Can't get legal hold configuration for %s.\n", obj.key)
    default:
     panic(err)
    }
   } else if legalHold != nil {
    log.Printf("Object %s has legal hold %v.", obj.key, *legalHold)
   } else {
    log.Printf("Object %s does not have legal hold configured.", obj.key)
   }
  case Finish:
   log.Println("Let's clean up.")
  }
  log.Println(strings.Repeat("-", 88))
 }
}

type BucketKeyVersionId struct {
 bucket    string
 key       string
 versionId string
}
```

```
// GetAllObjects gets the object versions in the example S3 buckets and returns them
 in a flattened list.
func (scenario *ObjectLockScenario) GetAllObjects(ctx context.Context)
 []BucketKeyVersionId {
 var objectList []BucketKeyVersionId
 for _, info := range createInfo {
  bucket := scenario.resources.demoBuckets[info.name]
  versions, err := scenario.s3Actions.ListObjectVersions(ctx, bucket.name)
  if err != nil {
   switch err.(type) {
   case *types.NoSuchBucket:
    log.Printf("Couldn't get object versions for %s.\n", bucket.name)
   default:
    panic(err)
   }
  } else {
   for _, version := range versions {
    objectList = append(objectList,
     BucketKeyVersionId{bucket: bucket.name, key: *version.Key, versionId:
 *version.VersionId})
   }
  }
 }
 return objectList
}

// makeObjectChoiceList makes the object version list into a list of strings that
 are displayed
// as choices.
func (scenario *ObjectLockScenario) makeObjectChoiceList(bucketObjects
 []BucketKeyVersionId) []string {
 choices := make([]string, len(bucketObjects))
 for i := 0; i < len(bucketObjects); i++ {
  choices[i] = fmt.Sprintf("%s in %s with VersionId %s.",
   bucketObjects[i].key, bucketObjects[i].bucket, bucketObjects[i].versionId)
 }
 return choices
}

// Run runs the S3 Object Lock scenario.
func (scenario *ObjectLockScenario) Run(ctx context.Context) {
 defer func() {
  if r := recover(); r != nil {
```

```
    log.Println("Something went wrong with the demo.")
    _, isMock := scenario.questioner.(*demotools.MockQuestioner)
    if isMock || scenario.questioner.AskBool("Do you want to see the full error
 message (y/n)?", "y") {
     log.Println(r)
    }
    scenario.resources.Cleanup(ctx)
   }
 }()

 log.Println(strings.Repeat("-", 88))
 log.Println("Welcome to the Amazon S3 Object Lock Feature Scenario.")
 log.Println(strings.Repeat("-", 88))

 scenario.CreateBuckets(ctx)
 scenario.EnableLockOnBucket(ctx)
 scenario.SetDefaultRetentionPolicy(ctx)
 scenario.UploadTestObjects(ctx)
 scenario.SetObjectLockConfigurations(ctx)
 scenario.InteractWithObjects(ctx)

 scenario.resources.Cleanup(ctx)

 log.Println(strings.Repeat("-", 88))
 log.Println("Thanks for watching!")
 log.Println(strings.Repeat("-", 88))
}
```

定義包裝此範例使用之 S3 動作的結構。

```
import (
 "bytes"
 "context"
 "errors"
 "fmt"
 "log"
 "time"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/feature/s3/manager"
```

```
 "github.com/aws/aws-sdk-go-v2/service/s3"
 "github.com/aws/aws-sdk-go-v2/service/s3/types"
 "github.com/aws/smithy-go"
)

// S3Actions wraps S3 service actions.
type S3Actions struct {
 S3Client  *s3.Client
 S3Manager *manager.Uploader
}



// CreateBucketWithLock creates a new S3 bucket with optional object locking enabled
// and waits for the bucket to exist before returning.
func (actor S3Actions) CreateBucketWithLock(ctx context.Context, bucket string,
 region string, enableObjectLock bool) (string, error) {
 input := &s3.CreateBucketInput{
  Bucket: aws.String(bucket),
  CreateBucketConfiguration: &types.CreateBucketConfiguration{
   LocationConstraint: types.BucketLocationConstraint(region),
  },
 }

 if enableObjectLock {
  input.ObjectLockEnabledForBucket = aws.Bool(true)
 }

 _, err := actor.S3Client.CreateBucket(ctx, input)
 if err != nil {
  var owned *types.BucketAlreadyOwnedByYou
  var exists *types.BucketAlreadyExists
  if errors.As(err, &owned) {
   log.Printf("You already own bucket %s.\n", bucket)
   err = owned
  } else if errors.As(err, &exists) {
   log.Printf("Bucket %s already exists.\n", bucket)
   err = exists
  }
 } else {
  err = s3.NewBucketExistsWaiter(actor.S3Client).Wait(
   ctx, &s3.HeadBucketInput{Bucket: aws.String(bucket)}, time.Minute)
  if err != nil {
   log.Printf("Failed attempt to wait for bucket %s to exist.\n", bucket)
```

```
  }
 }

 return bucket, err
}



// GetObjectLegalHold retrieves the legal hold status for an S3 object.
func (actor S3Actions) GetObjectLegalHold(ctx context.Context, bucket string, key
 string, versionId string) (*types.ObjectLockLegalHoldStatus, error) {
 var status *types.ObjectLockLegalHoldStatus
 input := &s3.GetObjectLegalHoldInput{
  Bucket:    aws.String(bucket),
  Key:       aws.String(key),
  VersionId: aws.String(versionId),
 }

 output, err := actor.S3Client.GetObjectLegalHold(ctx, input)
 if err != nil {
  var noSuchKeyErr *types.NoSuchKey
  var apiErr *smithy.GenericAPIError
  if errors.As(err, &noSuchKeyErr) {
   log.Printf("Object %s does not exist in bucket %s.\n", key, bucket)
   err = noSuchKeyErr
  } else if errors.As(err, &apiErr) {
   switch apiErr.ErrorCode() {
   case "NoSuchObjectLockConfiguration":
    log.Printf("Object %s does not have an object lock configuration.\n", key)
    err = nil
   case "InvalidRequest":
    log.Printf("Bucket %s does not have an object lock configuration.\n", bucket)
    err = nil
   }
  }
 } else {
  status = &output.LegalHold.Status
 }

 return status, err
}
```

```
// GetObjectLockConfiguration retrieves the object lock configuration for an S3
 bucket.
func (actor S3Actions) GetObjectLockConfiguration(ctx context.Context, bucket
 string) (*types.ObjectLockConfiguration, error) {
 var lockConfig *types.ObjectLockConfiguration
 input := &s3.GetObjectLockConfigurationInput{
  Bucket: aws.String(bucket),
 }

 output, err := actor.S3Client.GetObjectLockConfiguration(ctx, input)
 if err != nil {
  var noBucket *types.NoSuchBucket
  var apiErr *smithy.GenericAPIError
  if errors.As(err, &noBucket) {
   log.Printf("Bucket %s does not exist.\n", bucket)
   err = noBucket
  } else if errors.As(err, &apiErr) && apiErr.ErrorCode() ==
 "ObjectLockConfigurationNotFoundError" {
   log.Printf("Bucket %s does not have an object lock configuration.\n", bucket)
   err = nil
  }
 } else {
  lockConfig = output.ObjectLockConfiguration
 }

 return lockConfig, err
}



// GetObjectRetention retrieves the object retention configuration for an S3 object.
func (actor S3Actions) GetObjectRetention(ctx context.Context, bucket string, key
 string) (*types.ObjectLockRetention, error) {
 var retention *types.ObjectLockRetention
 input := &s3.GetObjectRetentionInput{
  Bucket: aws.String(bucket),
  Key:    aws.String(key),
 }

 output, err := actor.S3Client.GetObjectRetention(ctx, input)
 if err != nil {
  var noKey *types.NoSuchKey
  var apiErr *smithy.GenericAPIError
  if errors.As(err, &noKey) {
```

```
    log.Printf("Object %s does not exist in bucket %s.\n", key, bucket)
    err = noKey
   } else if errors.As(err, &apiErr) {
    switch apiErr.ErrorCode() {
    case "NoSuchObjectLockConfiguration":
     err = nil
    case "InvalidRequest":
     log.Printf("Bucket %s does not have locking enabled.", bucket)
     err = nil
    }
   }
  } else {
   retention = output.Retention
  }

  return retention, err
}



// PutObjectLegalHold sets the legal hold configuration for an S3 object.
func (actor S3Actions) PutObjectLegalHold(ctx context.Context, bucket string, key
 string, versionId string, legalHoldStatus types.ObjectLockLegalHoldStatus) error {
 input := &s3.PutObjectLegalHoldInput{
  Bucket: aws.String(bucket),
  Key:    aws.String(key),
  LegalHold: &types.ObjectLockLegalHold{
   Status: legalHoldStatus,
  },
 }
 if versionId != "" {
  input.VersionId = aws.String(versionId)
 }

 _, err := actor.S3Client.PutObjectLegalHold(ctx, input)
 if err != nil {
  var noKey *types.NoSuchKey
  if errors.As(err, &noKey) {
   log.Printf("Object %s does not exist in bucket %s.\n", key, bucket)
   err = noKey
  }
 }

 return err
```

```
}



// ModifyDefaultBucketRetention modifies the default retention period of an existing
 bucket.
func (actor S3Actions) ModifyDefaultBucketRetention(
 ctx context.Context, bucket string, lockMode types.ObjectLockEnabled,
 retentionPeriod int32, retentionMode types.ObjectLockRetentionMode) error {

 input := &s3.PutObjectLockConfigurationInput{
  Bucket: aws.String(bucket),
  ObjectLockConfiguration: &types.ObjectLockConfiguration{
   ObjectLockEnabled: lockMode,
   Rule: &types.ObjectLockRule{
    DefaultRetention: &types.DefaultRetention{
     Days: aws.Int32(retentionPeriod),
     Mode: retentionMode,
    },
   },
  },
 }
 _, err := actor.S3Client.PutObjectLockConfiguration(ctx, input)
 if err != nil {
  var noBucket *types.NoSuchBucket
  if errors.As(err, &noBucket) {
   log.Printf("Bucket %s does not exist.\n", bucket)
   err = noBucket
  }
 }

 return err
}



// EnableObjectLockOnBucket enables object locking on an existing bucket.
func (actor S3Actions) EnableObjectLockOnBucket(ctx context.Context, bucket string)
 error {
 // Versioning must be enabled on the bucket before object locking is enabled.
 verInput := &s3.PutBucketVersioningInput{
  Bucket: aws.String(bucket),
  VersioningConfiguration: &types.VersioningConfiguration{
   MFADelete: types.MFADeleteDisabled,
```

```
   Status:    types.BucketVersioningStatusEnabled,
  },
 }
 _, err := actor.S3Client.PutBucketVersioning(ctx, verInput)
 if err != nil {
  var noBucket *types.NoSuchBucket
  if errors.As(err, &noBucket) {
   log.Printf("Bucket %s does not exist.\n", bucket)
   err = noBucket
  }
  return err
 }

 input := &s3.PutObjectLockConfigurationInput{
  Bucket: aws.String(bucket),
  ObjectLockConfiguration: &types.ObjectLockConfiguration{
   ObjectLockEnabled: types.ObjectLockEnabledEnabled,
  },
 }
 _, err = actor.S3Client.PutObjectLockConfiguration(ctx, input)
 if err != nil {
  var noBucket *types.NoSuchBucket
  if errors.As(err, &noBucket) {
   log.Printf("Bucket %s does not exist.\n", bucket)
   err = noBucket
  }
 }

 return err
}



// PutObjectRetention sets the object retention configuration for an S3 object.
func (actor S3Actions) PutObjectRetention(ctx context.Context, bucket string, key
 string, retentionMode types.ObjectLockRetentionMode, retentionPeriodDays int32)
 error {
 input := &s3.PutObjectRetentionInput{
  Bucket: aws.String(bucket),
  Key:    aws.String(key),
  Retention: &types.ObjectLockRetention{
   Mode:            retentionMode,
   RetainUntilDate: aws.Time(time.Now().AddDate(0, 0, int(retentionPeriodDays))),
  },
```

```
  BypassGovernanceRetention: aws.Bool(true),
 }

 _, err := actor.S3Client.PutObjectRetention(ctx, input)
 if err != nil {
  var noKey *types.NoSuchKey
  if errors.As(err, &noKey) {
   log.Printf("Object %s does not exist in bucket %s.\n", key, bucket)
   err = noKey
  }
 }

 return err
}



// UploadObject uses the S3 upload manager to upload an object to a bucket.
func (actor S3Actions) UploadObject(ctx context.Context, bucket string, key string,
 contents string) (string, error) {
 var outKey string
 input := &s3.PutObjectInput{
  Bucket:            aws.String(bucket),
  Key:               aws.String(key),
  Body:              bytes.NewReader([]byte(contents)),
  ChecksumAlgorithm: types.ChecksumAlgorithmSha256,
 }
 output, err := actor.S3Manager.Upload(ctx, input)
 if err != nil {
  var noBucket *types.NoSuchBucket
  if errors.As(err, &noBucket) {
   log.Printf("Bucket %s does not exist.\n", bucket)
   err = noBucket
  }
 } else {
  err := s3.NewObjectExistsWaiter(actor.S3Client).Wait(ctx, &s3.HeadObjectInput{
   Bucket: aws.String(bucket),
   Key:    aws.String(key),
  }, time.Minute)
  if err != nil {
   log.Printf("Failed attempt to wait for object %s to exist in %s.\n", key, bucket)
  } else {
   outKey = *output.Key
  }
```

```
 }
 return outKey, err
}



// ListObjectVersions lists all versions of all objects in a bucket.
func (actor S3Actions) ListObjectVersions(ctx context.Context, bucket string)
 ([]types.ObjectVersion, error) {
 var err error
 var output *s3.ListObjectVersionsOutput
 var versions []types.ObjectVersion
 input := &s3.ListObjectVersionsInput{Bucket: aws.String(bucket)}
 versionPaginator := s3.NewListObjectVersionsPaginator(actor.S3Client, input)
 for versionPaginator.HasMorePages() {
  output, err = versionPaginator.NextPage(ctx)
  if err != nil {
   var noBucket *types.NoSuchBucket
   if errors.As(err, &noBucket) {
    log.Printf("Bucket %s does not exist.\n", bucket)
    err = noBucket
   }
   break
  } else {
   versions = append(versions, output.Versions...)
  }
 }
 return versions, err
}



// DeleteObject deletes an object from a bucket.
func (actor S3Actions) DeleteObject(ctx context.Context, bucket string, key string,
 versionId string, bypassGovernance bool) (bool, error) {
 deleted := false
 input := &s3.DeleteObjectInput{
  Bucket: aws.String(bucket),
  Key:    aws.String(key),
 }
 if versionId != "" {
  input.VersionId = aws.String(versionId)
 }
 if bypassGovernance {
```

```
  input.BypassGovernanceRetention = aws.Bool(true)
 }
 _, err := actor.S3Client.DeleteObject(ctx, input)
 if err != nil {
  var noKey *types.NoSuchKey
  var apiErr *smithy.GenericAPIError
  if errors.As(err, &noKey) {
   log.Printf("Object %s does not exist in %s.\n", key, bucket)
   err = noKey
  } else if errors.As(err, &apiErr) {
   switch apiErr.ErrorCode() {
   case "AccessDenied":
    log.Printf("Access denied: cannot delete object %s from %s.\n", key, bucket)
    err = nil
   case "InvalidArgument":
    if bypassGovernance {
     log.Printf("You cannot specify bypass governance on a bucket without lock
 enabled.")
     err = nil
    }
   }
  }
 } else {
  err = s3.NewObjectNotExistsWaiter(actor.S3Client).Wait(
   ctx, &s3.HeadObjectInput{Bucket: aws.String(bucket), Key: aws.String(key)},
 time.Minute)
  if err != nil {
   log.Printf("Failed attempt to wait for object %s in bucket %s to be deleted.\n",
 key, bucket)
  } else {
   deleted = true
  }
 }
 return deleted, err
}



// DeleteObjects deletes a list of objects from a bucket.
func (actor S3Actions) DeleteObjects(ctx context.Context, bucket string, objects
 []types.ObjectIdentifier, bypassGovernance bool) error {
 if len(objects) == 0 {
  return nil
 }
```

```
 input := s3.DeleteObjectsInput{
  Bucket: aws.String(bucket),
  Delete: &types.Delete{
   Objects: objects,
   Quiet:   aws.Bool(true),
  },
 }
 if bypassGovernance {
  input.BypassGovernanceRetention = aws.Bool(true)
 }
 delOut, err := actor.S3Client.DeleteObjects(ctx, &input)
 if err != nil || len(delOut.Errors) > 0 {
  log.Printf("Error deleting objects from bucket %s.\n", bucket)
  if err != nil {
   var noBucket *types.NoSuchBucket
   if errors.As(err, &noBucket) {
    log.Printf("Bucket %s does not exist.\n", bucket)
    err = noBucket
   }
  } else if len(delOut.Errors) > 0 {
   for _, outErr := range delOut.Errors {
    log.Printf("%s: %s\n", *outErr.Key, *outErr.Message)
   }
   err = fmt.Errorf("%s", *delOut.Errors[0].Message)
  }
 } else {
  for _, delObjs := range delOut.Deleted {
   err = s3.NewObjectNotExistsWaiter(actor.S3Client).Wait(
    ctx, &s3.HeadObjectInput{Bucket: aws.String(bucket), Key: delObjs.Key},
 time.Minute)
   if err != nil {
    log.Printf("Failed attempt to wait for object %s to be deleted.\n",
 *delObjs.Key)
   } else {
    log.Printf("Deleted %s.\n", *delObjs.Key)
   }
  }
 }
 return err
}
```

清除資源。

```
import (
 "context"
 "log"
 "s3_object_lock/actions"
 "time"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/s3"
 "github.com/aws/aws-sdk-go-v2/service/s3/types"
 "github.com/awsdocs/aws-doc-sdk-examples/gov2/demotools"
)

// DemoBucket contains metadata for buckets used in this example.
type DemoBucket struct {
 name             string
 retentionEnabled bool
 objectKeys       []string
}

// Resources keeps track of AWS resources created during the ObjectLockScenario and
 handles
// cleanup when the scenario finishes.
type Resources struct {
 demoBuckets map[string]*DemoBucket

 s3Actions  *actions.S3Actions
 questioner demotools.IQuestioner
}

// init initializes objects in the Resources struct.
func (resources *Resources) init(s3Actions *actions.S3Actions, questioner
 demotools.IQuestioner) {
 resources.s3Actions = s3Actions
 resources.questioner = questioner
 resources.demoBuckets = map[string]*DemoBucket{}
}

// Cleanup deletes all AWS resources created during the ObjectLockScenario.
```

```
func (resources *Resources) Cleanup(ctx context.Context) {
 defer func() {
  if r := recover(); r != nil {
   log.Printf("Something went wrong during cleanup.\n%v\n", r)
   log.Println("Use the AWS Management Console to remove any remaining resources " +
    "that were created for this scenario.")
  }
 }()

 wantDelete := resources.questioner.AskBool("Do you want to remove all of the AWS
 resources that were created "+
  "during this demo (y/n)?", "y")
 if !wantDelete {
  log.Println("Be sure to remove resources when you're done with them to avoid
 unexpected charges!")
  return
 }

 log.Println("Removing objects from S3 buckets and deleting buckets...")
 resources.deleteBuckets(ctx)
 //resources.deleteRetentionObjects(resources.retentionBucket,
 resources.retentionObjects)

 log.Println("Cleanup complete.")
}

// deleteBuckets empties and then deletes all buckets created during the
 ObjectLockScenario.
func (resources *Resources) deleteBuckets(ctx context.Context) {
 for _, info := range createInfo {
  bucket := resources.demoBuckets[info.name]
  resources.deleteObjects(ctx, bucket)
  _, err := resources.s3Actions.S3Client.DeleteBucket(ctx, &s3.DeleteBucketInput{
   Bucket: aws.String(bucket.name),
  })
  if err != nil {
   panic(err)
  }
 }
 for _, info := range createInfo {
  bucket := resources.demoBuckets[info.name]
  err := s3.NewBucketNotExistsWaiter(resources.s3Actions.S3Client).Wait(
   ctx, &s3.HeadBucketInput{Bucket: aws.String(bucket.name)}, time.Minute)
  if err != nil {
```

```
    log.Printf("Failed attempt to wait for bucket %s to be deleted.\n", bucket.name)
   } else {
    log.Printf("Deleted %s.\n", bucket.name)
   }
  }
  resources.demoBuckets = map[string]*DemoBucket{}
}

// deleteObjects deletes all objects in the specified bucket.
func (resources *Resources) deleteObjects(ctx context.Context, bucket *DemoBucket) {
  lockConfig, err := resources.s3Actions.GetObjectLockConfiguration(ctx, bucket.name)
  if err != nil {
   panic(err)
  }
  versions, err := resources.s3Actions.ListObjectVersions(ctx, bucket.name)
  if err != nil {
   switch err.(type) {
   case *types.NoSuchBucket:
    log.Printf("No objects to get from %s.\n", bucket.name)
   default:
    panic(err)
   }
  }
  delObjects := make([]types.ObjectIdentifier, len(versions))
  for i, version := range versions {
   if lockConfig != nil && lockConfig.ObjectLockEnabled ==
  types.ObjectLockEnabledEnabled {
    status, err := resources.s3Actions.GetObjectLegalHold(ctx, bucket.name,
  *version.Key, *version.VersionId)
    if err != nil {
     switch err.(type) {
     case *types.NoSuchKey:
      log.Printf("Couldn't determine legal hold status for %s in %s.\n",
  *version.Key, bucket.name)
     default:
      panic(err)
     }
    } else if status != nil && *status == types.ObjectLockLegalHoldStatusOn {
     err = resources.s3Actions.PutObjectLegalHold(ctx, bucket.name, *version.Key,
  *version.VersionId, types.ObjectLockLegalHoldStatusOff)
     if err != nil {
      switch err.(type) {
      case *types.NoSuchKey:
```

```
      log.Printf("Couldn't turn off legal hold for %s in %s.\n", *version.Key,
 bucket.name)
     default:
      panic(err)
     }
    }
   }
  }
  delObjects[i] = types.ObjectIdentifier{Key: version.Key, VersionId:
 version.VersionId}
 }
 err = resources.s3Actions.DeleteObjects(ctx, bucket.name, delObjects,
 bucket.retentionEnabled)
 if err != nil {
  switch err.(type) {
  case *types.NoSuchBucket:
   log.Println("Nothing to delete.")
  default:
   panic(err)
  }
 }
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的下列主題。
  - GetObjectLegalHold
  - GetObjectLockConfiguration
  - GetObjectRetention
  - PutObjectLegalHold
  - PutObjectLockConfiguration
  - PutObjectRetention

### 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。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

建立使用上傳和下載管理員的函數，將資料分成數個部分，並同時傳輸。

```
import (
 "bytes"
 "context"
 "errors"
 "fmt"
 "io"
 "log"
 "os"
 "time"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/feature/s3/manager"
 "github.com/aws/aws-sdk-go-v2/service/s3"
 "github.com/aws/aws-sdk-go-v2/service/s3/types"
 "github.com/aws/smithy-go"
)

// BucketBasics encapsulates the Amazon Simple Storage Service (Amazon S3) actions
// used in the examples.
// It contains S3Client, an Amazon S3 service client that is used to perform bucket
// and object actions.
type BucketBasics struct {
 S3Client *s3.Client
}



// UploadLargeObject uses an upload manager to upload data to an object in a bucket.
// The upload manager breaks large data into parts and uploads the parts
 concurrently.
func (basics BucketBasics) UploadLargeObject(ctx context.Context, bucketName string,
 objectKey string, largeObject []byte) error {
```

```
 largeBuffer := bytes.NewReader(largeObject)
 var partMiBs int64 = 10
 uploader := manager.NewUploader(basics.S3Client, func(u *manager.Uploader) {
  u.PartSize = partMiBs * 1024 * 1024
 })
 _, err := uploader.Upload(ctx, &s3.PutObjectInput{
  Bucket: aws.String(bucketName),
  Key:    aws.String(objectKey),
  Body:   largeBuffer,
 })
 if err != nil {
  var apiErr smithy.APIError
  if errors.As(err, &apiErr) && apiErr.ErrorCode() == "EntityTooLarge" {
   log.Printf("Error while uploading object to %s. The object is too large.\n"+
    "The maximum size for a multipart upload is 5TB.", bucketName)
  } else {
   log.Printf("Couldn't upload large object to %v:%v. Here's why: %v\n",
    bucketName, objectKey, err)
  }
 } else {
  err = s3.NewObjectExistsWaiter(basics.S3Client).Wait(
   ctx, &s3.HeadObjectInput{Bucket: aws.String(bucketName), Key:
 aws.String(objectKey)}, time.Minute)
  if err != nil {
   log.Printf("Failed attempt to wait for object %s to exist.\n", objectKey)
  }
 }

 return err
}



// DownloadLargeObject uses a download manager to download an object from a bucket.
// The download manager gets the data in parts and writes them to a buffer until all
 of
// the data has been downloaded.
func (basics BucketBasics) DownloadLargeObject(ctx context.Context, bucketName
 string, objectKey string) ([]byte, error) {
 var partMiBs int64 = 10
 downloader := manager.NewDownloader(basics.S3Client, func(d *manager.Downloader) {
  d.PartSize = partMiBs * 1024 * 1024
 })
 buffer := manager.NewWriteAtBuffer([]byte{})
```

```
 _, err := downloader.Download(ctx, buffer, &s3.GetObjectInput{
  Bucket: aws.String(bucketName),
  Key:    aws.String(objectKey),
 })
 if err != nil {
  log.Printf("Couldn't download large object from %v:%v. Here's why: %v\n",
   bucketName, objectKey, err)
 }
 return buffer.Bytes(), err
}
```

執行互動式情境，示範如何在內容中使用上傳和下載管理員。

```
import (
 "context"
 "crypto/rand"
 "log"
 "strings"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/s3"
 "github.com/awsdocs/aws-doc-sdk-examples/gov2/demotools"
 "github.com/awsdocs/aws-doc-sdk-examples/gov2/s3/actions"
)

// RunLargeObjectScenario is an interactive example that shows you how to use Amazon
// Simple Storage Service (Amazon S3) to upload and download large objects.
//
// 1. Create a bucket.
// 3. Upload a large object to the bucket by using an upload manager.
// 5. Download a large object by using a download manager.
// 8. Delete all objects in the bucket.
// 9. Delete the bucket.
//
// This example creates an Amazon S3 service client from the specified sdkConfig so
 that
// you can replace it with a mocked or stubbed config for unit testing.
//
// It uses a questioner from the `demotools` package to get input during the
 example.
```

```
// This package can be found in the ..\..\demotools folder of this repo.
func RunLargeObjectScenario(ctx context.Context, sdkConfig aws.Config, questioner
 demotools.IQuestioner) {
 defer func() {
  if r := recover(); r != nil {
   log.Println("Something went wrong with the demo.")
   _, isMock := questioner.(*demotools.MockQuestioner)
   if isMock || questioner.AskBool("Do you want to see the full error message (y/
n)?", "y") {
    log.Println(r)
   }
  }
 }()

 log.Println(strings.Repeat("-", 88))
 log.Println("Welcome to the Amazon S3 large object demo.")
 log.Println(strings.Repeat("-", 88))

 s3Client := s3.NewFromConfig(sdkConfig)
 bucketBasics := actions.BucketBasics{S3Client: s3Client}

 bucketName := questioner.Ask("Let's create a bucket. Enter a name for your
 bucket:",
  demotools.NotEmpty{})
 bucketExists, err := bucketBasics.BucketExists(ctx, bucketName)
 if err != nil {
  panic(err)
 }
 if !bucketExists {
  err = bucketBasics.CreateBucket(ctx, bucketName, sdkConfig.Region)
  if err != nil {
   panic(err)
  } else {
   log.Println("Bucket created.")
  }
 }
 log.Println(strings.Repeat("-", 88))

 mibs := 30
 log.Printf("Let's create a slice of %v MiB of random bytes and upload it to your
 bucket. ", mibs)
 questioner.Ask("Press Enter when you're ready.")
 largeBytes := make([]byte, 1024*1024*mibs)
 _, _ = rand.Read(largeBytes)
```

```
 largeKey := "doc-example-large"
 log.Println("Uploading...")
 err = bucketBasics.UploadLargeObject(ctx, bucketName, largeKey, largeBytes)
 if err != nil {
  panic(err)
 }
 log.Printf("Uploaded %v MiB object as %v", mibs, largeKey)
 log.Println(strings.Repeat("-", 88))

 log.Printf("Let's download the %v MiB object.", mibs)
 questioner.Ask("Press Enter when you're ready.")
 log.Println("Downloading...")
 largeDownload, err := bucketBasics.DownloadLargeObject(ctx, bucketName, largeKey)
 if err != nil {
  panic(err)
 }
 log.Printf("Downloaded %v bytes.", len(largeDownload))
 log.Println(strings.Repeat("-", 88))

 if questioner.AskBool("Do you want to delete your bucket and all of its "+
  "contents? (y/n)", "y") {
  log.Println("Deleting object.")
  err = bucketBasics.DeleteObjects(ctx, bucketName, []string{largeKey})
  if err != nil {
   panic(err)
  }
  log.Println("Deleting bucket.")
  err = bucketBasics.DeleteBucket(ctx, bucketName)
  if err != nil {
   panic(err)
  }
 } else {
  log.Println("Okay. Don't forget to delete objects from your bucket to avoid
 charges.")
 }
 log.Println(strings.Repeat("-", 88))

 log.Println("Thanks for watching!")
 log.Println(strings.Repeat("-", 88))
}
```

# 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。

SDK for Go V2

> **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 Go 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
package main

import (
 "context"
 "log"

 "github.com/aws/aws-lambda-go/events"
 "github.com/aws/aws-lambda-go/lambda"
 "github.com/aws/aws-sdk-go-v2/config"
 "github.com/aws/aws-sdk-go-v2/service/s3"
)

func handler(ctx context.Context, s3Event events.S3Event) error {
 sdkConfig, err := config.LoadDefaultConfig(ctx)
 if err != nil {
  log.Printf("failed to load default config: %s", err)
  return err
 }
 s3Client := s3.NewFromConfig(sdkConfig)

 for _, record := range s3Event.Records {
  bucket := record.S3.Bucket.Name
```

```
  key := record.S3.Object.URLDecodedKey
  headOutput, err := s3Client.HeadObject(ctx, &s3.HeadObjectInput{
   Bucket: &bucket,
   Key:    &key,
  })
  if err != nil {
   log.Printf("error getting head of object %s/%s: %s", bucket, key, err)
   return err
  }
  log.Printf("successfully retrieved %s/%s of type %s", bucket, key,
 *headOutput.ContentType)
 }

 return nil
}

func main() {
 lambda.Start(handler)
}
```

# 使用適用於 Go V2 的 SDK 的 Amazon SNS 範例

下列程式碼範例示範如何使用 適用於 Go 的 AWS SDK V2 搭配 Amazon SNS 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
- 無伺服器範例

# 開始使用

## 您好 Amazon SNS

下列程式碼範例示範如何開始使用 Amazon SNS。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
package main

import (
 "context"
 "fmt"
 "log"

 "github.com/aws/aws-sdk-go-v2/config"
 "github.com/aws/aws-sdk-go-v2/service/sns"
 "github.com/aws/aws-sdk-go-v2/service/sns/types"
)

// main uses the AWS SDK for Go V2 to create an Amazon Simple Notification Service
// (Amazon SNS) client and list the topics in your account.
// This example uses the default settings specified in your shared credentials
// and config files.
func main() {
 ctx := context.Background()
 sdkConfig, err := config.LoadDefaultConfig(ctx)
 if err != nil {
  fmt.Println("Couldn't load default configuration. Have you set up your AWS
 account?")
  fmt.Println(err)
  return
 }
 snsClient := sns.NewFromConfig(sdkConfig)
 fmt.Println("Let's list the topics for your account.")
```

```
 var topics []types.Topic
 paginator := sns.NewListTopicsPaginator(snsClient, &sns.ListTopicsInput{})
 for paginator.HasMorePages() {
  output, err := paginator.NextPage(ctx)
  if err != nil {
   log.Printf("Couldn't get topics. Here's why: %v\n", err)
   break
  } else {
   topics = append(topics, output.Topics...)
  }
 }
 if len(topics) == 0 {
  fmt.Println("You don't have any topics!")
 } else {
  for _, topic := range topics {
   fmt.Printf("\t%v\n", *topic.TopicArn)
  }
 }
}
```

- 如需 API 詳細資訊，請參閱 適用於 Go 的 AWS SDK API 參考中的 ListTopics。

## 動作

### `CreateTopic`

以下程式碼範例顯示如何使用 `CreateTopic`。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "context"
```

```
 "encoding/json"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/sns"
 "github.com/aws/aws-sdk-go-v2/service/sns/types"
)

// SnsActions encapsulates the Amazon Simple Notification Service (Amazon SNS)
 actions
// used in the examples.
type SnsActions struct {
 SnsClient *sns.Client
}



// CreateTopic creates an Amazon SNS topic with the specified name. You can
 optionally
// specify that the topic is created as a FIFO topic and whether it uses content-
based
// deduplication instead of ID-based deduplication.
func (actor SnsActions) CreateTopic(ctx context.Context, topicName string,
 isFifoTopic bool, contentBasedDeduplication bool) (string, error) {
 var topicArn string
 topicAttributes := map[string]string{}
 if isFifoTopic {
  topicAttributes["FifoTopic"] = "true"
 }
 if contentBasedDeduplication {
  topicAttributes["ContentBasedDeduplication"] = "true"
 }
 topic, err := actor.SnsClient.CreateTopic(ctx, &sns.CreateTopicInput{
  Name:       aws.String(topicName),
  Attributes: topicAttributes,
 })
 if err != nil {
  log.Printf("Couldn't create topic %v. Here's why: %v\n", topicName, err)
 } else {
  topicArn = *topic.TopicArn
 }

 return topicArn, err
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的 CreateTopic。

### `DeleteTopic`

以下程式碼範例顯示如何使用 `DeleteTopic`。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "context"
 "encoding/json"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/sns"
 "github.com/aws/aws-sdk-go-v2/service/sns/types"
)

// SnsActions encapsulates the Amazon Simple Notification Service (Amazon SNS)
 actions
// used in the examples.
type SnsActions struct {
 SnsClient *sns.Client
}



// DeleteTopic delete an Amazon SNS topic.
func (actor SnsActions) DeleteTopic(ctx context.Context, topicArn string) error {
 _, err := actor.SnsClient.DeleteTopic(ctx, &sns.DeleteTopicInput{
  TopicArn: aws.String(topicArn)})
 if err != nil {
```

```
  log.Printf("Couldn't delete topic %v. Here's why: %v\n", topicArn, err)
 }
 return err
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的 DeleteTopic。

### `ListTopics`

以下程式碼範例顯示如何使用 `ListTopics`。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
package main

import (
 "context"
 "fmt"
 "log"

 "github.com/aws/aws-sdk-go-v2/config"
 "github.com/aws/aws-sdk-go-v2/service/sns"
 "github.com/aws/aws-sdk-go-v2/service/sns/types"
)

// main uses the AWS SDK for Go V2 to create an Amazon Simple Notification Service
// (Amazon SNS) client and list the topics in your account.
// This example uses the default settings specified in your shared credentials
// and config files.
func main() {
 ctx := context.Background()
 sdkConfig, err := config.LoadDefaultConfig(ctx)
 if err != nil {
```

```
 fmt.Println("Couldn't load default configuration. Have you set up your AWS
account?")
 fmt.Println(err)
 return
}
snsClient := sns.NewFromConfig(sdkConfig)
fmt.Println("Let's list the topics for your account.")
var topics []types.Topic
paginator := sns.NewListTopicsPaginator(snsClient, &sns.ListTopicsInput{})
for paginator.HasMorePages() {
 output, err := paginator.NextPage(ctx)
 if err != nil {
  log.Printf("Couldn't get topics. Here's why: %v\n", err)
  break
 } else {
  topics = append(topics, output.Topics...)
 }
}
if len(topics) == 0 {
 fmt.Println("You don't have any topics!")
} else {
 for _, topic := range topics {
  fmt.Printf("\t%v\n", *topic.TopicArn)
 }
}
}
```

- 如需 API 詳細資訊，請參閱 適用於 Go 的 AWS SDK API 參考中的 ListTopics。

### `Publish`

以下程式碼範例顯示如何使用 `Publish`。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "context"
 "encoding/json"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/sns"
 "github.com/aws/aws-sdk-go-v2/service/sns/types"
)

// SnsActions encapsulates the Amazon Simple Notification Service (Amazon SNS)
 actions
// used in the examples.
type SnsActions struct {
 SnsClient *sns.Client
}



// Publish publishes a message to an Amazon SNS topic. The message is then sent to
 all
// subscribers. When the topic is a FIFO topic, the message must also contain a
 group ID
// and, when ID-based deduplication is used, a deduplication ID. An optional key-
value
// filter attribute can be specified so that the message can be filtered according
 to
// a filter policy.
func (actor SnsActions) Publish(ctx context.Context, topicArn string, message
 string, groupId string, dedupId string, filterKey string, filterValue string) error
 {
 publishInput := sns.PublishInput{TopicArn: aws.String(topicArn), Message:
 aws.String(message)}
 if groupId != "" {
  publishInput.MessageGroupId = aws.String(groupId)
 }
 if dedupId != "" {
  publishInput.MessageDeduplicationId = aws.String(dedupId)
 }
 if filterKey != "" && filterValue != "" {
  publishInput.MessageAttributes = map[string]types.MessageAttributeValue{
```

```
   filterKey: {DataType: aws.String("String"), StringValue:
 aws.String(filterValue)},
  }
 }
 _, err := actor.SnsClient.Publish(ctx, &publishInput)
 if err != nil {
  log.Printf("Couldn't publish message to topic %v. Here's why: %v", topicArn, err)
 }
 return err
}
```

- 如需 API 詳細資訊，請參閱 適用於 Go 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`。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

使用篩選條件訂閱主題的佇列。

```
import (
 "context"
 "encoding/json"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/sns"
 "github.com/aws/aws-sdk-go-v2/service/sns/types"
)

// SnsActions encapsulates the Amazon Simple Notification Service (Amazon SNS)
 actions
```

```
// used in the examples.
type SnsActions struct {
 SnsClient *sns.Client
}



// SubscribeQueue subscribes an Amazon Simple Queue Service (Amazon SQS) queue to an
// Amazon SNS topic. When filterMap is not nil, it is used to specify a filter
 policy
// so that messages are only sent to the queue when the message has the specified
 attributes.
func (actor SnsActions) SubscribeQueue(ctx context.Context, topicArn string,
 queueArn string, filterMap map[string][]string) (string, error) {
 var subscriptionArn string
 var attributes map[string]string
 if filterMap != nil {
  filterBytes, err := json.Marshal(filterMap)
  if err != nil {
   log.Printf("Couldn't create filter policy, here's why: %v\n", err)
   return "", err
  }
  attributes = map[string]string{"FilterPolicy": string(filterBytes)}
 }
 output, err := actor.SnsClient.Subscribe(ctx, &sns.SubscribeInput{
  Protocol:              aws.String("sqs"),
  TopicArn:              aws.String(topicArn),
  Attributes:            attributes,
  Endpoint:              aws.String(queueArn),
  ReturnSubscriptionArn: true,
 })
 if err != nil {
  log.Printf("Couldn't susbscribe queue %v to topic %v. Here's why: %v\n",
   queueArn, topicArn, err)
 } else {
  subscriptionArn = *output.SubscriptionArn
 }

 return subscriptionArn, err
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的訂閱。

# 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。

### SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，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。

```
import (
 "context"
 "encoding/json"
 "fmt"
 "log"
 "strings"
 "topics_and_queues/actions"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/sns"
 "github.com/aws/aws-sdk-go-v2/service/sqs"
 "github.com/aws/aws-sdk-go-v2/service/sqs/types"
 "github.com/awsdocs/aws-doc-sdk-examples/gov2/demotools"
)

const FIFO_SUFFIX = ".fifo"
const TONE_KEY = "tone"
```

```
var ToneChoices = []string{"cheerful", "funny", "serious", "sincere"}

// MessageBody is used to deserialize the body of a message from a JSON string.
type MessageBody struct {
 Message string
}

// ScenarioRunner separates the steps of this scenario into individual functions so
 that
// they are simpler to read and understand.
type ScenarioRunner struct {
 questioner demotools.IQuestioner
 snsActor   *actions.SnsActions
 sqsActor   *actions.SqsActions
}

func (runner ScenarioRunner) CreateTopic(ctx context.Context) (string, string, bool,
 bool) {
 log.Println("SNS topics can be configured as FIFO (First-In-First-Out) or standard.
\n" +
  "FIFO topics deliver messages in order and support deduplication and message
 filtering.")
 isFifoTopic := runner.questioner.AskBool("\nWould you like to work with FIFO
 topics? (y/n) ", "y")

 contentBasedDeduplication := false
 if isFifoTopic {
  log.Println(strings.Repeat("-", 88))
  log.Println("Because you have chosen a FIFO topic, deduplication is supported.\n"
 +
   "Deduplication IDs are either set in the message or are automatically generated
\n" +
   "from content using a hash function. If a message is successfully published to\n"
 +
   "an SNS FIFO topic, any message published and determined to have the same\n" +
   "deduplication ID, within the five-minute deduplication interval, is accepted\n"
 +
   "but not delivered. For more information about deduplication, see:\n" +
   "\thttps://docs.aws.amazon.com/sns/latest/dg/fifo-message-dedup.html.")
  contentBasedDeduplication = runner.questioner.AskBool(
   "\nDo you want to use content-based deduplication instead of entering a
 deduplication ID? (y/n) ", "y")
 }
 log.Println(strings.Repeat("-", 88))
```

```
 topicName := runner.questioner.Ask("Enter a name for your SNS topic. ")
 if isFifoTopic {
  topicName = fmt.Sprintf("%v%v", topicName, FIFO_SUFFIX)
  log.Printf("Because you have selected a FIFO topic, '%v' must be appended to\n"+
   "the topic name.", FIFO_SUFFIX)
 }

 topicArn, err := runner.snsActor.CreateTopic(ctx, topicName, isFifoTopic,
 contentBasedDeduplication)
 if err != nil {
  panic(err)
 }
 log.Printf("Your new topic with the name '%v' and Amazon Resource Name (ARN) \n"+
  "'%v' has been created.", topicName, topicArn)

 return topicName, topicArn, isFifoTopic, contentBasedDeduplication
}

func (runner ScenarioRunner) CreateQueue(ctx context.Context, ordinal string,
 isFifoTopic bool) (string, string) {
 queueName := runner.questioner.Ask(fmt.Sprintf("Enter a name for the %v SQS queue.
 ", ordinal))
 if isFifoTopic {
  queueName = fmt.Sprintf("%v%v", queueName, FIFO_SUFFIX)
  if ordinal == "first" {
   log.Printf("Because you are creating a FIFO SQS queue, '%v' must "+
    "be appended to the queue name.\n", FIFO_SUFFIX)
  }
 }
 queueUrl, err := runner.sqsActor.CreateQueue(ctx, queueName, isFifoTopic)
 if err != nil {
  panic(err)
 }
 log.Printf("Your new SQS queue with the name '%v' and the queue URL "+
  "'%v' has been created.", queueName, queueUrl)

 return queueName, queueUrl
}

func (runner ScenarioRunner) SubscribeQueueToTopic(
 ctx context.Context, queueName string, queueUrl string, topicName string, topicArn
 string, ordinal string,
 isFifoTopic bool) (string, bool) {
```

```
queueArn, err := runner.sqsActor.GetQueueArn(ctx, queueUrl)
if err != nil {
 panic(err)
}
log.Printf("The ARN of your queue is: %v.\n", queueArn)

err = runner.sqsActor.AttachSendMessagePolicy(ctx, queueUrl, queueArn, topicArn)
if err != nil {
 panic(err)
}
log.Println("Attached an IAM policy to the queue so the SNS topic can send " +
 "messages to it.")
log.Println(strings.Repeat("-", 88))

var filterPolicy map[string][]string
if isFifoTopic {
 if ordinal == "first" {
  log.Println("Subscriptions to a FIFO topic can have filters.\n" +
   "If you add a filter to this subscription, then only the filtered messages\n" +
   "will be received in the queue.\n" +
   "For information about message filtering, see\n" +
   "\thttps://docs.aws.amazon.com/sns/latest/dg/sns-message-filtering.html\n" +
   "For this example, you can filter messages by a \"tone\" attribute.")
 }

 wantFiltering := runner.questioner.AskBool(
  fmt.Sprintf("Do you want to filter messages that are sent to \"%v\"\n"+
   "from the %v topic? (y/n) ", queueName, topicName), "y")
 if wantFiltering {
  log.Println("You can filter messages by one or more of the following \"tone\"
attributes.")

  var toneSelections []string
  askAboutTones := true
  for askAboutTones {
   toneIndex := runner.questioner.AskChoice(
    "Enter the number of the tone you want to filter by:\n", ToneChoices)
   toneSelections = append(toneSelections, ToneChoices[toneIndex])
   askAboutTones = runner.questioner.AskBool("Do you want to add another tone to
the filter? (y/n) ", "y")
  }
  log.Printf("Your subscription will be filtered to only pass the following tones:
%v\n", toneSelections)
```

```
    filterPolicy = map[string][]string{TONE_KEY: toneSelections}
   }
  }

  subscriptionArn, err := runner.snsActor.SubscribeQueue(ctx, topicArn, queueArn,
  filterPolicy)
  if err != nil {
   panic(err)
  }
  log.Printf("The queue %v is now subscribed to the topic %v with the subscription
  ARN %v.\n",
   queueName, topicName, subscriptionArn)

  return subscriptionArn, filterPolicy != nil
}

func (runner ScenarioRunner) PublishMessages(ctx context.Context, topicArn string,
  isFifoTopic bool, contentBasedDeduplication bool, usingFilters bool) {
  var message string
  var groupId string
  var dedupId string
  var toneSelection string
  publishMore := true
  for publishMore {
   groupId = ""
   dedupId = ""
   toneSelection = ""
   message = runner.questioner.Ask("Enter a message to publish: ")
   if isFifoTopic {
    log.Println("Because you are using a FIFO topic, you must set a message group ID.
\n" +
     "All messages within the same group will be received in the order they were
  published.")
    groupId = runner.questioner.Ask("Enter a message group ID: ")
    if !contentBasedDeduplication {
     log.Println("Because you are not using content-based deduplication,\n" +
      "you must enter a deduplication ID.")
     dedupId = runner.questioner.Ask("Enter a deduplication ID: ")
    }
   }
   if usingFilters {
    if runner.questioner.AskBool("Add a tone attribute so this message can be
  filtered? (y/n) ", "y") {
     toneIndex := runner.questioner.AskChoice(
```

```
     "Enter the number of the tone you want to filter by:\n", ToneChoices)
    toneSelection = ToneChoices[toneIndex]
   }
  }

  err := runner.snsActor.Publish(ctx, topicArn, message, groupId, dedupId, TONE_KEY,
 toneSelection)
  if err != nil {
   panic(err)
  }
  log.Println(("Your message was published."))

  publishMore = runner.questioner.AskBool("Do you want to publish another messsage?
 (y/n) ", "y")
 }
}

func (runner ScenarioRunner) PollForMessages(ctx context.Context, queueUrls
 []string) {
 log.Println("Polling queues for messages...")
 for _, queueUrl := range queueUrls {
  var messages []types.Message
  for {
   currentMsgs, err := runner.sqsActor.GetMessages(ctx, queueUrl, 10, 1)
   if err != nil {
    panic(err)
   }
   if len(currentMsgs) == 0 {
    break
   }
   messages = append(messages, currentMsgs...)
  }
  if len(messages) == 0 {
   log.Printf("No messages were received by queue %v.\n", queueUrl)
  } else if len(messages) == 1 {
   log.Printf("One message was received by queue %v:\n", queueUrl)

  } else {
   log.Printf("%v messages were received by queue %v:\n", len(messages), queueUrl)
  }
  for msgIndex, message := range messages {
   messageBody := MessageBody{}
   err := json.Unmarshal([]byte(*message.Body), &messageBody)
   if err != nil {
```

```
    panic(err)
   }
   log.Printf("Message %v: %v\n", msgIndex+1, messageBody.Message)
  }

  if len(messages) > 0 {
   log.Printf("Deleting %v messages from queue %v.\n", len(messages), queueUrl)
   err := runner.sqsActor.DeleteMessages(ctx, queueUrl, messages)
   if err != nil {
    panic(err)
   }
  }
 }
}

// RunTopicsAndQueuesScenario is an interactive example that shows you how to use
 the
// AWS SDK for Go to create and use Amazon SNS topics and Amazon SQS queues.
//
// 1. Create a topic (FIFO or non-FIFO).
// 2. Subscribe several queues to the topic with an option to apply a filter.
// 3. Publish messages to the topic.
// 4. Poll the queues for messages received.
// 5. Delete the topic and the queues.
//
// This example creates service clients from the specified sdkConfig so that
// you can replace it with a mocked or stubbed config for unit testing.
//
// It uses a questioner from the `demotools` package to get input during the
 example.
// This package can be found in the ..\..\demotools folder of this repo.
func RunTopicsAndQueuesScenario(
 ctx context.Context, sdkConfig aws.Config, questioner demotools.IQuestioner) {
 resources := Resources{}
 defer func() {
  if r := recover(); r != nil {
   log.Println("Something went wrong with the demo.\n" +
    "Cleaning up any resources that were created...")
   resources.Cleanup(ctx)
  }
 }()
 queueCount := 2

 log.Println(strings.Repeat("-", 88))
```

```
 log.Printf("Welcome to messaging with topics and queues.\n\n"+
  "In this scenario, you will create an SNS topic and subscribe %v SQS queues to the
\n"+
  "topic. You can select from several options for configuring the topic and the\n"+
  "subscriptions for the queues. You can then post to the topic and see the results
\n"+
  "in the queues.\n", queueCount)

 log.Println(strings.Repeat("-", 88))

 runner := ScenarioRunner{
  questioner: questioner,
  snsActor:   &actions.SnsActions{SnsClient: sns.NewFromConfig(sdkConfig)},
  sqsActor:   &actions.SqsActions{SqsClient: sqs.NewFromConfig(sdkConfig)},
 }
 resources.snsActor = runner.snsActor
 resources.sqsActor = runner.sqsActor

 topicName, topicArn, isFifoTopic, contentBasedDeduplication :=
 runner.CreateTopic(ctx)
 resources.topicArn = topicArn
 log.Println(strings.Repeat("-", 88))

 log.Printf("Now you will create %v SQS queues and subscribe them to the topic.\n",
 queueCount)
 ordinals := []string{"first", "next"}
 usingFilters := false
 for _, ordinal := range ordinals {
  queueName, queueUrl := runner.CreateQueue(ctx, ordinal, isFifoTopic)
  resources.queueUrls = append(resources.queueUrls, queueUrl)

  _, filtering := runner.SubscribeQueueToTopic(ctx, queueName, queueUrl, topicName,
 topicArn, ordinal, isFifoTopic)
  usingFilters = usingFilters || filtering
 }

 log.Println(strings.Repeat("-", 88))
 runner.PublishMessages(ctx, topicArn, isFifoTopic, contentBasedDeduplication,
 usingFilters)
 log.Println(strings.Repeat("-", 88))
 runner.PollForMessages(ctx, resources.queueUrls)

 log.Println(strings.Repeat("-", 88))
```

```
 wantCleanup := questioner.AskBool("Do you want to remove all AWS resources created
 for this scenario? (y/n) ", "y")
 if wantCleanup {
  log.Println("Cleaning up resources...")
  resources.Cleanup(ctx)
 }

 log.Println(strings.Repeat("-", 88))
 log.Println("Thanks for watching!")
 log.Println(strings.Repeat("-", 88))
}
```

定義包裝此範例使用之 Amazon SNS 動作的結構。

```
import (
 "context"
 "encoding/json"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/sns"
 "github.com/aws/aws-sdk-go-v2/service/sns/types"
)

// SnsActions encapsulates the Amazon Simple Notification Service (Amazon SNS)
 actions
// used in the examples.
type SnsActions struct {
 SnsClient *sns.Client
}



// CreateTopic creates an Amazon SNS topic with the specified name. You can
 optionally
// specify that the topic is created as a FIFO topic and whether it uses content-
based
// deduplication instead of ID-based deduplication.
func (actor SnsActions) CreateTopic(ctx context.Context, topicName string,
 isFifoTopic bool, contentBasedDeduplication bool) (string, error) {
```

```
 var topicArn string
 topicAttributes := map[string]string{}
 if isFifoTopic {
  topicAttributes["FifoTopic"] = "true"
 }
 if contentBasedDeduplication {
  topicAttributes["ContentBasedDeduplication"] = "true"
 }
 topic, err := actor.SnsClient.CreateTopic(ctx, &sns.CreateTopicInput{
  Name:       aws.String(topicName),
  Attributes: topicAttributes,
 })
 if err != nil {
  log.Printf("Couldn't create topic %v. Here's why: %v\n", topicName, err)
 } else {
  topicArn = *topic.TopicArn
 }

 return topicArn, err
}



// DeleteTopic delete an Amazon SNS topic.
func (actor SnsActions) DeleteTopic(ctx context.Context, topicArn string) error {
 _, err := actor.SnsClient.DeleteTopic(ctx, &sns.DeleteTopicInput{
  TopicArn: aws.String(topicArn)})
 if err != nil {
  log.Printf("Couldn't delete topic %v. Here's why: %v\n", topicArn, err)
 }
 return err
}



// SubscribeQueue subscribes an Amazon Simple Queue Service (Amazon SQS) queue to an
// Amazon SNS topic. When filterMap is not nil, it is used to specify a filter
 policy
// so that messages are only sent to the queue when the message has the specified
 attributes.
func (actor SnsActions) SubscribeQueue(ctx context.Context, topicArn string,
 queueArn string, filterMap map[string][]string) (string, error) {
 var subscriptionArn string
 var attributes map[string]string
```

```
 if filterMap != nil {
  filterBytes, err := json.Marshal(filterMap)
  if err != nil {
   log.Printf("Couldn't create filter policy, here's why: %v\n", err)
   return "", err
  }
  attributes = map[string]string{"FilterPolicy": string(filterBytes)}
 }
 output, err := actor.SnsClient.Subscribe(ctx, &sns.SubscribeInput{
  Protocol:              aws.String("sqs"),
  TopicArn:              aws.String(topicArn),
  Attributes:            attributes,
  Endpoint:              aws.String(queueArn),
  ReturnSubscriptionArn: true,
 })
 if err != nil {
  log.Printf("Couldn't susbscribe queue %v to topic %v. Here's why: %v\n",
   queueArn, topicArn, err)
 } else {
  subscriptionArn = *output.SubscriptionArn
 }

 return subscriptionArn, err
}



// Publish publishes a message to an Amazon SNS topic. The message is then sent to
 all
// subscribers. When the topic is a FIFO topic, the message must also contain a
 group ID
// and, when ID-based deduplication is used, a deduplication ID. An optional key-
value
// filter attribute can be specified so that the message can be filtered according
 to
// a filter policy.
func (actor SnsActions) Publish(ctx context.Context, topicArn string, message
 string, groupId string, dedupId string, filterKey string, filterValue string) error
 {
 publishInput := sns.PublishInput{TopicArn: aws.String(topicArn), Message:
 aws.String(message)}
 if groupId != "" {
  publishInput.MessageGroupId = aws.String(groupId)
 }
```

```
 if dedupId != "" {
  publishInput.MessageDeduplicationId = aws.String(dedupId)
 }
 if filterKey != "" && filterValue != "" {
  publishInput.MessageAttributes = map[string]types.MessageAttributeValue{
   filterKey: {DataType: aws.String("String"), StringValue:
 aws.String(filterValue)},
  }
 }
 _, err := actor.SnsClient.Publish(ctx, &publishInput)
 if err != nil {
  log.Printf("Couldn't publish message to topic %v. Here's why: %v", topicArn, err)
 }
 return err
}
```

定義包裝此範例使用之 Amazon SQS 動作的結構。

```
import (
 "context"
 "encoding/json"
 "fmt"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/sqs"
 "github.com/aws/aws-sdk-go-v2/service/sqs/types"
)

// SqsActions encapsulates the Amazon Simple Queue Service (Amazon SQS) actions
// used in the examples.
type SqsActions struct {
 SqsClient *sqs.Client
}



// CreateQueue creates an Amazon SQS queue with the specified name. You can specify
// whether the queue is created as a FIFO queue.
```

```
func (actor SqsActions) CreateQueue(ctx context.Context, queueName string,
 isFifoQueue bool) (string, error) {
 var queueUrl string
 queueAttributes := map[string]string{}
 if isFifoQueue {
  queueAttributes["FifoQueue"] = "true"
 }
 queue, err := actor.SqsClient.CreateQueue(ctx, &sqs.CreateQueueInput{
  QueueName:  aws.String(queueName),
  Attributes: queueAttributes,
 })
 if err != nil {
  log.Printf("Couldn't create queue %v. Here's why: %v\n", queueName, err)
 } else {
  queueUrl = *queue.QueueUrl
 }

 return queueUrl, err
}



// GetQueueArn uses the GetQueueAttributes action to get the Amazon Resource Name
 (ARN)
// of an Amazon SQS queue.
func (actor SqsActions) GetQueueArn(ctx context.Context, queueUrl string) (string,
 error) {
 var queueArn string
 arnAttributeName := types.QueueAttributeNameQueueArn
 attribute, err := actor.SqsClient.GetQueueAttributes(ctx,
 &sqs.GetQueueAttributesInput{
  QueueUrl:       aws.String(queueUrl),
  AttributeNames: []types.QueueAttributeName{arnAttributeName},
 })
 if err != nil {
  log.Printf("Couldn't get ARN for queue %v. Here's why: %v\n", queueUrl, err)
 } else {
  queueArn = attribute.Attributes[string(arnAttributeName)]
 }
 return queueArn, err
}
```

```
// AttachSendMessagePolicy uses the SetQueueAttributes action to attach a policy to
 an
// Amazon SQS queue that allows the specified Amazon SNS topic to send messages to
 the
// queue.
func (actor SqsActions) AttachSendMessagePolicy(ctx context.Context, queueUrl
 string, queueArn string, topicArn string) error {
 policyDoc := PolicyDocument{
  Version: "2012-10-17",
  Statement: []PolicyStatement{{
   Effect:    "Allow",
   Action:    "sqs:SendMessage",
   Principal: map[string]string{"Service": "sns.amazonaws.com"},
   Resource:  aws.String(queueArn),
   Condition: PolicyCondition{"ArnEquals": map[string]string{"aws:SourceArn":
 topicArn}},
  }},
 }
 policyBytes, err := json.Marshal(policyDoc)
 if err != nil {
  log.Printf("Couldn't create policy document. Here's why: %v\n", err)
  return err
 }
 _, err = actor.SqsClient.SetQueueAttributes(ctx, &sqs.SetQueueAttributesInput{
  Attributes: map[string]string{
   string(types.QueueAttributeNamePolicy): string(policyBytes),
  },
  QueueUrl: aws.String(queueUrl),
 })
 if err != nil {
  log.Printf("Couldn't set send message policy on queue %v. Here's why: %v\n",
 queueUrl, err)
 }
 return err
}

// PolicyDocument defines a policy document as a Go struct that can be serialized
// to JSON.
type PolicyDocument struct {
 Version   string
 Statement []PolicyStatement
}

// PolicyStatement defines a statement in a policy document.
```

```
type PolicyStatement struct {
 Effect    string
 Action    string
 Principal map[string]string `json:",omitempty"`
 Resource  *string           `json:",omitempty"`
 Condition PolicyCondition   `json:",omitempty"`
}

// PolicyCondition defines a condition in a policy.
type PolicyCondition map[string]map[string]string



// GetMessages uses the ReceiveMessage action to get messages from an Amazon SQS
 queue.
func (actor SqsActions) GetMessages(ctx context.Context, queueUrl string,
 maxMessages int32, waitTime int32) ([]types.Message, error) {
 var messages []types.Message
 result, err := actor.SqsClient.ReceiveMessage(ctx, &sqs.ReceiveMessageInput{
  QueueUrl:            aws.String(queueUrl),
  MaxNumberOfMessages: maxMessages,
  WaitTimeSeconds:     waitTime,
 })
 if err != nil {
  log.Printf("Couldn't get messages from queue %v. Here's why: %v\n", queueUrl, err)
 } else {
  messages = result.Messages
 }
 return messages, err
}



// DeleteMessages uses the DeleteMessageBatch action to delete a batch of messages
 from
// an Amazon SQS queue.
func (actor SqsActions) DeleteMessages(ctx context.Context, queueUrl string,
 messages []types.Message) error {
 entries := make([]types.DeleteMessageBatchRequestEntry, len(messages))
 for msgIndex := range messages {
  entries[msgIndex].Id = aws.String(fmt.Sprintf("%v", msgIndex))
  entries[msgIndex].ReceiptHandle = messages[msgIndex].ReceiptHandle
 }
 _, err := actor.SqsClient.DeleteMessageBatch(ctx, &sqs.DeleteMessageBatchInput{
```

```
  Entries:  entries,
  QueueUrl: aws.String(queueUrl),
 })
 if err != nil {
  log.Printf("Couldn't delete messages from queue %v. Here's why: %v\n", queueUrl,
 err)
 }
 return err
}



// DeleteQueue deletes an Amazon SQS queue.
func (actor SqsActions) DeleteQueue(ctx context.Context, queueUrl string) error {
 _, err := actor.SqsClient.DeleteQueue(ctx, &sqs.DeleteQueueInput{
  QueueUrl: aws.String(queueUrl)})
 if err != nil {
  log.Printf("Couldn't delete queue %v. Here's why: %v\n", queueUrl, err)
 }
 return err
}
```

清除資源。

```
import (
 "context"
 "fmt"
 "log"
 "topics_and_queues/actions"
)

// Resources keeps track of AWS resources created during an example and handles
// cleanup when the example finishes.
type Resources struct {
 topicArn  string
 queueUrls []string
 snsActor  *actions.SnsActions
 sqsActor  *actions.SqsActions
}
```

```
// Cleanup deletes all AWS resources created during an example.
func (resources Resources) Cleanup(ctx context.Context) {
 defer func() {
  if r := recover(); r != nil {
   fmt.Println("Something went wrong during cleanup. Use the AWS Management Console
\n" +
    "to remove any remaining resources that were created for this scenario.")
  }
 }()

 var err error
 if resources.topicArn != "" {
  log.Printf("Deleting topic %v.\n", resources.topicArn)
  err = resources.snsActor.DeleteTopic(ctx, resources.topicArn)
  if err != nil {
   panic(err)
  }
 }

 for _, queueUrl := range resources.queueUrls {
  log.Printf("Deleting queue %v.\n", queueUrl)
  err = resources.sqsActor.DeleteQueue(ctx, queueUrl)
  if err != nil {
   panic(err)
  }
 }
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 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。

SDK for Go V2

> **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 Go 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
package main

import (
 "context"
 "fmt"

 "github.com/aws/aws-lambda-go/events"
 "github.com/aws/aws-lambda-go/lambda"
)

func handler(ctx context.Context, snsEvent events.SNSEvent) {
 for _, record := range snsEvent.Records {
  processMessage(record)
 }
 fmt.Println("done")
}

func processMessage(record events.SNSEventRecord) {
```

```
 message := record.SNS.Message
 fmt.Printf("Processed message: %s\n", message)
 // TODO: Process your record here
}

func main() {
 lambda.Start(handler)
}
```

# 使用適用於 Go V2 的 SDK 的 Amazon SQS 範例

下列程式碼範例示範如何使用 適用於 Go 的 AWS SDK V2 搭配 Amazon SQS 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
- 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。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
package main

import (
 "context"
 "fmt"
 "log"

 "github.com/aws/aws-sdk-go-v2/config"
 "github.com/aws/aws-sdk-go-v2/service/sqs"
)

// main uses the AWS SDK for Go V2 to create an Amazon Simple Queue Service
// (Amazon SQS) client and list the queues in your account.
// This example uses the default settings specified in your shared credentials
// and config files.
func main() {
 ctx := context.Background()
 sdkConfig, err := config.LoadDefaultConfig(ctx)
 if err != nil {
  fmt.Println("Couldn't load default configuration. Have you set up your AWS
 account?")
  fmt.Println(err)
  return
 }
 sqsClient := sqs.NewFromConfig(sdkConfig)
 fmt.Println("Let's list the queues for your account.")
 var queueUrls []string
 paginator := sqs.NewListQueuesPaginator(sqsClient, &sqs.ListQueuesInput{})
 for paginator.HasMorePages() {
  output, err := paginator.NextPage(ctx)
  if err != nil {
   log.Printf("Couldn't get queues. Here's why: %v\n", err)
   break
```

```
  } else {
   queueUrls = append(queueUrls, output.QueueUrls...)
  }
 }
 if len(queueUrls) == 0 {
  fmt.Println("You don't have any queues!")
 } else {
  for _, queueUrl := range queueUrls {
   fmt.Printf("\t%v\n", queueUrl)
  }
 }
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 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`。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "context"
 "encoding/json"
 "fmt"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/sqs"
 "github.com/aws/aws-sdk-go-v2/service/sqs/types"
```

```
)

// SqsActions encapsulates the Amazon Simple Queue Service (Amazon SQS) actions
// used in the examples.
type SqsActions struct {
 SqsClient *sqs.Client
}



// CreateQueue creates an Amazon SQS queue with the specified name. You can specify
// whether the queue is created as a FIFO queue.
func (actor SqsActions) CreateQueue(ctx context.Context, queueName string,
 isFifoQueue bool) (string, error) {
 var queueUrl string
 queueAttributes := map[string]string{}
 if isFifoQueue {
  queueAttributes["FifoQueue"] = "true"
 }
 queue, err := actor.SqsClient.CreateQueue(ctx, &sqs.CreateQueueInput{
  QueueName:  aws.String(queueName),
  Attributes: queueAttributes,
 })
 if err != nil {
  log.Printf("Couldn't create queue %v. Here's why: %v\n", queueName, err)
 } else {
  queueUrl = *queue.QueueUrl
 }

 return queueUrl, err
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的 CreateQueue。

### DeleteMessageBatch

以下程式碼範例顯示如何使用 DeleteMessageBatch。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "context"
 "encoding/json"
 "fmt"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/sqs"
 "github.com/aws/aws-sdk-go-v2/service/sqs/types"
)

// SqsActions encapsulates the Amazon Simple Queue Service (Amazon SQS) actions
// used in the examples.
type SqsActions struct {
 SqsClient *sqs.Client
}



// DeleteMessages uses the DeleteMessageBatch action to delete a batch of messages
 from
// an Amazon SQS queue.
func (actor SqsActions) DeleteMessages(ctx context.Context, queueUrl string,
 messages []types.Message) error {
 entries := make([]types.DeleteMessageBatchRequestEntry, len(messages))
 for msgIndex := range messages {
  entries[msgIndex].Id = aws.String(fmt.Sprintf("%v", msgIndex))
  entries[msgIndex].ReceiptHandle = messages[msgIndex].ReceiptHandle
 }
 _, err := actor.SqsClient.DeleteMessageBatch(ctx, &sqs.DeleteMessageBatchInput{
  Entries:  entries,
  QueueUrl: aws.String(queueUrl),
 })
```

```
 if err != nil {
  log.Printf("Couldn't delete messages from queue %v. Here's why: %v\n", queueUrl,
 err)
 }
 return err
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的 DeleteMessageBatch。

### `DeleteQueue`

以下程式碼範例顯示如何使用 `DeleteQueue`。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "context"
 "encoding/json"
 "fmt"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/sqs"
 "github.com/aws/aws-sdk-go-v2/service/sqs/types"
)

// SqsActions encapsulates the Amazon Simple Queue Service (Amazon SQS) actions
// used in the examples.
type SqsActions struct {
 SqsClient *sqs.Client
}
```

```
// DeleteQueue deletes an Amazon SQS queue.
func (actor SqsActions) DeleteQueue(ctx context.Context, queueUrl string) error {
 _, err := actor.SqsClient.DeleteQueue(ctx, &sqs.DeleteQueueInput{
  QueueUrl: aws.String(queueUrl)})
 if err != nil {
  log.Printf("Couldn't delete queue %v. Here's why: %v\n", queueUrl, err)
 }
 return err
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的 DeleteQueue。

### `GetQueueAttributes`

以下程式碼範例顯示如何使用 `GetQueueAttributes`。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "context"
 "encoding/json"
 "fmt"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/sqs"
 "github.com/aws/aws-sdk-go-v2/service/sqs/types"
)

// SqsActions encapsulates the Amazon Simple Queue Service (Amazon SQS) actions
// used in the examples.
type SqsActions struct {
```

```
 SqsClient *sqs.Client
}



// GetQueueArn uses the GetQueueAttributes action to get the Amazon Resource Name
 (ARN)
// of an Amazon SQS queue.
func (actor SqsActions) GetQueueArn(ctx context.Context, queueUrl string) (string,
 error) {
 var queueArn string
 arnAttributeName := types.QueueAttributeNameQueueArn
 attribute, err := actor.SqsClient.GetQueueAttributes(ctx,
 &sqs.GetQueueAttributesInput{
  QueueUrl:       aws.String(queueUrl),
  AttributeNames: []types.QueueAttributeName{arnAttributeName},
 })
 if err != nil {
  log.Printf("Couldn't get ARN for queue %v. Here's why: %v\n", queueUrl, err)
 } else {
  queueArn = attribute.Attributes[string(arnAttributeName)]
 }
 return queueArn, err
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的 GetQueueAttributes。

### `ListQueues`

以下程式碼範例顯示如何使用 `ListQueues`。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
package main

import (
 "context"
 "fmt"
 "log"

 "github.com/aws/aws-sdk-go-v2/config"
 "github.com/aws/aws-sdk-go-v2/service/sqs"
)

// main uses the AWS SDK for Go V2 to create an Amazon Simple Queue Service
// (Amazon SQS) client and list the queues in your account.
// This example uses the default settings specified in your shared credentials
// and config files.
func main() {
 ctx := context.Background()
 sdkConfig, err := config.LoadDefaultConfig(ctx)
 if err != nil {
  fmt.Println("Couldn't load default configuration. Have you set up your AWS
 account?")
  fmt.Println(err)
  return
 }
 sqsClient := sqs.NewFromConfig(sdkConfig)
 fmt.Println("Let's list the queues for your account.")
 var queueUrls []string
 paginator := sqs.NewListQueuesPaginator(sqsClient, &sqs.ListQueuesInput{})
 for paginator.HasMorePages() {
  output, err := paginator.NextPage(ctx)
  if err != nil {
   log.Printf("Couldn't get queues. Here's why: %v\n", err)
   break
  } else {
   queueUrls = append(queueUrls, output.QueueUrls...)
  }
 }
 if len(queueUrls) == 0 {
  fmt.Println("You don't have any queues!")
 } else {
  for _, queueUrl := range queueUrls {
   fmt.Printf("\t%v\n", queueUrl)
  }
 }
```

```
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的 ListQueues。

### `ReceiveMessage`

以下程式碼範例顯示如何使用 `ReceiveMessage`。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "context"
 "encoding/json"
 "fmt"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/sqs"
 "github.com/aws/aws-sdk-go-v2/service/sqs/types"
)

// SqsActions encapsulates the Amazon Simple Queue Service (Amazon SQS) actions
// used in the examples.
type SqsActions struct {
 SqsClient *sqs.Client
}



// GetMessages uses the ReceiveMessage action to get messages from an Amazon SQS
 queue.
func (actor SqsActions) GetMessages(ctx context.Context, queueUrl string,
 maxMessages int32, waitTime int32) ([]types.Message, error) {
```

```
 var messages []types.Message
 result, err := actor.SqsClient.ReceiveMessage(ctx, &sqs.ReceiveMessageInput{
  QueueUrl:            aws.String(queueUrl),
  MaxNumberOfMessages: maxMessages,
  WaitTimeSeconds:     waitTime,
 })
 if err != nil {
  log.Printf("Couldn't get messages from queue %v. Here's why: %v\n", queueUrl, err)
 } else {
  messages = result.Messages
 }
 return messages, err
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 的 AWS SDK API 參考》中的 ReceiveMessage。

### `SetQueueAttributes`

以下程式碼範例顯示如何使用 `SetQueueAttributes`。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，並了解如何在 AWS 程式碼範例儲存庫中設定和執行。

```
import (
 "context"
 "encoding/json"
 "fmt"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/sqs"
 "github.com/aws/aws-sdk-go-v2/service/sqs/types"
)
```

```
// SqsActions encapsulates the Amazon Simple Queue Service (Amazon SQS) actions
// used in the examples.
type SqsActions struct {
 SqsClient *sqs.Client
}



// AttachSendMessagePolicy uses the SetQueueAttributes action to attach a policy to
 an
// Amazon SQS queue that allows the specified Amazon SNS topic to send messages to
 the
// queue.
func (actor SqsActions) AttachSendMessagePolicy(ctx context.Context, queueUrl
 string, queueArn string, topicArn string) error {
 policyDoc := PolicyDocument{
  Version: "2012-10-17",
  Statement: []PolicyStatement{{
   Effect:    "Allow",
   Action:    "sqs:SendMessage",
   Principal: map[string]string{"Service": "sns.amazonaws.com"},
   Resource:  aws.String(queueArn),
   Condition: PolicyCondition{"ArnEquals": map[string]string{"aws:SourceArn":
 topicArn}},
  }},
 }
 policyBytes, err := json.Marshal(policyDoc)
 if err != nil {
  log.Printf("Couldn't create policy document. Here's why: %v\n", err)
  return err
 }
 _, err = actor.SqsClient.SetQueueAttributes(ctx, &sqs.SetQueueAttributesInput{
  Attributes: map[string]string{
   string(types.QueueAttributeNamePolicy): string(policyBytes),
  },
  QueueUrl: aws.String(queueUrl),
 })
 if err != nil {
  log.Printf("Couldn't set send message policy on queue %v. Here's why: %v\n",
 queueUrl, err)
 }
 return err
}
```

```
// PolicyDocument defines a policy document as a Go struct that can be serialized
// to JSON.
type PolicyDocument struct {
 Version   string
 Statement []PolicyStatement
}

// PolicyStatement defines a statement in a policy document.
type PolicyStatement struct {
 Effect    string
 Action    string
 Principal map[string]string `json:",omitempty"`
 Resource  *string           `json:",omitempty"`
 Condition PolicyCondition   `json:",omitempty"`
}

// PolicyCondition defines a condition in a policy.
type PolicyCondition map[string]map[string]string
```

- 如需 API 詳細資訊，請參閱《適用於 Go 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。

SDK for Go V2

> **Note**
>
> GitHub 上提供更多範例。尋找完整範例，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。

```
import (
 "context"
 "encoding/json"
 "fmt"
 "log"
 "strings"
 "topics_and_queues/actions"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/sns"
 "github.com/aws/aws-sdk-go-v2/service/sqs"
 "github.com/aws/aws-sdk-go-v2/service/sqs/types"
 "github.com/awsdocs/aws-doc-sdk-examples/gov2/demotools"
)

const FIFO_SUFFIX = ".fifo"
const TONE_KEY = "tone"

var ToneChoices = []string{"cheerful", "funny", "serious", "sincere"}

// MessageBody is used to deserialize the body of a message from a JSON string.
type MessageBody struct {
 Message string
}

// ScenarioRunner separates the steps of this scenario into individual functions so
 that
// they are simpler to read and understand.
type ScenarioRunner struct {
 questioner demotools.IQuestioner
 snsActor   *actions.SnsActions
 sqsActor   *actions.SqsActions
```

```
}

func (runner ScenarioRunner) CreateTopic(ctx context.Context) (string, string, bool,
 bool) {
 log.Println("SNS topics can be configured as FIFO (First-In-First-Out) or standard.
\n" +
  "FIFO topics deliver messages in order and support deduplication and message
 filtering.")
 isFifoTopic := runner.questioner.AskBool("\nWould you like to work with FIFO
 topics? (y/n) ", "y")

 contentBasedDeduplication := false
 if isFifoTopic {
  log.Println(strings.Repeat("-", 88))
  log.Println("Because you have chosen a FIFO topic, deduplication is supported.\n"
 +
   "Deduplication IDs are either set in the message or are automatically generated
\n" +
   "from content using a hash function. If a message is successfully published to\n"
 +
   "an SNS FIFO topic, any message published and determined to have the same\n" +
   "deduplication ID, within the five-minute deduplication interval, is accepted\n"
 +
   "but not delivered. For more information about deduplication, see:\n" +
   "\thttps://docs.aws.amazon.com/sns/latest/dg/fifo-message-dedup.html.")
  contentBasedDeduplication = runner.questioner.AskBool(
   "\nDo you want to use content-based deduplication instead of entering a
 deduplication ID? (y/n) ", "y")
 }
 log.Println(strings.Repeat("-", 88))

 topicName := runner.questioner.Ask("Enter a name for your SNS topic. ")
 if isFifoTopic {
  topicName = fmt.Sprintf("%v%v", topicName, FIFO_SUFFIX)
  log.Printf("Because you have selected a FIFO topic, '%v' must be appended to\n"+
   "the topic name.", FIFO_SUFFIX)
 }

 topicArn, err := runner.snsActor.CreateTopic(ctx, topicName, isFifoTopic,
 contentBasedDeduplication)
 if err != nil {
  panic(err)
 }
 log.Printf("Your new topic with the name '%v' and Amazon Resource Name (ARN) \n"+
```

```
  "'%v' has been created.", topicName, topicArn)

 return topicName, topicArn, isFifoTopic, contentBasedDeduplication
}

func (runner ScenarioRunner) CreateQueue(ctx context.Context, ordinal string,
 isFifoTopic bool) (string, string) {
 queueName := runner.questioner.Ask(fmt.Sprintf("Enter a name for the %v SQS queue.
 ", ordinal))
 if isFifoTopic {
  queueName = fmt.Sprintf("%v%v", queueName, FIFO_SUFFIX)
  if ordinal == "first" {
   log.Printf("Because you are creating a FIFO SQS queue, '%v' must "+
    "be appended to the queue name.\n", FIFO_SUFFIX)
  }
 }
 queueUrl, err := runner.sqsActor.CreateQueue(ctx, queueName, isFifoTopic)
 if err != nil {
  panic(err)
 }
 log.Printf("Your new SQS queue with the name '%v' and the queue URL "+
  "'%v' has been created.", queueName, queueUrl)

 return queueName, queueUrl
}

func (runner ScenarioRunner) SubscribeQueueToTopic(
 ctx context.Context, queueName string, queueUrl string, topicName string, topicArn
 string, ordinal string,
 isFifoTopic bool) (string, bool) {

 queueArn, err := runner.sqsActor.GetQueueArn(ctx, queueUrl)
 if err != nil {
  panic(err)
 }
 log.Printf("The ARN of your queue is: %v.\n", queueArn)

 err = runner.sqsActor.AttachSendMessagePolicy(ctx, queueUrl, queueArn, topicArn)
 if err != nil {
  panic(err)
 }
 log.Println("Attached an IAM policy to the queue so the SNS topic can send " +
  "messages to it.")
 log.Println(strings.Repeat("-", 88))
```

```
var filterPolicy map[string][]string
if isFifoTopic {
 if ordinal == "first" {
  log.Println("Subscriptions to a FIFO topic can have filters.\n" +
   "If you add a filter to this subscription, then only the filtered messages\n" +
   "will be received in the queue.\n" +
   "For information about message filtering, see\n" +
   "\thttps://docs.aws.amazon.com/sns/latest/dg/sns-message-filtering.html\n" +
   "For this example, you can filter messages by a \"tone\" attribute.")
 }

 wantFiltering := runner.questioner.AskBool(
  fmt.Sprintf("Do you want to filter messages that are sent to \"%v\"\n"+
   "from the %v topic? (y/n) ", queueName, topicName), "y")
 if wantFiltering {
  log.Println("You can filter messages by one or more of the following \"tone\"
attributes.")

  var toneSelections []string
  askAboutTones := true
  for askAboutTones {
   toneIndex := runner.questioner.AskChoice(
    "Enter the number of the tone you want to filter by:\n", ToneChoices)
   toneSelections = append(toneSelections, ToneChoices[toneIndex])
   askAboutTones = runner.questioner.AskBool("Do you want to add another tone to
the filter? (y/n) ", "y")
  }
  log.Printf("Your subscription will be filtered to only pass the following tones:
%v\n", toneSelections)
  filterPolicy = map[string][]string{TONE_KEY: toneSelections}
 }
}

subscriptionArn, err := runner.snsActor.SubscribeQueue(ctx, topicArn, queueArn,
filterPolicy)
if err != nil {
 panic(err)
}
log.Printf("The queue %v is now subscribed to the topic %v with the subscription
ARN %v.\n",
 queueName, topicName, subscriptionArn)

return subscriptionArn, filterPolicy != nil
```

```
}

func (runner ScenarioRunner) PublishMessages(ctx context.Context, topicArn string,
 isFifoTopic bool, contentBasedDeduplication bool, usingFilters bool) {
 var message string
 var groupId string
 var dedupId string
 var toneSelection string
 publishMore := true
 for publishMore {
  groupId = ""
  dedupId = ""
  toneSelection = ""
  message = runner.questioner.Ask("Enter a message to publish: ")
  if isFifoTopic {
   log.Println("Because you are using a FIFO topic, you must set a message group ID.
\n" +
    "All messages within the same group will be received in the order they were
 published.")
   groupId = runner.questioner.Ask("Enter a message group ID: ")
   if !contentBasedDeduplication {
    log.Println("Because you are not using content-based deduplication,\n" +
     "you must enter a deduplication ID.")
    dedupId = runner.questioner.Ask("Enter a deduplication ID: ")
   }
  }
  if usingFilters {
   if runner.questioner.AskBool("Add a tone attribute so this message can be
 filtered? (y/n) ", "y") {
    toneIndex := runner.questioner.AskChoice(
     "Enter the number of the tone you want to filter by:\n", ToneChoices)
    toneSelection = ToneChoices[toneIndex]
   }
  }

  err := runner.snsActor.Publish(ctx, topicArn, message, groupId, dedupId, TONE_KEY,
 toneSelection)
  if err != nil {
   panic(err)
  }
  log.Println(("Your message was published."))

  publishMore = runner.questioner.AskBool("Do you want to publish another messsage?
 (y/n) ", "y")
```

```
 }
}

func (runner ScenarioRunner) PollForMessages(ctx context.Context, queueUrls
 []string) {
 log.Println("Polling queues for messages...")
 for _, queueUrl := range queueUrls {
  var messages []types.Message
  for {
   currentMsgs, err := runner.sqsActor.GetMessages(ctx, queueUrl, 10, 1)
   if err != nil {
    panic(err)
   }
   if len(currentMsgs) == 0 {
    break
   }
   messages = append(messages, currentMsgs...)
  }
  if len(messages) == 0 {
   log.Printf("No messages were received by queue %v.\n", queueUrl)
  } else if len(messages) == 1 {
   log.Printf("One message was received by queue %v:\n", queueUrl)

  } else {
   log.Printf("%v messages were received by queue %v:\n", len(messages), queueUrl)
  }
  for msgIndex, message := range messages {
   messageBody := MessageBody{}
   err := json.Unmarshal([]byte(*message.Body), &messageBody)
   if err != nil {
    panic(err)
   }
   log.Printf("Message %v: %v\n", msgIndex+1, messageBody.Message)
  }

  if len(messages) > 0 {
   log.Printf("Deleting %v messages from queue %v.\n", len(messages), queueUrl)
   err := runner.sqsActor.DeleteMessages(ctx, queueUrl, messages)
   if err != nil {
    panic(err)
   }
  }
 }
}
```

```
// RunTopicsAndQueuesScenario is an interactive example that shows you how to use
 the
// AWS SDK for Go to create and use Amazon SNS topics and Amazon SQS queues.
//
// 1. Create a topic (FIFO or non-FIFO).
// 2. Subscribe several queues to the topic with an option to apply a filter.
// 3. Publish messages to the topic.
// 4. Poll the queues for messages received.
// 5. Delete the topic and the queues.
//
// This example creates service clients from the specified sdkConfig so that
// you can replace it with a mocked or stubbed config for unit testing.
//
// It uses a questioner from the `demotools` package to get input during the
 example.
// This package can be found in the ..\..\demotools folder of this repo.
func RunTopicsAndQueuesScenario(
 ctx context.Context, sdkConfig aws.Config, questioner demotools.IQuestioner) {
 resources := Resources{}
 defer func() {
  if r := recover(); r != nil {
   log.Println("Something went wrong with the demo.\n" +
    "Cleaning up any resources that were created...")
   resources.Cleanup(ctx)
  }
 }()
 queueCount := 2

 log.Println(strings.Repeat("-", 88))
 log.Printf("Welcome to messaging with topics and queues.\n\n"+
  "In this scenario, you will create an SNS topic and subscribe %v SQS queues to the
\n"+
  "topic. You can select from several options for configuring the topic and the\n"+
  "subscriptions for the queues. You can then post to the topic and see the results
\n"+
  "in the queues.\n", queueCount)

 log.Println(strings.Repeat("-", 88))

 runner := ScenarioRunner{
  questioner: questioner,
  snsActor:   &actions.SnsActions{SnsClient: sns.NewFromConfig(sdkConfig)},
  sqsActor:   &actions.SqsActions{SqsClient: sqs.NewFromConfig(sdkConfig)},
```

```
 }
 resources.snsActor = runner.snsActor
 resources.sqsActor = runner.sqsActor

 topicName, topicArn, isFifoTopic, contentBasedDeduplication :=
 runner.CreateTopic(ctx)
 resources.topicArn = topicArn
 log.Println(strings.Repeat("-", 88))

 log.Printf("Now you will create %v SQS queues and subscribe them to the topic.\n",
 queueCount)
 ordinals := []string{"first", "next"}
 usingFilters := false
 for _, ordinal := range ordinals {
  queueName, queueUrl := runner.CreateQueue(ctx, ordinal, isFifoTopic)
  resources.queueUrls = append(resources.queueUrls, queueUrl)

  _, filtering := runner.SubscribeQueueToTopic(ctx, queueName, queueUrl, topicName,
 topicArn, ordinal, isFifoTopic)
  usingFilters = usingFilters || filtering
 }

 log.Println(strings.Repeat("-", 88))
 runner.PublishMessages(ctx, topicArn, isFifoTopic, contentBasedDeduplication,
 usingFilters)
 log.Println(strings.Repeat("-", 88))
 runner.PollForMessages(ctx, resources.queueUrls)

 log.Println(strings.Repeat("-", 88))

 wantCleanup := questioner.AskBool("Do you want to remove all AWS resources created
 for this scenario? (y/n) ", "y")
 if wantCleanup {
  log.Println("Cleaning up resources...")
  resources.Cleanup(ctx)
 }

 log.Println(strings.Repeat("-", 88))
 log.Println("Thanks for watching!")
 log.Println(strings.Repeat("-", 88))
}
```

定義包裝此範例使用之 Amazon SNS 動作的結構。

```
import (
 "context"
 "encoding/json"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/sns"
 "github.com/aws/aws-sdk-go-v2/service/sns/types"
)

// SnsActions encapsulates the Amazon Simple Notification Service (Amazon SNS)
 actions
// used in the examples.
type SnsActions struct {
 SnsClient *sns.Client
}



// CreateTopic creates an Amazon SNS topic with the specified name. You can
 optionally
// specify that the topic is created as a FIFO topic and whether it uses content-
based
// deduplication instead of ID-based deduplication.
func (actor SnsActions) CreateTopic(ctx context.Context, topicName string,
 isFifoTopic bool, contentBasedDeduplication bool) (string, error) {
 var topicArn string
 topicAttributes := map[string]string{}
 if isFifoTopic {
  topicAttributes["FifoTopic"] = "true"
 }
 if contentBasedDeduplication {
  topicAttributes["ContentBasedDeduplication"] = "true"
 }
 topic, err := actor.SnsClient.CreateTopic(ctx, &sns.CreateTopicInput{
  Name:       aws.String(topicName),
  Attributes: topicAttributes,
 })
 if err != nil {
  log.Printf("Couldn't create topic %v. Here's why: %v\n", topicName, err)
 } else {
```

```
  topicArn = *topic.TopicArn
 }

 return topicArn, err
}



// DeleteTopic delete an Amazon SNS topic.
func (actor SnsActions) DeleteTopic(ctx context.Context, topicArn string) error {
 _, err := actor.SnsClient.DeleteTopic(ctx, &sns.DeleteTopicInput{
  TopicArn: aws.String(topicArn)})
 if err != nil {
  log.Printf("Couldn't delete topic %v. Here's why: %v\n", topicArn, err)
 }
 return err
}



// SubscribeQueue subscribes an Amazon Simple Queue Service (Amazon SQS) queue to an
// Amazon SNS topic. When filterMap is not nil, it is used to specify a filter
 policy
// so that messages are only sent to the queue when the message has the specified
 attributes.
func (actor SnsActions) SubscribeQueue(ctx context.Context, topicArn string,
 queueArn string, filterMap map[string][]string) (string, error) {
 var subscriptionArn string
 var attributes map[string]string
 if filterMap != nil {
  filterBytes, err := json.Marshal(filterMap)
  if err != nil {
   log.Printf("Couldn't create filter policy, here's why: %v\n", err)
   return "", err
  }
  attributes = map[string]string{"FilterPolicy": string(filterBytes)}
 }
 output, err := actor.SnsClient.Subscribe(ctx, &sns.SubscribeInput{
  Protocol:              aws.String("sqs"),
  TopicArn:              aws.String(topicArn),
  Attributes:            attributes,
  Endpoint:              aws.String(queueArn),
  ReturnSubscriptionArn: true,
 })
```

```
 if err != nil {
  log.Printf("Couldn't susbscribe queue %v to topic %v. Here's why: %v\n",
   queueArn, topicArn, err)
 } else {
  subscriptionArn = *output.SubscriptionArn
 }

 return subscriptionArn, err
}



// Publish publishes a message to an Amazon SNS topic. The message is then sent to
 all
// subscribers. When the topic is a FIFO topic, the message must also contain a
 group ID
// and, when ID-based deduplication is used, a deduplication ID. An optional key-
value
// filter attribute can be specified so that the message can be filtered according
 to
// a filter policy.
func (actor SnsActions) Publish(ctx context.Context, topicArn string, message
 string, groupId string, dedupId string, filterKey string, filterValue string) error
 {
 publishInput := sns.PublishInput{TopicArn: aws.String(topicArn), Message:
 aws.String(message)}
 if groupId != "" {
  publishInput.MessageGroupId = aws.String(groupId)
 }
 if dedupId != "" {
  publishInput.MessageDeduplicationId = aws.String(dedupId)
 }
 if filterKey != "" && filterValue != "" {
  publishInput.MessageAttributes = map[string]types.MessageAttributeValue{
   filterKey: {DataType: aws.String("String"), StringValue:
 aws.String(filterValue)},
  }
 }
 _, err := actor.SnsClient.Publish(ctx, &publishInput)
 if err != nil {
  log.Printf("Couldn't publish message to topic %v. Here's why: %v", topicArn, err)
 }
 return err
}
```

定義包裝此範例使用之 Amazon SQS 動作的結構。

```
import (
 "context"
 "encoding/json"
 "fmt"
 "log"

 "github.com/aws/aws-sdk-go-v2/aws"
 "github.com/aws/aws-sdk-go-v2/service/sqs"
 "github.com/aws/aws-sdk-go-v2/service/sqs/types"
)

// SqsActions encapsulates the Amazon Simple Queue Service (Amazon SQS) actions
// used in the examples.
type SqsActions struct {
 SqsClient *sqs.Client
}



// CreateQueue creates an Amazon SQS queue with the specified name. You can specify
// whether the queue is created as a FIFO queue.
func (actor SqsActions) CreateQueue(ctx context.Context, queueName string,
 isFifoQueue bool) (string, error) {
 var queueUrl string
 queueAttributes := map[string]string{}
 if isFifoQueue {
  queueAttributes["FifoQueue"] = "true"
 }
 queue, err := actor.SqsClient.CreateQueue(ctx, &sqs.CreateQueueInput{
  QueueName:  aws.String(queueName),
  Attributes: queueAttributes,
 })
 if err != nil {
  log.Printf("Couldn't create queue %v. Here's why: %v\n", queueName, err)
 } else {
  queueUrl = *queue.QueueUrl
 }
```

```
 return queueUrl, err
}



// GetQueueArn uses the GetQueueAttributes action to get the Amazon Resource Name
 (ARN)
// of an Amazon SQS queue.
func (actor SqsActions) GetQueueArn(ctx context.Context, queueUrl string) (string,
 error) {
 var queueArn string
 arnAttributeName := types.QueueAttributeNameQueueArn
 attribute, err := actor.SqsClient.GetQueueAttributes(ctx,
 &sqs.GetQueueAttributesInput{
  QueueUrl:       aws.String(queueUrl),
  AttributeNames: []types.QueueAttributeName{arnAttributeName},
 })
 if err != nil {
  log.Printf("Couldn't get ARN for queue %v. Here's why: %v\n", queueUrl, err)
 } else {
  queueArn = attribute.Attributes[string(arnAttributeName)]
 }
 return queueArn, err
}



// AttachSendMessagePolicy uses the SetQueueAttributes action to attach a policy to
 an
// Amazon SQS queue that allows the specified Amazon SNS topic to send messages to
 the
// queue.
func (actor SqsActions) AttachSendMessagePolicy(ctx context.Context, queueUrl
 string, queueArn string, topicArn string) error {
 policyDoc := PolicyDocument{
  Version: "2012-10-17",
  Statement: []PolicyStatement{{
   Effect:    "Allow",
   Action:    "sqs:SendMessage",
   Principal: map[string]string{"Service": "sns.amazonaws.com"},
   Resource:  aws.String(queueArn),
   Condition: PolicyCondition{"ArnEquals": map[string]string{"aws:SourceArn":
 topicArn}},
```

```
  }},
 }
 policyBytes, err := json.Marshal(policyDoc)
 if err != nil {
  log.Printf("Couldn't create policy document. Here's why: %v\n", err)
  return err
 }
 _, err = actor.SqsClient.SetQueueAttributes(ctx, &sqs.SetQueueAttributesInput{
  Attributes: map[string]string{
   string(types.QueueAttributeNamePolicy): string(policyBytes),
  },
  QueueUrl: aws.String(queueUrl),
 })
 if err != nil {
  log.Printf("Couldn't set send message policy on queue %v. Here's why: %v\n",
 queueUrl, err)
 }
 return err
}

// PolicyDocument defines a policy document as a Go struct that can be serialized
// to JSON.
type PolicyDocument struct {
 Version   string
 Statement []PolicyStatement
}

// PolicyStatement defines a statement in a policy document.
type PolicyStatement struct {
 Effect    string
 Action    string
 Principal map[string]string `json:",omitempty"`
 Resource  *string           `json:",omitempty"`
 Condition PolicyCondition   `json:",omitempty"`
}

// PolicyCondition defines a condition in a policy.
type PolicyCondition map[string]map[string]string



// GetMessages uses the ReceiveMessage action to get messages from an Amazon SQS
 queue.
```

```
func (actor SqsActions) GetMessages(ctx context.Context, queueUrl string,
 maxMessages int32, waitTime int32) ([]types.Message, error) {
 var messages []types.Message
 result, err := actor.SqsClient.ReceiveMessage(ctx, &sqs.ReceiveMessageInput{
  QueueUrl:            aws.String(queueUrl),
  MaxNumberOfMessages: maxMessages,
  WaitTimeSeconds:     waitTime,
 })
 if err != nil {
  log.Printf("Couldn't get messages from queue %v. Here's why: %v\n", queueUrl, err)
 } else {
  messages = result.Messages
 }
 return messages, err
}



// DeleteMessages uses the DeleteMessageBatch action to delete a batch of messages
 from
// an Amazon SQS queue.
func (actor SqsActions) DeleteMessages(ctx context.Context, queueUrl string,
 messages []types.Message) error {
 entries := make([]types.DeleteMessageBatchRequestEntry, len(messages))
 for msgIndex := range messages {
  entries[msgIndex].Id = aws.String(fmt.Sprintf("%v", msgIndex))
  entries[msgIndex].ReceiptHandle = messages[msgIndex].ReceiptHandle
 }
 _, err := actor.SqsClient.DeleteMessageBatch(ctx, &sqs.DeleteMessageBatchInput{
  Entries:  entries,
  QueueUrl: aws.String(queueUrl),
 })
 if err != nil {
  log.Printf("Couldn't delete messages from queue %v. Here's why: %v\n", queueUrl,
 err)
 }
 return err
}



// DeleteQueue deletes an Amazon SQS queue.
func (actor SqsActions) DeleteQueue(ctx context.Context, queueUrl string) error {
 _, err := actor.SqsClient.DeleteQueue(ctx, &sqs.DeleteQueueInput{
```

```
  QueueUrl: aws.String(queueUrl)})
 if err != nil {
  log.Printf("Couldn't delete queue %v. Here's why: %v\n", queueUrl, err)
 }
 return err
}
```

清除資源。

```
import (
 "context"
 "fmt"
 "log"
 "topics_and_queues/actions"
)

// Resources keeps track of AWS resources created during an example and handles
// cleanup when the example finishes.
type Resources struct {
 topicArn  string
 queueUrls []string
 snsActor  *actions.SnsActions
 sqsActor  *actions.SqsActions
}

// Cleanup deletes all AWS resources created during an example.
func (resources Resources) Cleanup(ctx context.Context) {
 defer func() {
  if r := recover(); r != nil {
   fmt.Println("Something went wrong during cleanup. Use the AWS Management Console
\n" +
    "to remove any remaining resources that were created for this scenario.")
  }
 }()

 var err error
 if resources.topicArn != "" {
  log.Printf("Deleting topic %v.\n", resources.topicArn)
  err = resources.snsActor.DeleteTopic(ctx, resources.topicArn)
  if err != nil {
```

```
    panic(err)
   }
  }

  for _, queueUrl := range resources.queueUrls {
   log.Printf("Deleting queue %v.\n", queueUrl)
   err = resources.sqsActor.DeleteQueue(ctx, queueUrl)
   if err != nil {
    panic(err)
   }
  }
}
```

- 如需 API 詳細資訊，請參閱《適用於 Go 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 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。

SDK for Go V2

> **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 Go 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
package integration_sqs_to_lambda

import (
 "fmt"
 "github.com/aws/aws-lambda-go/events"
 "github.com/aws/aws-lambda-go/lambda"
)

func handler(event events.SQSEvent) error {
 for _, record := range event.Records {
  err := processMessage(record)
  if err != nil {
   return err
  }
 }
 fmt.Println("done")
 return nil
}

func processMessage(record events.SQSMessage) error {
 fmt.Printf("Processed message %s\n", record.Body)
 // TODO: Do interesting work based on the new message
 return nil
}

func main() {
 lambda.Start(handler)
}
```

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。

SDK for Go V2

> **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 Go 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
package main

import (
 "context"
 "fmt"
 "github.com/aws/aws-lambda-go/events"
 "github.com/aws/aws-lambda-go/lambda"
)

func handler(ctx context.Context, sqsEvent events.SQSEvent) (map[string]interface{},
 error) {
 batchItemFailures := []map[string]interface{}{}

 for _, message := range sqsEvent.Records {
  if len(message.Body) > 0 {
   // Your message processing condition here
   fmt.Printf("Successfully processed message: %s\n", message.Body)
  } else {
   // Message processing failed
   fmt.Printf("Failed to process message %s\n", message.MessageId)
   batchItemFailures = append(batchItemFailures, map[string]interface{}
{"itemIdentifier": message.MessageId})
  }
 }

 sqsBatchResponse := map[string]interface{}{
```

```
  "batchItemFailures": batchItemFailures,
 }
 return sqsBatchResponse, nil
}

func main() {
 lambda.Start(handler)
}
```

# 遷移至 適用於 Go 的 AWS SDK v2

## 最低 Go 版本

適用於 Go 的 AWS SDK 需要 Go 1.23 的最低版本。您可以在下載https://go.dev/dl/頁面上下載最新版本的 Go。如需每個 Go 版本版本的詳細資訊，以及升級所需的相關資訊，請參閱發行歷史記錄。

## 模組化

適用於 Go 的 AWS SDK 已更新，以利用 Go 模組成為 Go 1.13 的預設開發模式。軟體開發套件提供的許多套件已模組化，並分別獨立進行版本化和發行。此變更可改善應用程式相依性建模，並讓 SDK 提供遵循 Go 模組版本控制策略的新功能。

以下是 SDK 提供的一些 Go 模組：

| 模組 | Description |
| --- | --- |
| `github.com/aws/aws-sdk-go-v2` | SDK 核心 |
| `github.com/aws/aws-sdk-go-v2/config` | 共用組態載入 |
| `github.com/aws/aws-sdk-go-v2/credentials` | AWS 登入資料提供者 |
| `github.com/aws/aws-sdk-go-v2/feature/ec2/imds` | Amazon EC2 執行個體中繼資料服務用戶端 |

SDK 的服務用戶端和更高層級的公用程式模組會巢狀在下列匯入路徑下：

| 匯入根目錄 | Description |
| --- | --- |
| `github.com/aws/aws-sdk-go-v2/service/` | 服務用戶端模組 |
| `github.com/aws/aws-sdk-go-v2/feature/` | Amazon S3 Transfer Manager 等服務的高階公用程式 |

# 組態載入

工作階段套件和相關聯的功能會取代為組態套件提供的簡化組態系統。config 套件是單獨的 Go 模組，可以透過 將 包含在應用程式的相依性中go get。

```
go get github.com/aws/aws-sdk-go-v2/config
```

session.New、session.NewSession、NewSessionWithOptions 和 session.Must 必須遷移至 config.LoadDefaultConfig。

config 套件提供數個協助程式函數，可協助以程式設計方式覆寫共用組態載入。這些函數名稱的字首為 ，With後面接著其覆寫的選項。讓我們來看看如何遷移session套件用量的一些範例。

如需載入共用組態的詳細資訊，請參閱 設定軟體開發套件。

## 範例

### 從 NewSession 遷移至 LoadDefaultConfig

下列範例顯示 在沒有其他引數參數session.NewSession的情況下如何使用 遷移至 config.LoadDefaultConfig。

```
// V1 using NewSession

import "github.com/aws/aws-sdk-go/aws/session"

// ...

sess, err := session.NewSession()
if err != nil {
    // handle error
}
```

```
// V2 using LoadDefaultConfig

import "context"
import "github.com/aws/aws-sdk-go-v2/config"

// ...
```

```
cfg, err := config.LoadDefaultConfig(context.TODO())
if err != nil {
    // handle error
}
```

## 使用 aws.Config 選項從 NewSession 遷移

此範例示範如何在組態載入期間遷移覆寫`aws.Config`值。可以提供一或多個`config.With*`協助程式函數給 `config.LoadDefaultConfig`，以覆寫載入的組態值。在此範例中， AWS 區域會覆寫為`us-west-2`使用 config.WithRegion 協助程式函數。

```
// V1

import "github.com/aws/aws-sdk-go/aws"
import "github.com/aws/aws-sdk-go/aws/session"

// ...

sess, err := session.NewSession(aws.Config{
    Region: aws.String("us-west-2")
})
if err != nil {
    // handle error
}
```

```
// V2

import "context"
import "github.com/aws/aws-sdk-go-v2/config"

// ...

cfg, err := config.LoadDefaultConfig(context.TODO(),
    config.WithRegion("us-west-2"),
)
if err != nil {
    // handle error
}
```

### 從 NewSessionWithOptions 遷移

此範例示範如何在組態載入期間遷移覆寫值。可以提供零或多個config.With*協助程式函數給config.LoadDefaultConfig，以覆寫載入的組態值。在此範例中，我們會示範如何覆寫載入 AWS SDK 共用組態時所使用的目標設定檔。

```
// V1

import "github.com/aws/aws-sdk-go/aws"
import "github.com/aws/aws-sdk-go/aws/session"

// ...

sess, err := session.NewSessionWithOptions(aws.Config{
    Profile: "my-application-profile"
})
if err != nil {
    // handle error
}
```

```
// V2

import "context"
import "github.com/aws/aws-sdk-go-v2/config"

// ...

cfg, err := config.LoadDefaultConfig(context.TODO(),
    config.WithSharedConfigProfile("my-application-profile"),
)
if err != nil {
    // handle error
}
```

## 模擬和 *iface

其中的*iface套件和界面（例如 s3iface.S3API) 已移除。這些界面定義不穩定，因為每次服務新增操作時都會中斷。

的使用*iface應取代為所使用服務操作的範圍呼叫者定義界面：

```
// V1

import "io"

import "github.com/aws/aws-sdk-go/service/s3"
import "github.com/aws/aws-sdk-go/service/s3/s3iface"

func GetObjectBytes(client s3iface.S3API, bucket, key string) ([]byte, error) {
    object, err := client.GetObject(&s3.GetObjectInput{
        Bucket: &bucket,
        Key:    &key,
    })
    if err != nil {
        return nil, err
    }
    defer object.Body.Close()

    return io.ReadAll(object.Body)
}
```

```
// V2

import "context"
import "io"

import "github.com/aws/aws-sdk-go-v2/service/s3"

type GetObjectAPIClient interface {
    GetObject(context.Context, *s3.GetObjectInput, ...func(*s3.Options))
 (*s3.GetObjectOutput, error)
}

func GetObjectBytes(ctx context.Context, client GetObjectAPIClient, bucket, key string)
 ([]byte, error) {
    object, err := client.GetObject(ctx, &s3.GetObjectInput{
        Bucket: &bucket,
        Key:    &key,
    })
    if err != nil {
        return nil, err
    }
    defer object.Body.Close()
```

```
    return io.ReadAll(object.Body)
}
```

如需詳細資訊，請參閱使用 適用於 Go 的 AWS SDK v2 進行單位測試。

## 登入資料和登入資料提供者

aws/credentials 套件和相關聯的登入資料提供者已重新定位至登入資料套件位置。credentials 套件是您使用 擷取的 Go 模組go get。

```
go get github.com/aws/aws-sdk-go-v2/credentials
```

適用於 Go 的 AWS SDK v2 版本會更新 AWS 登入資料提供者，以提供一致的介面來擷取 AWS 登入資料。每個提供者都會實作 aws.CredentialsProvider 介面，定義傳回類似 適用於 Go 的 AWS SDK v1 登入資料.Value 類型的 (aws.Credentials, error). aws.Credentials Retrieve的方法。

您必須使用 aws.CredentialsCache 包裝aws.CredentialsProvider物件，以允許發生登入資料快取。您可以使用 NewCredentialsCache 建構aws.CredentialsCache物件。根據預設，由 設定的登入資料config.LoadDefaultConfig會包裝在 中aws.CredentialsCache。

下表列出登入資料提供者從 適用於 Go 的 AWS SDK v1 到 v2 AWS 的位置變更。

| Name | V1 匯入 | V2 匯入 |
| --- | --- | --- |
| Amazon EC2 IAM 角色登入資料 | github.com/aws/aws-sdk-go/aws/credentials/ec2rolecreds | github.com/aws/aws-sdk-go-v2/credentials/ec2rolecreds |
| 端點登入資料 | github.com/aws/aws-sdk-go/aws/credentials/endpointcreds | github.com/aws/aws-sdk-go-v2/credentials/endpointcreds |
| 程序登入資料 | github.com/aws/aws-sdk-go/aws/credentials/processcreds | github.com/aws/aws-sdk-go-v2/credentials/processcreds |
| AWS Security Token Service | github.com/aws/aws-sdk-go/aws/credentials/stscreds | github.com/aws/aws-sdk-go-v2/credentials/stscreds |

## 靜態登入資料

使用 credentials.NewStaticCredentials 以程式設計方式建構靜態登入資料的應用程式必須使用 credentials.NewStaticCredentialsProvider。

### 範例

```
// V1

import "github.com/aws/aws-sdk-go/aws/credentials"

// ...

appCreds := credentials.NewStaticCredentials(accessKey, secretKey, sessionToken)
value, err := appCreds.Get()
if err != nil {
    // handle error
}
```

```
// V2

import "context"
import "github.com/aws/aws-sdk-go-v2/aws"
import "github.com/aws/aws-sdk-go-v2/credentials"

// ...

appCreds := aws.NewCredentialsCache(credentials.NewStaticCredentialsProvider(accessKey,
 secretKey, sessionToken))
value, err := appCreds.Retrieve(context.TODO())
if err != nil {
    // handle error
}
```

## Amazon EC2 IAM 角色登入資料

您必須遷移 NewCredentials 和 NewCredentialsWithClient 的用量，才能使用 New。

ec2rolecreds 套件的 ec2rolecreds.New採用 ec2rolecreds.Options 的功能選項做為輸入，可讓您覆寫要使用的特定 Amazon EC2 執行個體中繼資料服務用戶端，或覆寫憑證過期時段。

### 範例

```
// V1

import "github.com/aws/aws-sdk-go/aws/credentials/ec2rolecreds"

// ...

appCreds := ec2rolecreds.NewCredentials(sess)
value, err := appCreds.Get()
if err != nil {
    // handle error
}
```

```
// V2

import "context"
import "github.com/aws/aws-sdk-go-v2/aws"
import "github.com/aws/aws-sdk-go-v2/credentials/ec2rolecreds"

// ...

// New returns an object of a type that satisfies the aws.CredentialProvider interface
appCreds := aws.NewCredentialsCache(ec2rolecreds.New())
value, err := appCreds.Retrieve(context.TODO())
if err != nil {
    // handle error
}
```

## 端點登入資料

您必須遷移 NewCredentialsClient 和 NewProviderClient 的用量，才能使用 New。

endpointcreds 套件的 New函數採用字串引數，其中包含 HTTP 或 HTTPS 端點的 URL 來擷取登入資料，以及 endpointcreds.Options 的功能選項來變更登入資料提供者並覆寫特定組態設定。

## 程序登入資料

您必須遷移 NewCredentials、NewCredentialsCommand 和 NewCredentialsTimeout 的使用，才能使用 NewProvider 或 NewProviderCommand。

processcreds 套件的 NewProvider函數採用字串引數，這是要在主機環境 shell 中執行的命令，以及 選項的功能選項，以變更登入資料提供者並覆寫特定組態設定。

NewProviderCommand 接受 NewCommandBuilder 界面的實作，該界面定義了更複雜的程序命令，這些命令可能需要一或多個命令列引數，或具有特定的執行環境需求。DefaultNewCommandBuilder 會實作此界面，並為需要多個命令列引數的程序定義命令建置器。

### 範例

```
// V1

import "github.com/aws/aws-sdk-go/aws/credentials/processcreds"

// ...

appCreds := processcreds.NewCredentials("/path/to/command")
value, err := appCreds.Get()
if err != nil {
    // handle error
}
```

```
// V2

import "context"
import "github.com/aws/aws-sdk-go-v2/aws"
import "github.com/aws/aws-sdk-go-v2/credentials/processcreds"

// ...

appCreds := aws.NewCredentialsCache(processcreds.NewProvider("/path/to/command"))
value, err := appCreds.Retrieve(context.TODO())
if err != nil {
    // handle error
}
```

## AWS Security Token Service 登入資料

### AssumeRole

您必須遷移 NewCredentials 和 NewCredentialsWithClient 的用量，才能使用 NewAssumeRoleProvider。

stscreds 套件的 NewAssumeRoleProvider函數必須使用 sts.Client 呼叫，並從提供的 sts.Client設定登入資料中擔任 AWS Identity and Access Management 角色 ARN。您也可以提供一組 AssumeRoleOptions 的功能選項，以修改提供者的其他選用設定。

**範例**

```
// V1

import "github.com/aws/aws-sdk-go/aws/credentials/stscreds"

// ...

appCreds := stscreds.NewCredentials(sess, "arn:aws:iam::123456789012:role/demo")
value, err := appCreds.Get()
if err != nil {
    // handle error
}
```

```
// V2

import "context"
import "github.com/aws/aws-sdk-go-v2/credentials/stscreds"
import "github.com/aws/aws-sdk-go-v2/service/sts"

// ...

client := sts.NewFromConfig(cfg)

appCreds := stscreds.NewAssumeRoleProvider(client, "arn:aws:iam::123456789012:role/
demo")
value, err := appCreds.Retrieve(context.TODO())
if err != nil {
    // handle error
}
```

### AssumeRoleWithWebIdentity

您必須遷移 NewWebIdentityCredentials、NewWebIdentityRoleProvider 和 NewWebIdentityRoleProviderWithToken 的用量，才能使用 NewWebIdentityRoleProvider。

stscreds 套件的NewWebIdentityRoleProvider函數必須使用 sts.Client 呼叫，並使用提供的 sts.Client已設定的登入資料擔任 AWS Identity and Access Management 角色 ARN，以及用於

提供 OAuth 2.0 或 OpenID Connect ID 字符的 IdentityTokenRetriever 實作。IdentityTokenFile 是 IdentityTokenRetriever，可用來從應用程式主機檔案系統上的檔案提供 Web 身分字符。您也可以提供一組 WebIdentityRoleOptions 的功能選項，以修改提供者的其他選用設定。

範例

```
// V1

import "github.com/aws/aws-sdk-go/aws/credentials/stscreds"

// ...

appCreds := stscreds.NewWebIdentityRoleProvider(sess, "arn:aws:iam::123456789012:role/
demo", "sessionName", "/path/to/token")
value, err := appCreds.Get()
if err != nil {
    // handle error
}
```

```
// V2

import "context"
import "github.com/aws/aws-sdk-go-v2/aws"
import "github.com/aws/aws-sdk-go-v2/credentials/stscreds"
import "github.com/aws/aws-sdk-go-v2/service/sts"

// ...

client := sts.NewFromConfig(cfg)

appCreds := aws.NewCredentialsCache(stscreds.NewWebIdentityRoleProvider(
        client,
        "arn:aws:iam::123456789012:role/demo",
        stscreds.IdentityTokenFile("/path/to/file"),
        func(o *stscreds.WebIdentityRoleOptions) {
            o.RoleSessionName = "sessionName"
        }))
value, err := appCreds.Retrieve(context.TODO())
if err != nil {
    // handle error
}
```

# 服務用戶端

適用於 Go 的 AWS SDK 提供巢狀在`github.com/aws/aws-sdk-go-v2/service`匯入路徑下方的服務用戶端模組。每個服務用戶端都包含在使用每個服務唯一識別符的 Go 套件中。下表提供 中服務匯入路徑的一些範例 適用於 Go 的 AWS SDK。

| 服務名稱 | V1 匯入路徑 | V2 匯入路徑 |
| --- | --- | --- |
| Amazon S3 | `github.com/aws/aws-sdk-go/service/s3` | `github.com/aws/aws-sdk-go-v2/service/s3` |
| Amazon DynamoDB | `github.com/aws/aws-sdk-go/service/dynamodb` | `github.com/aws/aws-sdk-go-v2/service/dynamodb` |
| Amazon CloudWatch Logs | `github.com/aws/aws-sdk-go/service/cloudwatchlogs` | `github.com/aws/aws-sdk-go-v2/service/cloudwatchlogs` |

每個服務用戶端套件都是獨立版本的 Go 模組。若要新增服務用戶端做為應用程式的相依性，請使用`go get`命令搭配服務的匯入路徑。例如，若要將 Amazon S3 用戶端新增至您的相依性，請使用

```
go get github.com/aws/aws-sdk-go-v2/service/s3
```

## 用戶端建構

您可以使用用戶端套件中的 適用於 Go 的 AWS SDK `New`或 `NewFromConfig` 建構函數，在 中建構用戶端。從 適用於 Go 的 AWS SDK v1 遷移時，我們建議您使用 `NewFromConfig` 變體，這會使用來自 的值傳回新的服務用戶端`aws.Config`。值`aws.Config`將在使用 載入 SDK 共用組態時建立`config.LoadDefaultConfig`。如需建立服務用戶端的詳細資訊，請參閱 搭配 AWS 服務使用 適用於 Go 的 AWS SDK v2。

### 範例 1

```
// V1

import "github.com/aws/aws-sdk-go/aws/session"
```

```
import "github.com/aws/aws-sdk-go/service/s3"

// ...

sess, err := session.NewSession()
if err != nil {
    // handle error
}

client := s3.New(sess)
```

```
// V2

import "context"
import "github.com/aws/aws-sdk-go-v2/config"
import "github.com/aws/aws-sdk-go-v2/service/s3"

// ...

cfg, err := config.LoadDefaultConfig(context.TODO())
if err != nil {
    // handle error
}

client := s3.NewFromConfig(cfg)
```

## 範例 2：覆寫用戶端設定

```
// V1

import "github.com/aws/aws-sdk-go/aws"
import "github.com/aws/aws-sdk-go/aws/session"
import "github.com/aws/aws-sdk-go/service/s3"

// ...

sess, err := session.NewSession()
if err != nil {
    // handle error
}

client := s3.New(sess, &aws.Config{
    Region: aws.String("us-west-2"),
```

```
})
```

```
// V2

import "context"
import "github.com/aws/aws-sdk-go-v2/config"
import "github.com/aws/aws-sdk-go-v2/service/s3"

// ...

cfg, err := config.LoadDefaultConfig(context.TODO())
if err != nil {
    // handle error
}

client := s3.NewFromConfig(cfg, func(o *s3.Options) {
    o.Region = "us-west-2"
})
```

## 端點

端點套件不再存在於 中 適用於 Go 的 AWS SDK。每個服務用戶端現在都會將其所需的 AWS 端點中繼資料內嵌在用戶端套件中。這可減少編譯應用程式的整體二進位大小，不再包含應用程式未使用之服務的端點中繼資料。

此外，每個服務現在都會公開自己的界面，以在 中解析端點`EndpointResolverV2`。每個 API 都會為服務 取得一組唯一的參數`EndpointParameters`，當叫用 操作時，這些參數的值是由 SDK 從各種位置取得。

根據預設，服務用戶端會使用其設定 AWS 的區域來解析目標區域的服務端點。如果您的應用程式需要自訂端點，您可以在 `aws.Config`結構的 `EndpointResolverV2` 欄位上指定自訂行為。如果您的應用程式實作自訂端點。解析程式必須將其遷移以符合這個新的每個服務界面。

如需端點和實作自訂解析程式的詳細資訊，請參閱 設定用戶端端點。

## 身分驗證

適用於 Go 的 AWS SDK 支援更進階的身分驗證行為，這可讓您使用較新的 AWS 服務功能，例如 codecatalyst 和 S3 Express One Zone。此外，此行為可以根據每個用戶端進行自訂。

# 叫用 API 操作

服務用戶端操作方法的數量已大幅減少。<OperationName>Request、<OperationName>WithContext和 <OperationName>方法都已合併為單一操作方法<OperationName>。

## 範例

下列範例顯示如何將對 Amazon S3 PutObject 操作的呼叫從 適用於 Go 的 AWS SDK v1 遷移至 v2。

```
// V1

import "context"
import "github.com/aws/aws-sdk-go/service/s3"

// ...

client := s3.New(sess)

// Pattern 1
output, err := client.PutObject(&s3.PutObjectInput{
    // input parameters
})

// Pattern 2
output, err := client.PutObjectWithContext(context.TODO(), &s3.PutObjectInput{
    // input parameters
})

// Pattern 3
req, output := client.PutObjectRequest(context.TODO(), &s3.PutObjectInput{
    // input parameters
})
err := req.Send()
```

```
// V2

import "context"
import "github.com/aws/aws-sdk-go-v2/service/s3"

// ...
```

```
client := s3.NewFromConfig(cfg)

output, err := client.PutObject(context.TODO(), &s3.PutObjectInput{
    // input parameters
})
```

## 服務資料類型

操作的最上層輸入和輸出類型可在服務用戶端套件中找到。指定操作的輸入和輸出類型遵循 `<OperationName>Input`和 的模式`<OperationName>Output`，其中 `OperationName`是您調用的操作名稱。例如，Amazon S3 PutObject 操作的輸入和輸出形狀分別為 PutObjectInput 和 PutObjectOutput。

除了輸入和輸出類型之外，所有其他服務資料類型都已遷移至位於服務用戶端`types`套件匯入路徑階層下的套件。例如，s3.AccessControlPolicy 類型現在位於 type.AccessControlPolicy。

### 列舉值

開發套件現在為所有 API 列舉欄位提供類型體驗。您現在可以使用服務用戶端`types`套件中找到的其中一種具體類型，而不是使用從服務 API 參考文件中複製的字串常值。例如，您可以為 Amazon S3 PutObjectInput 操作提供要套用至物件的 ACL。在 適用於 Go 的 AWS SDK v1 中，此參數是一種`*string`類型。在 中 適用於 Go 的 AWS SDK，此參數現在是 type.ObjectCannedACL。`types` 套件為可指派給此欄位的有效列舉值提供產生的常數。例如，type.ObjectCannedACLPrivate 是「私有」固定 ACL 值的常數。此值可用來代替管理應用程式中的字串常數。

## 指標參數

針對所有輸入參數傳遞至服務操作所需的 適用於 Go 的 AWS SDK v1 指標參考。 適用於 Go 的 AWS SDK v2 已簡化大多數 服務的體驗，盡可能不需要將輸入值做為指標傳遞。此變更表示許多服務用戶端操作不再需要您的應用程式傳遞下列類型的指標參考：`uint8`、`uint16`、`uint32`、`int8`、`int16int32`、`float32`、`float64`、、`bool`。同樣地，配量和映射元素類型也隨之更新，以反映其元素是否必須做為指標參考傳遞。

aws 套件包含協助程式函數，用於建立 Go 內建類型的指標，這些協助程式應該用來更輕鬆地處理這些 Go 類型的建立指標類型。同樣地，也為這些類型的安全取消參考指標值提供了協助程式方法。例如，aws.String 函數會從 `string` ⇒ 轉換`*string`。反之，aws.ToString 會從 `*string` ⇒ 轉換`string`。從 適用於 Go 的 AWS SDK v1 升級至 v2 時，您必須遷移協助程式的使用量，以便從指標類型轉換為非指標變體。例如，aws.StringValue 必須更新為 `aws.ToString`。

# 錯誤類型

適用於 Go 的 AWS SDK 充分利用 Go 1.13 中引入的錯誤包裝功能。建立錯誤回應模型的服務在其用戶端的types套件中產生了可用的類型，可用於測試用戶端操作錯誤是否由這些類型之一造成。例如，如果嘗試擷取不存在的物件金鑰，Amazon S3 GetObject操作可能會傳回NoSuchKey錯誤。您可以使用 errors.As 來測試傳回的操作錯誤是否為類型。NoSuchKey 錯誤。如果服務未針對錯誤建立特定類型的模型，您可以使用 smithy.APIError 介面類型來檢查傳回的錯誤碼和來自服務的訊息。此功能會取代 v1 中的 awserr.Error 和其他 awserr 功能。 適用於 Go 的 AWS SDK 如需處理錯誤的詳細資訊，請參閱 處理 適用於 Go 的 AWS SDK V2 中的錯誤。

## 範例

```
// V1

import "github.com/aws/aws-sdk-go/aws/awserr"
import "github.com/aws/aws-sdk-go/service/s3"

// ...

client := s3.New(sess)

output, err := s3.GetObject(&s3.GetObjectInput{
    // input parameters
})
if err != nil {
    if awsErr, ok := err.(awserr.Error); ok {
        if awsErr.Code() == "NoSuchKey" {
            // handle NoSuchKey
        } else {
            // handle other codes
        }
        return
    }
    // handle a error
}
```

```
// V2

import "context"
import "github.com/aws/aws-sdk-go-v2/service/s3"
import "github.com/aws/aws-sdk-go-v2/service/s3/types"
```

```
import "github.com/aws/smithy-go"

// ...

client := s3.NewFromConfig(cfg)

output, err := client.GetObject(context.TODO(), &s3.GetObjectInput{
    // input parameters
})
if err != nil {
    var nsk *types.NoSuchKey
    if errors.As(err, &nsk) {
        // handle NoSuchKey error
        return
    }
    var apiErr smithy.APIError
    if errors.As(err, &apiErr) {
        code := apiErr.ErrorCode()
        message := apiErr.ErrorMessage()
        // handle error code
        return
    }
    // handle error
    return
}
```

## 分頁程式

服務操作分頁程式不再被叫用為服務用戶端上的方法。若要將分頁器用於 操作，您必須使用其中一種分頁器建構器方法來建構 操作的分頁器。例如，若要透過 Amazon S3 `ListObjectsV2`操作使用分頁，您必須使用 s3.NewListObjectsV2Paginator 建構其分頁程式。此建構函數會傳回 ListObjectsV2Paginator 提供方法 `HasMorePages`，並`NextPage`用於判斷是否有更多頁面可擷取和叫用操作來分別擷取下一頁。如需使用 SDK 分頁程式的詳細資訊，請參閱 使用操作分頁器。

讓我們看看如何從 適用於 Go 的 AWS SDK v1 分頁器遷移到 適用於 Go 的 AWS SDK v2 對等項目的範例。

### 範例

```
// V1

import "fmt"
```

```
import "github.com/aws/aws-sdk-go/service/s3"

// ...

client := s3.New(sess)

params := &s3.ListObjectsV2Input{
    // input parameters
}

totalObjects := 0
err := client.ListObjectsV2Pages(params, func(output *s3.ListObjectsV2Output, lastPage
 bool) bool {
    totalObjects += len(output.Contents)
    return !lastPage
})
if err != nil {
    // handle error
}
fmt.Println("total objects:", totalObjects)
```

```
// V2

import "context"
import "fmt"
import "github.com/aws/aws-sdk-go-v2/service/s3"

// ...

client := s3.NewFromConfig(cfg)

params := &s3.ListObjectsV2Input{
    // input parameters
}

totalObjects := 0
paginator := s3.NewListObjectsV2Paginator(client, params)
for paginator.HasMorePages() {
    output, err := paginator.NextPage(context.TODO())
    if err != nil {
        // handle error
    }
    totalObjects += len(output.Contents)
```

```
}
fmt.Println("total objects:", totalObjects)
```

## 等待程式

服務操作等待程式不再被叫用為服務用戶端上的方法。若要使用等待程式，請先建構所需的等待程式類型，然後叫用等待方法。例如，若要等待 Amazon S3 儲存貯體存在，您必須建構`BucketExists`等待程式。使用 s3.NewBucketExistsWaiter 建構函數來建立 s3.BucketExistsWaiter。`s3.BucketExistsWaiter` 提供一種`Wait`方法，可用來等待儲存貯體變成可用。

## 預先簽章的請求

V1 SDK 在技術上支援預先簽署任何 AWS SDK 操作，不過，這無法準確地代表服務層級實際支援的內容（實際上，大多數 AWS 服務操作不支援預先簽署）。

適用於 Go 的 AWS SDK 會針對支援的可預先簽章操作，使用特定 API 公開服務套件中的特定`PresignClient`實作，以解決此問題。 APIs

注意：如果服務缺少您在 SDK v1 中成功使用的 操作的預先簽署支援，請在 GitHub 上提出問題，讓我們知道。

Presign 和 PresignRequest 的使用必須轉換為使用服務特定的預先簽署用戶端。

下列範例示範如何遷移 S3 GetObject 請求的預先簽章：

```
// V1

import (
    "fmt"
    "time"

    "github.com/aws/aws-sdk-go/aws"
    "github.com/aws/aws-sdk-go/aws/session"
    "github.com/aws/aws-sdk-go/service/s3"
)

func main() {
    sess := session.Must(session.NewSessionWithOptions(session.Options{
        SharedConfigState: session.SharedConfigEnable,
    }))
```

```
    svc := s3.New(sess)
    req, _ := svc.GetObjectRequest(&s3.GetObjectInput{
        Bucket: aws.String("amzn-s3-demo-bucket"),
        Key:    aws.String("key"),
    })

    // pattern 1
    url1, err := req.Presign(20 * time.Minute)
    if err != nil {
        panic(err)
    }
    fmt.Println(url1)

    // pattern 2
    url2, header, err := req.PresignRequest(20 * time.Minute)
    if err != nil {
        panic(err)
    }
    fmt.Println(url2, header)
}
```

```
// V2

import (
    "context"
    "fmt"
    "time"

    "github.com/aws/aws-sdk-go-v2/aws"
    "github.com/aws/aws-sdk-go-v2/config"
    "github.com/aws/aws-sdk-go-v2/service/s3"
)

func main() {
    cfg, err := config.LoadDefaultConfig(context.Background())
    if err != nil {
        panic(err)
    }

    svc := s3.NewPresignClient(s3.NewFromConfig(cfg))
    req, err := svc.PresignGetObject(context.Background(), &s3.GetObjectInput{
        Bucket: aws.String("amzn-s3-demo-bucket"),
```

```
        Key:    aws.String("key"),
    }, func(o *s3.PresignOptions) {
        o.Expires = 20 * time.Minute
    })
    if err != nil {
        panic(err)
    }

    fmt.Println(req.Method, req.URL, req.SignedHeader)
}
```

# 請求自訂

單體 request.Request API 已重新箱體化。

## 操作輸入/輸出

分別Data保留操作輸入和輸出結構的不透明Request欄位 Params和 ，現在可於特定中介軟體階段內做為輸入/輸出存取：

請求參考 Request.Params和 Request.Data 必須遷移至中介軟體的處理常式。

### 遷移 **Params**

```
// V1

import (
    "github.com/aws/aws-sdk-go/aws"
    "github.com/aws/aws-sdk-go/aws/request"
    "github.com/aws/aws-sdk-go/aws/session"
    "github.com/aws/aws-sdk-go/service/s3"
)

func withPutObjectDefaultACL(acl string) request.Option {
    return func(r *request.Request) {
        in, ok := r.Params.(*s3.PutObjectInput)
        if !ok {
            return
        }

        if in.ACL == nil {
            in.ACL = aws.String(acl)
```

```
        }
        r.Params = in
    }
}

func main() {
    sess := session.Must(session.NewSession())

 sess.Handlers.Validate.PushBack(withPutObjectDefaultACL(s3.ObjectCannedACLBucketOwnerFullContr

    // ...
}
```

```
// V2

import (
    "context"

    "github.com/aws/aws-sdk-go-v2/service/s3"
    "github.com/aws/aws-sdk-go-v2/service/s3/types"
    "github.com/aws/smithy-go/middleware"
    smithyhttp "github.com/aws/smithy-go/transport/http"
)

type withPutObjectDefaultACL struct {
    acl types.ObjectCannedACL
}

// implements middleware.InitializeMiddleware, which runs BEFORE a request has
// been serialized and can act on the operation input
var _ middleware.InitializeMiddleware = (*withPutObjectDefaultACL)(nil)

func (*withPutObjectDefaultACL) ID() string {
    return "withPutObjectDefaultACL"
}

func (m *withPutObjectDefaultACL) HandleInitialize(ctx context.Context, in
 middleware.InitializeInput, next middleware.InitializeHandler) (
    out middleware.InitializeOutput, metadata middleware.Metadata, err error,
) {
    input, ok := in.Parameters.(*s3.PutObjectInput)
    if !ok {
        return next.HandleInitialize(ctx, in)
```

```
    }

    if len(input.ACL) == 0 {
        input.ACL = m.acl
    }
    in.Parameters = input
    return next.HandleInitialize(ctx, in)
}

// create a helper function to simplify instrumentation of our middleware
func WithPutObjectDefaultACL(acl types.ObjectCannedACL) func (*s3.Options) {
    return func(o *s3.Options) {
        o.APIOptions = append(o.APIOptions, func (s *middleware.Stack) error {
            return s.Initialize.Add(&withPutObjectDefaultACL{acl: acl},
 middleware.After)
        })
    }
}

func main() {
    cfg, err := config.LoadDefaultConfig(context.Background())
    if err != nil {
        // ...
    }

    svc := s3.NewFromConfig(cfg,
 WithPutObjectDefaultACL(types.ObjectCannedACLBucketOwnerFullControl))
    // ...
}
```

## 遷移 **Data**

```
// V1

import (
    "github.com/aws/aws-sdk-go/aws"
    "github.com/aws/aws-sdk-go/aws/request"
    "github.com/aws/aws-sdk-go/aws/session"
    "github.com/aws/aws-sdk-go/service/s3"
)

func readPutObjectOutput(r *request.Request) {
        output, ok := r.Data.(*s3.PutObjectOutput)
```

```
        if !ok {
            return
        }

        // ...
    }
}

func main() {
    sess := session.Must(session.NewSession())
    sess.Handlers.Unmarshal.PushBack(readPutObjectOutput)

    svc := s3.New(sess)
    // ...
}
```

```
// V2

import (
    "context"

    "github.com/aws/aws-sdk-go-v2/config"
    "github.com/aws/aws-sdk-go-v2/service/s3"
    "github.com/aws/smithy-go/middleware"
    smithyhttp "github.com/aws/smithy-go/transport/http"
)

type readPutObjectOutput struct{}

var _ middleware.DeserializeMiddleware = (*readPutObjectOutput)(nil)

func (*readPutObjectOutput) ID() string {
    return "readPutObjectOutput"
}

func (*readPutObjectOutput) HandleDeserialize(ctx context.Context, in
 middleware.DeserializeInput, next middleware.DeserializeHandler) (
    out middleware.DeserializeOutput, metadata middleware.Metadata, err error,
) {
    out, metadata, err = next.HandleDeserialize(ctx, in)
    if err != nil {
        // ...
    }
```

```
    output, ok := in.Parameters.(*s3.PutObjectOutput)
    if !ok {
        return out, metadata, err
    }

    // inspect output...

    return out, metadata, err
}

func WithReadPutObjectOutput(o *s3.Options) {
    o.APIOptions = append(o.APIOptions, func (s *middleware.Stack) error {
        return s.Initialize.Add(&withReadPutObjectOutput{}, middleware.Before)
    })
}

func main() {
    cfg, err := config.LoadDefaultConfig(context.Background())
    if err != nil {
        // ...
    }

    svc := s3.NewFromConfig(cfg, WithReadPutObjectOutput)
    // ...
}
```

## HTTP 請求/回應

來自 的 HTTPRequest和 HTTPResponse 欄位現在Request會在特定中介軟體階段公開。由於中介軟體與傳輸無關，您必須對中介軟體輸入或輸出執行類型聲明，以顯示基礎 HTTP 請求或回應。

請求參考 Request.HTTPRequest和 Request.HTTPResponse 必須遷移至中介軟體的處理常式。

### 遷移 **HTTPRequest**

```
// V1

import (
    "github.com/aws/aws-sdk-go/aws/request"
    "github.com/aws/aws-sdk-go/aws/session"
)
```

```
func withHeader(header, val string) request.Option {
    return func(r *request.Request) {
        request.HTTPRequest.Header.Set(header, val)
    }
}

func main() {
    sess := session.Must(session.NewSession())
    sess.Handlers.Build.PushBack(withHeader("x-user-header", "..."))

    svc := s3.New(sess)
    // ...
}
```

```
// V2

import (
    "context"
    "fmt"

    "github.com/aws/aws-sdk-go-v2/config"
    "github.com/aws/aws-sdk-go-v2/service/s3"
    "github.com/aws/smithy-go/middleware"
    smithyhttp "github.com/aws/smithy-go/transport/http"
)

type withHeader struct {
    header, val string
}

// implements middleware.BuildMiddleware, which runs AFTER a request has been
// serialized and can operate on the transport request
var _ middleware.BuildMiddleware = (*withHeader)(nil)

func (*withHeader) ID() string {
    return "withHeader"
}

func (m *withHeader) HandleBuild(ctx context.Context, in middleware.BuildInput, next
 middleware.BuildHandler) (
    out middleware.BuildOutput, metadata middleware.Metadata, err error,
) {
    req, ok := in.Request.(*smithyhttp.Request)
```

```
    if !ok {
        return out, metadata, fmt.Errorf("unrecognized transport type %T", in.Request)
    }

    req.Header.Set(m.header, m.val)
    return next.HandleBuild(ctx, in)
}

func WithHeader(header, val string) func (*s3.Options) {
    return func(o *s3.Options) {
        o.APIOptions = append(o.APIOptions, func (s *middleware.Stack) error {
            return s.Build.Add(&withHeader{
                header: header,
                val: val,
            }, middleware.After)
        })
    }
}

func main() {
    cfg, err := config.LoadDefaultConfig(context.Background())
    if err != nil {
        // ...
    }

    svc := s3.NewFromConfig(cfg, WithHeader("x-user-header", "..."))
    // ...
}
```

## 處理常式階段

SDK v2 中介軟體階段是 v1 處理常式階段的後續版本。

下表提供 v1 處理常式階段的粗略映射至其在 V2 中介軟體堆疊內的同等位置：

| v1 處理常式名稱 | v2 中介軟體階段 |
| --- | --- |
| 驗證 | 初始化 |
| 建置 | 序列化 |
| 符號 | 完成 |

| v1 處理常式名稱 | v2 中介軟體階段 |
| --- | --- |
| 傳送 | 不適用 (1) |
| ValidateResponse | 取消序列化 |
| 取消封送 | 取消序列化 |
| UnmarshalMetadata | 取消序列化 |
| UnmarshalError | 取消序列化 |
| 重試 | 完成，"Retry"中介軟體後 (2) |
| AfterRetry | 在"Retry"中介軟體之前完成後置 next.HandleFinalize() (2，3) |
| CompleteAttempt | 完成，步驟結束 |
| 完成 | 初始化、步驟開始、後 next.HandleInitialize() (3) |

(1) v1 中的Send階段實際上是 v2 中包裝的 HTTP 用戶端往返。此行為由用戶端選項上的 HTTPClient 欄位控制。

(2) 完成步驟中中介軟體之後的任何"Retry"中介軟體都將成為重試迴圈的一部分。

(3) 操作時間的中介軟體「堆疊」內建於重複裝飾的處理常式函數中。每個處理常式都負責呼叫鏈結中的下一個處理常式。這隱含表示在呼叫下一個步驟之後，中介軟體步驟也可以採取動作。

例如，對於位於堆疊頂端的初始化步驟，這表示在呼叫下一個處理常式之後，在請求結束時有效操作的初始化中介軟體：

```
// V2

import (
    "context"

    "github.com/aws/smithy-go/middleware"
)
```

```
type onComplete struct{}

var _ middleware.InitializeMiddleware = (*onComplete)(nil)

func (*onComplete) ID() string {
    return "onComplete"
}

func (*onComplete) HandleInitialize(ctx context.Context, in middleware.InitializeInput,
 next middleware.InitializeHandler) (
    out middleware.InitializeOutput, metadata middleware.Metadata, err error,
) {
    out, metadata, err = next.HandleInitialize(ctx, in)

    // the entire operation was invoked above - the deserialized response is
    // available opaquely in out.Result, run post-op actions here...

    return out, metadata, err
}
```

# 功能

## Amazon EC2 執行個體中繼資料服務

適用於 Go 的 AWS SDK 提供 Amazon EC2 執行個體中繼資料服務 (IMDS) 用戶端，您可以在 Amazon EC2 執行個體上執行應用程式時用來查詢本機 IMDS。IMDS 用戶端是獨立的 Go 模組，可使用 新增至您的應用程式

```
go get github.com/aws/aws-sdk-go-v2/feature/ec2/imds
```

用戶端建構函數和方法操作已更新，以符合其他 SDK 服務用戶端的設計。

### 範例

```
// V1

import "github.com/aws/aws-sdk-go/aws/ec2metadata"

// ...
```

```
client := ec2metadata.New(sess)

region, err := client.Region()
if err != nil {
    // handle error
}
```

```
// V2

import "context"
import "github.com/aws/aws-sdk-go-v2/feature/ec2/imds"

// ...

client := imds.NewFromConfig(cfg)

region, err := client.GetRegion(context.TODO())
if err != nil {
    // handle error
}
```

## Amazon S3 Transfer Manager

Amazon S3 Transfer Manager 可用於同時管理物件的上傳和下載。此套件位於服務用戶端匯入路徑之外的 Go 模組中。您可以使用 擷取此模組`go get github.com/aws/aws-sdk-go-v2/feature/s3/manager`。

s3.NewUploader 和 s3.NewUploaderWithClient 已取代為建構函數方法 manager.NewUploader，用於建立 Upload Manager 用戶端。

s3.NewDownloader 和 s3.NewDownloaderWithClient 已取代為單一建構函式方法管理員。NewDownloader 用於建立 Download Manager 用戶端。

## Amazon CloudFront 簽署公用程式

在服務用戶端匯入路徑之外的 Go 適用於 Go 的 AWS SDK 模組中提供 Amazon CloudFront 簽署公用程式。可以使用 擷取此模組`go get`。

```
go get github.com/aws/aws-sdk-go-v2/feature/cloudfront/sign
```

## Amazon S3 加密用戶端

從 開始 適用於 Go 的 AWS SDK，Amazon S3 加密用戶端是AWS 加密工具下的個別模組。Go 的最新版本 S3 加密用戶端 3.x 現已在 GitHub 提供。可以使用 擷取此模組go get：

```
go get github.com/aws/amazon-s3-encryption-client-go/v3
```

個別 EncryptionClient(v1、v2) 和 DecryptionClient(v1、v2) APIs 已取代為單一用戶端 S3EncryptionClientV3，公開加密和解密功能。

如同 中的其他 服務用戶端 適用於 Go 的 AWS SDK，操作 APIs 已壓縮：

- GetObject、 GetObjectRequest和 GetObjectWithContext 解密 APIs 會由 GetObject 取代。
- PutObject 會取代 PutObjectRequest、 PutObject和 PutObjectWithContext加密 API。APIs

若要了解如何遷移至 3.x 主要版本的加密用戶端，請參閱本指南。

# 服務自訂變更

## Amazon S3

從 適用於 Go 的 AWS SDK v1 遷移到 v2 時，需要注意的重要變更包括使用客戶提供的金鑰 (SSE-C) 處理SSECustomerKey用於伺服器端加密的 。在 適用於 Go 的 AWS SDK v1 中，SSECustomerKey 對 Base64 的編碼是由 SDK 在內部處理。在 SDK v2 中，此自動編碼已移除，現在需要先手動編碼 SSECustomerKey 至 Base64，再將其傳遞至 SDK。

調整範例：

```
// V1

import (
  "context"
  "encoding/base64"
  "github.com/aws/aws-sdk-go-v2/config"
  "github.com/aws/aws-sdk-go-v2/service/s3"
)
// ... more code
```

```
plainTextKey := "12345678901234567890123456789012" // 32 bytes in length

// calculate md5..

_, err = client.PutObjectWithContext(context.Background(), &s3.PutObjectInput{
    Bucket: aws.String("amzn-s3-demo-bucket"),
    Key:    aws.String("your-object-key"),
    Body:                 strings.NewReader("hello-world"),
    SSECustomerKey:       &plainTextKey,
    SSECustomerKeyMD5:    &base64Md5,
    SSECustomerAlgorithm: aws.String("AES256"),
})

// ... more code
```

```
// V2

import (
  "github.com/aws/aws-sdk-go/aws"
  "github.com/aws/aws-sdk-go/aws/session"
  "github.com/aws/aws-sdk-go/service/s3"
)

// ... more code

plainTextKey := "12345678901234567890123456789012" // 32 bytes in length
base64EncodedKey := base64.StdEncoding.EncodeToString([]byte(plainTextKey))

// calculate md5..

_, err = client.PutObject(context.Background(), &s3.PutObjectInput{
    Bucket: aws.String("amzn-s3-demo-bucket"),
    Key:    aws.String("your-object-key"),
    Body:                 strings.NewReader("hello-world"),
    SSECustomerKey:       &base64EncodedKey,
    SSECustomerKeyMD5:    &base64Md5,
    SSECustomerAlgorithm: aws.String("AES256"),
})

// ... more code
```

# 中的安全性 適用於 Go 的 AWS SDK

的雲端安全 AWS 是最高優先順序。身為 AWS 客戶，您可以受益於資料中心和網路架構，這些架構是專為滿足最安全敏感組織的需求而建置。

安全是 AWS 與您之間的共同責任。共同責任模型將其描述為雲端的安全性和雲端中的安全性：

- 雲端的安全性 – AWS 負責保護在 中執行 AWS 服務的基礎設施 AWS 雲端。 AWS 也為您提供可安全使用的服務。在AWS 合規計畫中，第三方稽核人員會定期測試和驗證我們安全的有效性。若要了解適用的合規計劃 適用於 Go 的 AWS SDK，請參閱AWS 合規計劃的 服務範圍。
- 雲端的安全性 – 您的責任取決於您使用 AWS 的服務。您也必須對其他因素負責，包括資料的機密性、您公司的要求和適用法律和法規。

本文件可協助您了解如何在使用 時套用共同責任模型 適用於 Go 的 AWS SDK。下列主題說明如何設定 適用於 Go 的 AWS SDK 以符合您的安全與合規目標。您也會了解如何使用其他 AWS 服務來協助您監控和保護 適用於 Go 的 AWS SDK 資源。

主題

- 中的資料保護 適用於 Go 的 AWS SDK
- 的合規驗證 適用於 Go 的 AWS SDK
- 中的彈性 適用於 Go 的 AWS SDK

## 中的資料保護 適用於 Go 的 AWS SDK

AWS 共同責任模型適用於 中的資料保護 適用於 Go 的 AWS SDK。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 共同的責任模型和 GDPR 部落格文章。

基於資料保護目的，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 適用於 Go 的 AWS SDK 或使用 主控台、API AWS CLI或其他 AWS 服務 AWS SDKs 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。

# 的合規驗證 適用於 Go 的 AWS SDK

若要了解 是否 AWS 服務 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。

# 中的彈性 適用於 Go 的 AWS SDK

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 提供多個實體分隔且隔離的可用區域，這些區域與低延遲、高輸送量和高度備援的聯網連接。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。

# 適用於 Go 的 AWS SDK v2 開發人員指南的文件歷史記錄

下表說明 適用於 Go 的 AWS SDK v2 的文件版本。

| 變更 | 描述 | 日期 |
| --- | --- | --- |
| HTTP 攔截器 | 新章節涵蓋 HTTP 攔截器，其優於中介軟體、可用勾點和註冊方法。 | 2025 年 9 月 4 日 |
| 使用檢查總和保護資料完整性 | 內容已更新，其中包含自動檢查總和計算的詳細資訊。 | 2025 年 1 月 16 日 |
| 初始版本 | 適用於 Go 的 AWS SDK v2 開發人員指南的初始版本 | 2024 年 10 月 31 日 |

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。