

Developer Guide

# AWS SDK for Kotlin



# AWS SDK for Kotlin: Developer Guide

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# What is the AWS SDK for Kotlin?

The AWS SDK for Kotlin provides Kotlin APIs for Amazon Web Services. Using the SDK, you can build Kotlin applications that work with Amazon S3, Amazon EC2, Amazon DynamoDB, and more. With the Kotlin SDK, you can target the JVM platform or Android API level 24 or higher. Support for additional platforms like JavaScript and Native is coming in future releases.

To track upcoming features in the future releases, see our [roadmap on GitHub](#).

## Get started with the SDK

To get started with the SDK, follow the [Get started](#) tutorial.

To set up your development environment, see [Set up](#).

To create and configure service clients for making requests to AWS services, see [Configuration](#). For information on various features of the SDK, see [Use the SDK](#).

For use cases and examples of performing specific API operations, see [Code examples](#).

## Maintenance and support for SDK major versions

For information about maintenance and support for SDK major versions and their underlying dependencies, see the following topics in the *AWS SDKs and Tools Reference Guide*:

- [AWS SDKs and Tools Maintenance Policy](#)
- [AWS SDKs and Tools Version Support Matrix](#)

## Additional resources

In addition to this guide, the following are valuable online resources for SDK for Kotlin developers:

- [AWS developer blog](#)
- [Developer forums](#)
- [SDK source](#) (GitHub)
- [AWS Code Sample Catalog](#)

- [@awsdevelopers](#) (X, formerly Twitter)

# Get started with the SDK for Kotlin

The AWS SDK for Kotlin provides Kotlin APIs for each AWS service. Using the SDK, you can build Kotlin applications that work with Amazon S3, Amazon EC2, Amazon DynamoDB, and more.

This tutorial shows you how to use Gradle to define dependencies for the AWS SDK for Kotlin. Then, you create code that writes data to a DynamoDB table. Although you might want to use the features of an IDE, all you need for this tutorial is a terminal window and a text editor.

Follow these steps to complete this tutorial:

- [Step 1: Set up for this tutorial](#)
- [Step 2: Create the project](#)
- [Step 3: Write the code](#)
- [Step 4: Build and run the application](#)

## Step 1: Set up for this tutorial

Before you begin this tutorial, you need an IAM Identity Center permission set that can access DynamoDB and a Kotlin development environment configured with IAM Identity Center single sign-on settings to access to AWS.

Follow the instructions in the [Basic set up](#) of this guide to get the basics setup for this tutorial.

After you have configured your development environment with [single sign-on access](#) for the Kotlin SDK and you have an [active AWS access portal session](#), continue with Step 2.

## Step 2: Create the project

To create the project for this tutorial, first use Gradle to create a Kotlin project. Then, update the `gradle.build.kts` file with the required settings and dependencies for the AWS SDK for Kotlin.

**To create a new project using Gradle**

**Note**

Gradle version 8.1 offers the four prompts in step 3 below. If you use a different version of Gradle the prompts might differ.

1. Create a new directory called `getstarted` in a location of your choice, such as your desktop or home folder.
2. Open a terminal or command prompt window and navigate to the `getstarted` directory you created.
3. Use the following command to create a new Gradle project configuration file (`build.gradle.kts`) and a basic Kotlin class.

```
gradle init --type kotlin-application --dsl kotlin
```

- When prompted with `Project name`, press Enter.
- When prompted for `Source package`, enter `example.aws.getstarted`.
- When prompted with `Enter target version of Java (min. 7) (default: 11)`, press Enter.
- When prompted with `Generate build using new APIs and behavior`, press the Enter key.

**To configure your project with dependencies for the AWS SDK for Kotlin and Amazon S3**

- In the folder `getstarted` that you created in the previous procedure, navigate to the `app` directory and open the `build.gradle.kts` file.
- Replace its contents with the following Gradle code, and then save your changes.

```
import org.jetbrains.kotlin.gradle.tasks.KotlinCompile

plugins {
    kotlin("jvm") version "1.9.10"
    application
}

group = "example.aws"
version = "1.0-SNAPSHOT"
```

```
repositories {
    mavenCentral()
}

dependencies {
    implementation("aws.sdk.kotlin:s3:1.0.0")
    testImplementation(kotlin("test"))
}

tasks.withType<Test> {
    useJUnitPlatform()
}

tasks.withType<KotlinCompile>() {
    kotlinOptions.jvmTarget = "17"
}

application.mainClass.set("example.aws.getstarted.AppKt")
```

The `dependencies` section contains an entry for the Amazon S3 module of the AWS SDK for Kotlin. The Gradle compiler is configured to use Java 17 in the `tasks.withType<KotlinCompile>()` section.

#### Note

For the latest version of the Amazon S3 module of the SDK for Kotlin, see the [Maven central repository](#) and use that value in the following code.

## Step 3: Write the code

After the project has been created and configured, edit the project's default class `App` to use the following example code.

1. In your project folder `app`, navigate to the directory `src/main/kotlin/example/aws/getstarted`. Open the `App.kt` file.
2. Replace its contents with the following code and save the file.

```
package example.aws.getstarted
```

```
import aws.sdk.kotlin.services.s3.*
import aws.sdk.kotlin.services.s3.model.BucketLocationConstraint
import aws.smithy.kotlin.runtime.content.ByteString
import kotlinx.coroutines.runBlocking
import java.util.UUID

val REGION = "us-west-2"
val BUCKET = "bucket-#{UUID.randomUUID()}"
val KEY = "key"

fun main(): Unit = runBlocking {
    S3Client
        .fromEnvironment { region = REGION }
        .use { s3 ->
            setupTutorial(s3)

            println("Creating object $BUCKET/$KEY...")

            s3.putObject {
                bucket = BUCKET
                key = KEY
                body = ByteString.fromString("Testing with the Kotlin SDK")
            }

            println("Object $BUCKET/$KEY created successfully!")

            cleanUp(s3)
        }
}

suspend fun setupTutorial(s3: S3Client) {
    println("Creating bucket $BUCKET...")
    s3.createBucket {
        bucket = BUCKET
        if (REGION != "us-east-1") { // Do not set location constraint for us-east-1.
            createBucketConfiguration {
                locationConstraint = BucketLocationConstraint.fromValue(REGION)
            }
        }
    }
    println("Bucket $BUCKET created successfully!")
}
```

```
suspend fun cleanUp(s3: S3Client) {
    println("Deleting object $BUCKET/$KEY...")
    s3.deleteObject {
        bucket = BUCKET
        key = KEY
    }
    println("Object $BUCKET/$KEY deleted successfully!")

    println("Deleting bucket $BUCKET...")
    s3.deleteBucket {
        bucket = BUCKET
    }
    println("Bucket $BUCKET deleted successfully!")
}
```

## Step 4: Build and run the application

After the project is created and contains the example class, build and run the application.

1. Open a terminal or command prompt window and navigate to your project directory `getstarted`.
2. Use the following command to build and run your application:

```
gradle run
```

The application calls the [createBucket](#) API operation to create a new S3 bucket and then calls [putObject](#) to put a new object into the new S3 bucket.

In the `cleanUp()` function at the end, the application deletes the object and then deletes the S3 bucket.

### To see the results in the Amazon S3 console

1. In `App.kt`, comment out the line `cleanUp(s3)` in the `runBlocking` section and save the file.
2. Rebuild the project and put a new object into a new S3 bucket by running `gradle run`.
3. Sign in to the [Amazon S3 console](#) to view the new object in the new S3 bucket.

After you view the object, delete the S3 bucket.

## Success

If your Gradle project built and ran without error, then congratulations. You have successfully built your first Kotlin application using the AWS SDK for Kotlin.

## Cleanup

When you are done developing your new application, delete any AWS resources that you created during this tutorial to avoid incurring any charges. You might also want to delete or archive the project folder (`get-started`) that you created in Step 2.

Follow these steps to clean up resources:

- If you commented out the call to the `cleanup()` function, delete the S3 bucket by using the [Amazon S3 console](#).

## Next steps

Now that you have the basics down, you can learn about the following:

- [Additional setup steps to work with the SDK for Kotlin](#)
- [Configuration of SDK for Kotlin](#)
- [Using the SDK for Kotlin](#)
- [Security for the SDK for Kotlin](#)



# Set up the AWS SDK for Kotlin

To make requests to AWS services using the AWS SDK for Kotlin, you need the following:

- The ability to sign-in to the AWS access portal
- Permission to use the AWS resources your application needs
- A development environment with the following elements:
  - [Shared configuration files](#) that are setup with at least one of the following ways:
    - The `config` file contains IAM Identity Center credentials settings so that the SDK can obtain AWS credentials
    - The `credentials` file contains temporary credentials
  - A build automation tool such as [Maven](#) or [Gradle](#)
- An active AWS access portal session when you are ready to run your application

## In this topic

- [Basic set up](#)
- [Create a project file](#)
- [Code your Kotlin project using the SDK for Kotlin](#)

## Basic set up

### Overview

To successfully develop applications that access AWS services using the AWS SDK for Kotlin, the following requirements must be met.

- You must be able to [sign in to the AWS access portal](#) available in the AWS IAM Identity Center.
- The [permissions of the IAM role](#) configured for the SDK must allow access to the AWS services that your application requires. The permissions associated with the **PowerUserAccess** AWS managed policy are sufficient for most development needs.
- A development environment with the following elements:
  - [Shared configuration files](#) that are set up in at least one of the following ways:

- The config file contains [IAM Identity Center single sign-on settings](#) so that the SDK can get AWS credentials.
- The `credentials` file contains temporary credentials.
- An [installation of Java 8 or later](#).
- A [build automation tool](#) such as [Maven](#) or [Gradle](#).
- A text editor to work with code.
- (Optional, but recommended) An IDE (integrated development environment) such as [IntelliJ IDEA](#) or [Eclipse](#).

When you use an IDE, you can also integrate AWS Toolkits to more easily work with AWS services. The [AWS Toolkit for IntelliJ](#) and [AWS Toolkit for Eclipse](#) are two toolkits that you can use.

- An active AWS access portal session when you are ready to run your application. You use the AWS Command Line Interface to [initiate the sign-in process](#) to IAM Identity Center's AWS access portal.

### Important

The instructions in this setup section assume that you or organization uses IAM Identity Center. If your organization uses an external identity provider that works independently of IAM Identity Center, find out how you can get temporary credentials for the SDK for Kotlin to use. Follow these instructions to add temporary credentials to the `~/.aws/credentials` file.

If your identity provider adds temporary credentials automatically to the `~/.aws/credentials` file, make sure that the profile name is `[default]` so that you do not need to provide a profile name to the SDK or AWS CLI.

## Sign-in ability to the AWS access portal

The AWS access portal is the web location where you manually sign in to the IAM Identity Center. The format of the URL is `d-xxxxxxxxxx.awsapps.com/start` or `your_subdomain.awsapps.com/start`.

If you are not familiar with the AWS access portal, follow the guidance for account access in the [IAM Identity Center authentication](#) topic in the AWS SDKs and Tools Reference Guide.

## Set up single sign-on access for the SDK

After you complete Step 2 in the [programmatic access section](#) in order for the SDK to use IAM Identity Center authentication, your system should contain the following elements.

- The AWS CLI, which you use to start an [AWS access portal session](#) before you run your application.
- An `~/.aws/config` file that contains a [default profile](#). The SDK for Kotlin uses the profile's SSO token provider configuration to acquire credentials before sending requests to AWS. The `sso_role_name` value, which is an IAM role connected to an IAM Identity Center permission set, should allow access to the AWS services used in your application.

The following sample config file shows a default profile set up with SSO token provider configuration. The profile's `sso_session` setting refers to the named `sso-session` section. The `sso-session` section contains settings to initiate an AWS access portal session.

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

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

For more details about the settings used in the SSO token provider configuration, see [SSO token provider configuration](#) in the AWS SDKs and Tools Reference Guide.

If your development environment is not set up for programmatic access as previously shown, follow [Step 2 in the SDKs Reference Guide](#).

## Sign in using the AWS CLI

Before running an application that accesses AWS services, you need an active AWS access portal session in order for the SDK to use IAM Identity Center authentication to resolve credentials. Run the following command in the AWS CLI to sign in to the AWS access portal.

```
aws sso login
```

Since you have a default profile setup, you don't need to call the command with a `--profile` option. If your SSO token provider configuration uses a named profile, the command is `aws sso login --profile named-profile`.

To test if you already have an active session, run the following AWS CLI command.

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

The response to this command should report the IAM Identity Center account and permission set configured in the shared `config` file.

### Note

If you already have an active AWS access portal session and run `aws sso login`, you will not be required to provide credentials.

However, you will see a dialog that requests permission for `botocore` to access your information. `botocore` is the foundation for the AWS CLI .

Select **Allow** to authorize access to your information for the AWS CLI and SDK for Kotlin.

## Install Java and a build tool

Your development environment needs the following:

- JDK 8 or later. The AWS SDK for Kotlin works with the [Oracle Java SE Development Kit](#) and with distributions of Open Java Development Kit (OpenJDK) such as [Amazon Corretto](#), [Red Hat OpenJDK](#), and [AdoptOpenJDK](#).
- A build tool or IDE that supports Maven Central such as Apache Maven, Gradle, or IntelliJ.
  - For information about how to install and use Maven, see <http://maven.apache.org/>.
  - For information about how to install and use Gradle, see <https://gradle.org/>.



## 7. Save the credentials file

The SDK for Kotlin will access these temporary credentials when it create a service client and use them for each request. The settings for the IAM role chosen in step 5a determine [how long the temporary credentials are valid](#). The maximum duration is twelve hours.

After the temporary credentials expire, repeat steps 4 through 7.

## Create a project file

After you configure single sign-on access and your development environment, create a Kotlin project using your preferred build tool. Add dependencies for the AWS services that your application needs to access.

To see the list of all possible Maven artifact names, consult the [API reference documentation](#). To find the latest version of the SDK, check the [latest release on GitHub](#).

### Gradle (literal notation)

The following example `build.gradle.kts` file has dependencies for seven AWS services.

```
import org.jetbrains.kotlin.gradle.tasks.KotlinCompile

plugins {
    kotlin("jvm") version "1.9.10"
    application
}

group = "com.example"
version = "1.0-SNAPSHOT"

repositories {
    mavenCentral()
}

dependencies {
    implementation("aws.sdk.kotlin:s3:1.0.0")
    implementation("aws.sdk.kotlin:dynamodb:1.0.0")
    implementation("aws.sdk.kotlin:iam:1.0.0")
    implementation("aws.sdk.kotlin:cloudwatch:1.0.0")
    implementation("aws.sdk.kotlin:cognitoidentityprovider:1.0.0")
}
```

```
implementation("aws.sdk.kotlin:sns:1.0.0")
implementation("aws.sdk.kotlin:pinpoint:1.0.0")

// test dependency
testImplementation(kotlin("test"))
}

tasks.withType<Test> {
    useJUnitPlatform()
}

tasks.withType<KotlinCompile>() {
    kotlinOptions.jvmTarget = "17"
}
```

## Gradle (version catalog)

The AWS SDK for Kotlin publishes a [Gradle version catalog](#) that can help you discover the names of dependencies and keep version numbers synchronized across multiple artifacts.

Note that version catalogs are a preview feature of Gradle before version 8. Depending on the version of Gradle that you use, you may need to opt-in via the [Feature Preview API](#).

### To use a Gradle version catalog

1. In your `settings.gradle.kts` file, add a `versionCatalogs` block inside the `dependencyResolutionManagement` block.

The following example file configures the AWS SDK for Kotlin version catalog for version `1.0.0`. Replace `1.0.0` with the [latest version](#) or the version you want to use.

```
dependencyResolutionManagement {
    repositories {
        mavenCentral()
    }

    versionCatalogs {
        create("awssdk") {
            from("aws.sdk.kotlin:version-catalog:1.0.0")
        }
    }
}
```

2. Declare dependencies in `build.gradle.kts` by using the type-safe identifiers made available by the version catalog.

The following example file declares dependencies for seven AWS services.

```
import org.jetbrains.kotlin.gradle.tasks.KotlinCompile

plugins {
    kotlin("jvm") version "1.9.10"
    application
}

group = "com.example"
version = "1.0-SNAPSHOT"

repositories {
    mavenCentral()
}

dependencies {
    implementation(awssdk.services.s3)
    implementation(awssdk.services.dynamodb)
    implementation(awssdk.services.iam)
    implementation(awssdk.services.cloudwatch)
    implementation(awssdk.services.cognitoidentityprovider)
    implementation(awssdk.services.sns)
    implementation(awssdk.services.pinpoint)

    // test dependency
    testImplementation(kotlin("test"))
}

tasks.withType<Test> {
    useJUnitPlatform()
}

tasks.withType<KotlinCompile>() {
    kotlinOptions.jvmTarget = "17"
}
```



## Maven

The following example `pom.xml` file has dependencies for seven AWS services.

```
<?xml version="1.0" encoding="UTF-8"?>
<project xmlns="http://maven.apache.org/POM/4.0.0" xmlns:xsi="http://
www.w3.org/2001/XMLSchema-instance" xsi:schemaLocation="http://maven.apache.org/
POM/4.0.0 http://maven.apache.org/maven-v4_0_0.xsd">

  <modelVersion>4.0.0</modelVersion>

  <groupId>com.example</groupId>
  <artifactId>setup</artifactId>
  <version>1.0-SNAPSHOT</version>

  <properties>
    <aws.sdk.kotlin.version>1.0.0</aws.sdk.kotlin.version>
    <kotlin.version>1.9.10</kotlin.version>
    <junit.version>4.13.2</junit.version>
  </properties>

  <dependencies>
    <dependency>
      <groupId>aws.sdk.kotlin</groupId>
      <artifactId>s3-jvm</artifactId>
      <version>${aws.sdk.kotlin.version}</version>
    </dependency>
    <dependency>
      <groupId>aws.sdk.kotlin</groupId>
      <artifactId>dynamodb-jvm</artifactId>
      <version>${aws.sdk.kotlin.version}</version>
    </dependency>
    <dependency>
      <groupId>aws.sdk.kotlin</groupId>
      <artifactId>iam-jvm</artifactId>
      <version>${aws.sdk.kotlin.version}</version>
    </dependency>
    <dependency>
      <groupId>aws.sdk.kotlin</groupId>
      <artifactId>cloudwatch-jvm</artifactId>
      <version>${aws.sdk.kotlin.version}</version>
    </dependency>
    <dependency>
      <groupId>aws.sdk.kotlin</groupId>
```

```
        <artifactId>cognitoidentityprovider-jvm</artifactId>
        <version>${aws.sdk.kotlin.version}</version>
    </dependency>
    <dependency>
        <groupId>aws.sdk.kotlin</groupId>
        <artifactId>sns-jvm</artifactId>
        <version>${aws.sdk.kotlin.version}</version>
    </dependency>
    <dependency>
        <groupId>aws.sdk.kotlin</groupId>
        <artifactId>pinpoint-jvm</artifactId>
        <version>${aws.sdk.kotlin.version}</version>
    </dependency>

<!-- Test dependencies -->
    <dependency>
        <groupId>org.jetbrains.kotlin</groupId>
        <artifactId>kotlin-test-junit</artifactId>
        <version>${kotlin.version}</version>
        <scope>test</scope>
    </dependency>
    <dependency>
        <groupId>junit</groupId>
        <artifactId>junit</artifactId>
        <version>${junit.version}</version>
        <scope>test</scope>
    </dependency>
    <dependency>
        <groupId>org.jetbrains.kotlin</groupId>
        <artifactId>kotlin-test</artifactId>
        <version>${kotlin.version}</version>
        <scope>test</scope>
    </dependency>
</dependencies>

<build>
    <sourceDirectory>src/main/kotlin</sourceDirectory>
    <testSourceDirectory>src/test/kotlin</testSourceDirectory>

    <plugins>
        <plugin>
            <groupId>org.jetbrains.kotlin</groupId>
            <artifactId>kotlin-maven-plugin</artifactId>
            <version>${kotlin.version}</version>
```

```
        <executions>
            <execution>
                <id>compile</id>
                <phase>compile</phase>
                <goals>
                    <goal>compile</goal>
                </goals>
            </execution>
            <execution>
                <id>test-compile</id>
                <phase>test-compile</phase>
                <goals>
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                </goals>
            </execution>
        </executions>
        <configuration>
            <jvmTarget>17</jvmTarget>
        </configuration>
    </plugin>
</plugins>
</build>
</project>
```

## Code your Kotlin project using the SDK for Kotlin

Now the fun begins. As you develop your application, you can refer to the [AWS SDK for Kotlin API Reference](#) for complete information on the API operations. Use the following links for general Kotlin API information:

- [Standard library API reference](#)
- [Coroutines overview](#)
- [Coroutines API](#)

## Log in using the AWS CLI

Whenever you run a program that accesses AWS services, you need an active AWS access portal session. You do this by running the following command.

```
aws sso login
```

Since you have a default profile setup, you do not need to call the command with a `--profile` option. If your IAM Identity Center single sign-on configuration uses a named profile, the command is `aws sso login --profile named-profile`.

To test if you already have an active session, run the following AWS CLI command.

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

The response to this command should report the IAM Identity Center account and permission set configured in the shared `config` file.

# Configure the AWS SDK for Kotlin

This section explains how to configure a service client using the AWS SDK for Kotlin. For more information, see the [SDK and Tools Reference Guide](#), which includes an overview of configuration that applies to all AWS SDKs.

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## Create a service client

To make a request to an AWS service, you must first instantiate a client for that service.

You can configure common settings for service clients, such as the HTTP client to use, logging level, and retry configuration. Additionally, each service client requires an AWS Region and a credentials provider. The SDK uses these values to send requests to the correct Region and to sign requests with the correct credentials.

You can specify these values programmatically in code or have them automatically loaded from the environment.

## Configure a client in code

To configure a service client with specific values, you can specify them in a lambda function passed to the service client factory method as shown in the following snippet.

```
val dynamoDbClient = DynamoDbClient {
    region = "us-east-1"
    credentialsProvider = ProfileCredentialsProvider(profileName = "myprofile")
}
```

Any values that you don't specify in the configuration block are set to defaults. For instance, if you don't specify a credentials provider as the previous code does, the credentials provider defaults to the [default credentials provider chain](#).

### Warning

Some properties such as `region` do not have a default. You must specify them explicitly in the configuration block when you use programmatic configuration. If the SDK can't resolve the property, API requests may fail.

## Configure a client from the environment

When creating a service client, the SDK can inspect locations in the current execution environment to determine some configuration properties. Those locations include [shared config and credentials files](#), [environment variables](#), and [JVM system properties](#). The properties available to be resolved include [AWS Region](#), [retry strategy](#), [log mode](#), and others. For more information on the all settings that the SDK can resolve from the execution environment, see the [AWS SDKs and Tools Settings Reference Guide](#).

To create a client with environment-sourced configuration, use the static method `suspend fun fromEnvironment()` on the service client interface:

```
val dynamoDbClient = DynamoDbClient.fromEnvironment()
```

Creating a client this way is useful when running on Amazon EC2, AWS Lambda, or any other context where the configuration of a service client is available from the environment. This decouples your code from the environment that it's running in and makes it easier to deploy your application to multiple Regions without changing the code.

Additionally, you can override specific properties by passing a `lambda` block to `fromEnvironment`. The following example loads some configuration properties from the environment (e.g., `Region`) but specifically overrides the credentials provider to use credentials from a profile.

```
val dynamoDbClient = DynamoDbClient.fromEnvironment {  
    credentialsProvider = ProfileCredentialsProvider(profileName = "myprofile")  
}
```



The SDK uses default values for any configuration property that can't be determined from programmatic settings or from the environment. For instance, if you don't specify a credentials provider in code or in an environment setting, the credentials provider defaults to the [default credentials provider chain](#).

### Warning

Some properties such as Region do not have a default. You must specify them in an environment setting or explicitly in the configuration block. If the SDK can't resolve the property, API requests may fail.

### Note

Although credentials-related properties—such as temporary access keys and SSO configuration—can be found in the execution environment, the values are not sourced by the client at creation time. Instead, the values are accessed by the credentials provider layer at each request.

## Close the client

When you no longer need the service client, close it to release any resources that it's using:

```
val dynamoDbClient = DynamoDbClient.fromEnvironment()
// Invoke several DynamoDB operations.
dynamoDbClient.close()
```

Because service clients extend the [Closeable](#) interface, you can use the [use](#) extension to close the client automatically at the end of a block as shown in the following snippet.

```
DynamoDbClient.fromEnvironment().use { dynamoDbClient ->
    // Invoke several DynamoDB operations.
}
```

In the previous example, the lambda block receives a reference to the client that was just created. You can invoke operations on this client reference and when the block is completed—including by throwing an exception—the client is closed.

## AWS Region selection

With AWS Regions, you can access AWS services that operate in a specific geographic area. This can be useful both for redundancy and to keep your data and applications running close to where you and your users will access them.

### Default Region provider chain

When loading a service client's configuration [from the environment](#), the following lookup process is used:

1. Any explicit Region set on the builder.
2. The `aws.region` JVM system property is checked. If it's set, that Region is used in the configuration of the client.
3. The `AWS_REGION` environment variable is checked. If it's set, that Region is used in the configuration of the client.
  - a. **Note:** This environment variable is set by the Lambda container.
4. The SDK checks the AWS shared configuration file. If the `region` property is set for the active profile, the SDK uses it.
  - a. The `AWS_CONFIG_FILE` environment variable can be used to customize the location of the shared config file.
  - b. The `aws.profile` JVM system property or the `AWS_PROFILE` environment variable can be used to customize the profile that the SDK loads.
5. The SDK attempts to use the Amazon EC2 Instance Metadata Service to determine the Region of the currently running EC2 instance.
6. If the Region still isn't resolved at this point, client creation fails with an exception.

## Credentials providers

To make requests to Amazon Web Services using the AWS SDK for Kotlin, the SDK uses cryptographically-signed credentials issued by AWS. At runtime, the SDK retrieves configuration values for credentials by checking several locations.

If the retrieved configuration includes [IAM Identity Center single sign-on access](#) settings, the SDK works with the IAM Identity Center to retrieve temporary credentials that it uses to make request to AWS services.

If the retrieved configuration includes [temporary credentials](#), the SDK uses them to make AWS service calls. Temporary credentials consist of access keys and a session token.

## The default credentials provider chain

When not explicitly specified at client construction, the SDK for Kotlin uses a credential provider that sequentially checks each place where you can supply credentials.

To use the default chain to supply credentials in your application, create a service client without explicitly specifying a credentials provider.

```
val ddb = DynamoDbClient {  
    region = "us-east-2"  
}
```

For more information, see the various ways to [construct and configure a client](#).

### Credential retrieval order

The default credentials provider chain searches for credentials using the following predefined sequence:

#### 1. Environment variables

The SDK attempts to load credentials from the `AWS_ACCESS_KEY_ID` and `AWS_SECRET_ACCESS_KEY`, and `AWS_SESSION_TOKEN` environment variables.

#### 2. Shared credentials and config files

The SDK attempts to load credentials from the `[default]` profile in the shared credentials and config files.

This sequence step is when the SDK for Kotlin uses the single sign-on token that was set up by running AWS CLI command `aws sso login`. The SDK uses the temporary credentials that the IAM Identity Center exchanged for a valid token. The SDK then uses the temporary credentials when it calls AWS services. The AWS SDKs and Tools Reference Guide has [detailed information about this process](#).

You can use the `aws.profile` JVM system property or the `AWS_PROFILE` environment variable to choose the profile you want the SDK to load.

**Note**

The `credentials` and `config` files are shared by various AWS SDKs and tools. For more information, see the [.aws/credentials](#) and [.aws/config files](#) in the [AWS SDKs and Tools Reference Guide](#).

### 3. AWS STS web identity (including Amazon Elastic Kubernetes Service (Amazon EKS))

The SDK attempts to resolve JVM system properties and environment variables to [assume a role using a web identity](#).

### 4. Amazon ECS container credentials ([IAM roles for task](#))

The SDK attempts to resolve `AWS_CONTAINER_CREDENTIALS_RELATIVE_URI` or `AWS_CONTAINER_CREDENTIALS_FULL_URI` environment variables to fetch credentials from.

### 5. Amazon EC2 Instance Metadata Service ([IAM role attached to an instance](#))

The SDK attempts to fetch credentials from the [Instance Metadata Service](#).

**Note**

The SDK only supports [IMDSv2](#).

6. If credentials still aren't resolved at this point, client creation fails with an exception.

## Explicit credentials provider

Instead of using the default provider chain, you can specify a specific credentials provider or a custom chain (`CredentialsProviderChain`) that the SDK should use. For example, if you set the default credentials using environment variables, supply an `EnvironmentCredentialsProvider` to the client builder, as in the following code snippet.

```
val ddb = DynamoDbClient {
    region = "us-east-1"
    credentialsProvider = EnvironmentCredentialsProvider()
}
```

**Note**

The default chain caches credentials, but standalone providers do not. You can wrap any credentials provider using the `CachedCredentialsProvider` class to avoid unnecessarily fetching credentials on every API call. The cached provider only fetches new credentials when the current ones expire.

**Note**

You can implement your own credentials provider or provider chain by implementing the `CredentialsProvider` interface.

## Configure client endpoints

When the AWS SDK for Kotlin calls an AWS service, one of its first steps is to determine where to route the request. This process is known as endpoint resolution.

You can configure endpoint resolution for the SDK when you build a service client. The default configuration for endpoint resolution is usually fine, but there are several reasons that might lead you to modify the default configuration. Two example reasons are as follows:

- Make requests to a prerelease version of a service or to a local deployment of a service.
- Access to specific service features not yet modeled in the SDK.

**Warning**

Endpoint resolution is an advanced SDK topic. If you change the default settings, you risk breaking your code. The default settings should apply to most users in production environments.

## Custom configuration

You can customize endpoint resolution of a service client with two properties that are available when you build the client:

1. `endpointUrl`: `Url`
2. `endpointProvider`: `EndpointProvider`

## Set `endpointUrl`

You can set a value for `endpointUrl` to indicate a "base" hostname for the service. This value, however, is not final since it is passed as a parameter to the client's `EndpointProvider` instance. The `EndpointProvider` implementation then can inspect and potentially modify that value to determine the final endpoint.

As an example, if you specify an `endpointUrl` value for an Amazon Simple Storage Service (Amazon S3) client and perform a `GetObject` operation, the default endpoint provider implementation injects the bucket name into the hostname value.

In practice, users set an `endpointUrl` value to point at a development or preview instance of a service.

## Set `endpointProvider`

A service client's `EndpointProvider` implementation determines final endpoint resolution. The `EndpointProvider` interface shown in the following code block exposes the `resolveEndpoint` method.

```
public fun interface EndpointProvider<T> {  
    public suspend fun resolveEndpoint(params: T): Endpoint  
}
```

A service client calls the `resolveEndpoint` method for every request. The service client uses the `Endpoint` value returned by the provider with no further changes.

## `EndpointProvider` properties

The `resolveEndpoint` method accepts a service-specific `EndpointParameters` object that contains properties used in endpoint resolution.

Every service includes the following base properties.

| Name                | Type                | Description             |
|---------------------|---------------------|-------------------------|
| <code>region</code> | <code>String</code> | The client's AWS Region |

| Name         | Type    | Description                                                            |
|--------------|---------|------------------------------------------------------------------------|
| endpoint     | String  | A string representation of the value set of <code>endpointUrl</code>   |
| useFips      | Boolean | Whether FIPS endpoints are enabled in the client's configuration       |
| useDualStack | Boolean | Whether dual-stack endpoints are enabled in the client's configuration |

Services can specify additional properties required for resolution. For example, Amazon S3 [S3EndpointParameters](#) includes the bucket name and also several Amazon S3-specific feature settings. For example, the `forcePathStyle` property determines whether virtual host addressing can be used.

If you implement your own provider, you shouldn't need to construct your own instance of `EndpointParameters`. The SDK provides the properties for each request and passes them to your implementation of `resolveEndpoint`.

## endpointUrl or endpointProvider

It is important to understand that the following two statements do NOT produce clients with equivalent endpoint resolution behavior:

```
// Use endpointUrl.
S3Client.fromEnvironment {
    endpointUrl = Url.parse("https://endpoint.example")
}

// Use endpointProvider.
S3Client.fromEnvironment {
    endpointProvider = object : S3EndpointProvider {
        override suspend fun resolveEndpoint(params: S3EndpointParameters): Endpoint =
            Endpoint("https://endpoint.example")
    }
}
```

The statement that sets the `endpointUrl` property specifies a *base* URL that is passed to the (default) provider, which can be modified as part of endpoint resolution.

The statement that sets the `endpointProvider` specifies the *final* URL the `S3Client` uses.

Although you can set both properties, in most cases that need customization, you provide one of them. As a general SDK user, you most often provide an `endpointUrl` value.

## A note about Amazon S3

Amazon S3 is a complex service with many of its features modeled through customized endpoints customizations, such as bucket virtual hosting. Virtual hosting is a feature of Amazon S3 where the bucket name is inserted into the hostname.

Because of this, we recommend that you don't replace the `EndpointProvider` implementation in an Amazon S3 service client. If you need to extend its resolution behavior, perhaps by sending requests to a local development stack with additional endpoint considerations, we recommend wrapping the default implementation. The following `endpointProvider` example shows a sample implementation of this approach.

## Examples

### `endpointUrl` example

The following code snippet shows how the general service endpoint can be overridden for an Amazon S3 client.

```
val client = S3Client.fromEnvironment {
    endpointUrl = Url.parse("https://custom-s3-endpoint.local")
    // EndpointProvider is left as the default.
}
```

### `endpointProvider` example

The following code snippet shows how to provide a custom endpoint provider that wraps the default implementation for Amazon S3.

```
import aws.sdk.kotlin.services.s3.endpoints.DefaultS3EndpointProvider
import aws.sdk.kotlin.services.s3.endpoints.S3EndpointParameters
```



```
import aws.sdk.kotlin.services.s3.endpoints.S3EndpointProvider
import aws.smithy.kotlin.runtime.client.endpoints.Endpoint

public class CustomS3EndpointProvider : S3EndpointProvider {
    override suspend fun resolveEndpoint(params: S3EndpointParameters) =
        if (/* Input params indicate we must route another endpoint for whatever
reason. */) {
            Endpoint(/* ... */)
        } else {
            // Fall back to the default resolution.
            DefaultS3EndpointProvider().resolveEndpoint(params)
        }
}
```

## endpointUrl and endpointProvider

The following example program demonstrates the interaction between the `endpointUrl` and `endpointProvider` settings. This is an advanced use case.

```
import aws.sdk.kotlin.services.s3.S3Client
import aws.sdk.kotlin.services.s3.endpoints.DefaultS3EndpointProvider
import aws.sdk.kotlin.services.s3.endpoints.S3EndpointParameters
import aws.sdk.kotlin.services.s3.endpoints.S3EndpointProvider
import aws.smithy.kotlin.runtime.client.endpoints.Endpoint

fun main() = runBlocking {
    S3Client.fromEnvironment {
        endpointUrl = Url.parse("https://example.endpoint")
        endpointProvider = CustomS3EndpointProvider()
    }.use { s3 ->
        // ...
    }
}

class CustomS3EndpointProvider : S3EndpointProvider {
    override suspend fun resolveEndpoint(params: S3EndpointParameters) {
        // The resolved string value of the endpointUrl set in the client above is
available here.
        println(params.endpoint)
        // ...
    }
}
```

# HTTP

This section covers the configuration of HTTP-related settings in the AWS SDK for Kotlin.

## Topics

- [HTTP client configuration](#)
- [Use an HTTP proxy](#)
- [HTTP interceptors](#)
- [Enforce a minimum TLS version](#)

## HTTP client configuration

By default, the AWS SDK for Kotlin uses an HTTP client based on [OkHttp](#). You can override the HTTP client and its configuration by supplying an explicitly configured client.

### Note

By default, each service client uses its own copy of an HTTP client. If you use multiple services in your application, you might want to construct a single HTTP client and share it across all service clients.

## Basic configuration

When you configure a service client, you can configure the default engine type. The SDK manages the resulting HTTP client engine and automatically closes it when it is no longer needed.

The following example shows configuration of an HTTP client during the initialization of a DynamoDB client.

## Imports

```
import aws.sdk.kotlin.services.dynamodb.DynamoDbClient
import kotlin.time.Duration.Companion.seconds
```

## Code

```
DynamoDbClient {
```

```
    region = "us-east-2"
    httpClient {
        maxConcurrency = 64u
        connectTimeout = 10.seconds
    }
}.use { ddb ->

    // Perform some actions with Amazon DynamoDB.
}
```

## Specify an HTTP engine type

For more advanced use cases, you can pass an additional parameter to `httpClient` that specifies the engine type. This way, you can set configuration parameters that are unique to that engine type.

The following example specifies the [OkHttpClient](#) that you can use to configure the [maxConcurrencyPerHost](#) property.

### Imports

```
import aws.sdk.kotlin.services.dynamodb.DynamoDbClient
import aws.smithy.kotlin.runtime.http.engine.okhttp.OkHttpClient
```

### Code

```
DynamoDbClient {
    region = "us-east-2"
    httpClient(OkHttpClient) { // The first parameter specifies the HTTP engine type.
        // The following parameter is generic HTTP configuration available in any
        engine type.
        maxConcurrency = 64u

        // The following parameter is OkHttpClient-specific configuration.
        maxConcurrencyPerHost = 32u
    }
}.use { ddb ->

    // Perform some actions with Amazon DynamoDB.
}
```

The possible values for the engine type are `OkHttpClient` and [CrtHttpClient](#).

To use configuration parameters specific to an HTTP engine, you must add the engine as a compile-time dependency. For the `OkHttpEngine`, you add the following dependency using Gradle.

```
implementation("aws.smithy.kotlin:http-client-engine-okhttp:0.28.2 ")
```

For the `CrtHttpEngine`, add the following dependency.

```
implementation("aws.smithy.kotlin:http-client-engine-crt:0.28.2 ")
```

You can find the most recent version of the dependencies at [Maven central](#).

## Use an explicit HTTP client

When you use an explicit HTTP client, you're responsible for its lifetime, including closing when you no longer need it. An HTTP client must live at least as long as any service client that uses it.

The following code example shows code that keeps the HTTP client stays alive while the `DynamoDbClient` is active. The `use` function makes sure the HTTP client closes properly.

## Imports

```
import aws.sdk.kotlin.services.dynamodb.DynamoDbClient
import aws.smithy.kotlin.runtime.http.engine.okhttp.OkHttpEngine
import kotlin.time.Duration.Companion.seconds
```

## Code

```
OkHttpEngine {
    maxConcurrency = 64u
    connectTimeout = 10.seconds
}.use { okHttpClient ->

    DynamoDbClient {
        region = "us-east-2"
        httpClient = okHttpClient
    }.use { ddb ->
        {
            // Perform some actions with Amazon DynamoDB.
        }
    }
}
```

## Use an HTTP proxy

To access AWS through proxy servers using the AWS SDK for Kotlin, you can configure either JVM system properties or environment variables. If both are provided, the JVM system properties take precedence.

### Use JVM system properties

The SDK looks for the JVM system properties `https.proxyHost`, `https.proxyPort`, and `http.nonProxyHosts`. For more information on these common JVM system properties, see [Networking and Proxies](#) in the Java documentation.

```
java -Dhttps.proxyHost=10.15.20.25 -Dhttps.proxyPort=1234 -
Dhttp.nonProxyHosts=localhost|api.example.com MyApplication
```

### Use environment variables

The SDK looks for the `https_proxy`, `http_proxy`, and `no_proxy` environment variables (and capitalized versions of each).

```
export http_proxy=http://10.15.20.25:1234
export https_proxy=http://10.15.20.25:5678
export no_proxy=localhost,api.example.com
```

### Use a proxy on EC2 instances

If you configure a proxy on an EC2 instance launched with an attached IAM role, make sure to exempt the address that's used to access the [instance metadata](#). To do this, set the `http.nonProxyHosts` JVM system property or `no_proxy` environment variable to the IP address of the Instance Metadata Service, which is `169.254.169.254`. This address does not vary.

```
export no_proxy=169.254.169.254
```

## HTTP interceptors

You can use interceptors to hook into the execution of API requests and responses. Interceptors are open-ended mechanisms in which the SDK calls code that you write to inject behavior into the request/response lifecycle. This way, you can modify an in-flight request, debug request processing, view exceptions, and more.

The following example shows a simple interceptor that adds an additional header to all outgoing requests before the retry loop is entered.

```
class AddHeader(
    private val key: String,
    private val value: String
) : HttpInterceptor {
    override suspend fun modifyBeforeRetryLoop(context:
    ProtocolRequestInterceptorContext<Any, HttpRequest>): HttpRequest {
        val httpReqBuilder = context.protocolRequest.toBuilder()
        httpReqBuilder.headers[key] = value
        return httpReqBuilder.build()
    }
}
```

For more information and the available interception hooks, see the [Interceptor interface](#).

## Interceptor registration

You register interceptors when you construct a service client or when you override configuration for a specific set of operations.

### Interceptor for all service client operations

The following code adds an `AddHeader` instance to the `interceptors` property of the builder. This addition adds the `x-foo-version` header to all operations before the retry loop is entered.

```
val s3 = S3Client.fromEnvironment {
    interceptors += AddHeader("x-foo-version", "1.0")
}

// All service operations invoked using 's3' will have the header appended.
s3.listBuckets { ... }
s3.listObjectsV2 { ... }
```

### Interceptor for only specific operations

By using the `withConfig` extension, you can [override service client configuration](#) for one or more operations for any service client. With this capability, you can register additional interceptors for a subset of operations.

The following example overrides the configuration of the `s3` instance for operations within the use extension. Operations called on `s3Scoped` contain both the `x-foo-version` and the `x-bar-version` headers.

```
// 's3' instance created in the previous code snippet.
s3.withConfig {
    interceptors += AddHeader("x-bar-version", "3.7")
}.use { s3Scoped ->
    // All service operations invoked using 's3Scoped' trigger interceptors
    // that were registered when the client was created and any added in the
    // withConfig { ... } extension.
}
```

## Enforce a minimum TLS version

With the AWS SDK for Kotlin, you can configure the minimum TLS version when you connect to service endpoints. The SDK offers different configuration options. In order of highest to lowest precedence, the options are:

- Explicitly configure the HTTP engine
- Set the `sdk.minTls` JVM system property
- Set the `SDK_MIN_TLS` environment variable

## Configure the HTTP engine

When you specify a non-default HTTP engine for a service client, you can set the `tlsContext.minVersion` field.

The following example configures the HTTP engine and any service client that uses it to use TLS v1.2 at a minimum.

```
DynamoDbClient {
    region = "us-east-2"
    httpClient {
        tlsContext {
            minVersion = TlsVersion.TLS_1_2
        }
    }
}.use { ddb ->
```

```
// Perform some actions with Amazon DynamoDB.  
}
```

## Set the `sdk.minTls` JVM system property

You can set the `sdk.minTls` JVM system property. When you launch an application with the system property set, all HTTP engines constructed by the AWS SDK for Kotlin use the specified minimum TLS version by default. However, you can explicitly override this in the HTTP engine configuration. The allowable values are:

- `TLS_1_0`
- `TLS_1_1`
- `TLS_1_2`
- `TLS_1_3`

## Set the `SDK_MIN_TLS` environment variable

You can set the `SDK_MIN_TLS` environment variable. When you launch an application with the environment variable set, all HTTP engines constructed by the AWS SDK for Kotlin use the specified minimum TLS version, unless overridden by another option.

The allowable values are:

- `TLS_1_0`
- `TLS_1_1`
- `TLS_1_2`
- `TLS_1_3`

## Retries

Calls to AWS services occasionally return unexpected exceptions. Certain types of errors, such as throttling or transient errors, might be successful if the call is retried.

This page describes how to configure automatic retries with the AWS SDK for Kotlin.



## Default retry configuration

By default, every service client is automatically configured with a [standard retry strategy](#). The default configuration tries a call that fails up to three times (the initial attempt plus two retries). The intervening delay between each call is configured with exponential backoff and random jitter to avoid retry storms. This configuration works for the majority of use cases but may be unsuitable in some circumstances, such as high-throughput systems.

The SDK attempts retries only on retryable errors. Examples of retryable errors are socket timeouts, service-side throttling, concurrency or optimistic lock failures, and transient service errors. Missing or invalid parameters, authentication/security errors, and misconfiguration exceptions are not considered retryable.

You can customize the standard retry strategy by setting the maximum attempts, delays and backoff, and token bucket configuration.

## Maximum attempts

You can customize the default maximum attempts (3) in the [retryStrategy DSL block](#) during client construction.

```
val dynamoDb = DynamoDbClient.fromEnvironment {
    retryStrategy {
        maxAttempts = 5
    }
}
```

With the DynamoDB service client shown in the previous snippet, the SDK tries API calls that fail up to five times (the initial attempt plus four retries).

You can disable automatic retries completely by setting the maximum attempts to one as shown in the following snippet.

```
val dynamoDb = DynamoDbClient.fromEnvironment {
    retryStrategy {
        maxAttempts = 1 // The SDK makes no retries.
    }
}
```

## Delays and backoff

If a retry is necessary, the default retry strategy waits before it makes the subsequent attempt. The delay for the first retry is small but it grows exponentially for later retries. The maximum amount of delay is capped so that it does not grow too large.

Finally, random jitter is applied to the delays between all attempts. The jitter helps mitigate the effect of large fleets that can cause retry storms. (See this [AWS Architecture Blog post](#) for a deeper discussion about exponential backoff and jitter.)

Delay parameters are configurable in the [delayProvider DSL block](#).

```
val dynamoDb = DynamoDbClient.fromEnvironment {
    retryStrategy {
        delayProvider {
            initialDelay = 100.milliseconds
            maxBackoff = 5.seconds
        }
    }
}
```

With the configuration shown in the previous snippet, the client delays the first retry attempt for up to 100 milliseconds. The maximum amount of time between any retry attempt is 5 seconds.

The following parameters are available for tuning delays and backoff.

| Parameter                 | Default value     | Description                                                                                                                                                      |
|---------------------------|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <code>initialDelay</code> | 10 milliseconds   | The maximum amount of delay for the first retry. When jitter is applied, the actual amount of delay may be less.                                                 |
| <code>jitter</code>       | 1.0 (full jitter) | The maximum amplitude by which to randomly reduce the calculated delay. The default value of 1.0 means that the calculated delay can be reduced to any amount up |

| Parameter  | Default value | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|            |               | <p>to 100% (for example, down to 0). A value of 0.5 means that the calculated delay can be reduced by up to half. Thus, a max delay of 10ms could be reduced to anywhere between 5ms and 10ms. A value of 0.0 means that no jitter is applied.</p> <div style="border: 1px solid #f08080; border-radius: 10px; padding: 10px;"><p><b>⚠ Important</b></p><p>#Jitter configuration is an advanced feature. Customizing this behavior is not normally recommended.</p></div> |
| maxBackoff | 20 seconds    | <p>The maximum amount of delay to apply to any attempt. Setting this value limits the exponential growth that occurs between subsequent attempts and prevents the calculated maximum from being too large. This parameter limits the calculated delay <i>before</i> jitter is applied. If applied, jitter might reduce the delay even further.</p>                                                                                                                                                       |

| Parameter                | Default value | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|--------------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <code>scaleFactor</code> | 1.5           | <p>The exponential base by which subsequent maximum delays will be increased . For example, given an <code>initialDelay</code> of 10ms and a <code>scaleFactor</code> of 1.5, the following max delays would be calculated:</p> <ul style="list-style-type: none"><li>• Retry 1: <math>10\text{ms} \times 1.5^0 = 10\text{ms}</math></li><li>• Retry 2: <math>10\text{ms} \times 1.5^1 = 15\text{ms}</math></li><li>• Retry 3: <math>10\text{ms} \times 1.5^2 = 22.5\text{ms}</math></li><li>• Retry 4: <math>10\text{ms} \times 1.5^3 = 33.75\text{ms}</math></li></ul> <p>When jitter is applied, the actual amount of each delay might be less.</p> |

## Retry token bucket

You can modify retry behavior further by using a token bucket algorithm. This helps to reduce failure retries that are less likely to succeed or that might take more time to resolve, such as timeout and throttling failures.

### Important

Token bucket configuration is an advanced feature. Customizing this behavior is not normally recommended.

Each retry attempt (optionally including the initial attempt) decrements some capacity from the token bucket. The amount decremented depends on the type of attempt. For example, retrying transient errors might be cheap, but retrying timeout or throttling errors might be more expensive.

A successful attempt returns capacity to the bucket. The bucket may not be incremented beyond its maximum capacity nor decremented below zero.

Depending on the value of the `useCircuitBreakerMode` setting, attempts to decrement capacity below zero result in one of the following outcomes:

- An exception is thrown – For example, if too many retries have occurred and more retries are unlikely to succeed.
- A delay – For example, delays until the bucket has sufficient capacity again.

The token bucket parameters are configurable in the [tokenBucket DSL block](#):

```
val dynamoDb = DynamoDbClient.fromEnvironment {
    retryStrategy {
        tokenBucket {
            maxCapacity = 100
            refillUnitsPerSecond = 2
        }
    }
}
```

The following parameters are available for tuning the retry token bucket:

| Parameter                   | Default value | Description                                                                                                                                                                           |
|-----------------------------|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <code>initialTryCost</code> | 0             | The amount to decrement from the bucket for initial attempts. The default value of 0 means that no capacity will be decremented and thus initial attempts are not stopped or delayed. |

| Parameter                               | Default value | Description                                                                                                                                                                                                                                                                            |
|-----------------------------------------|---------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <code>initialTrySuccessIncrement</code> | 1             | The amount to increment capacity when the initial attempt was successful.                                                                                                                                                                                                              |
| <code>maxCapacity</code>                | 500           | The maximum capacity of the token bucket. The number of available tokens cannot exceed this number.                                                                                                                                                                                    |
| <code>refillUnitsPerSecond</code>       | 0             | The amount of capacity re-added to the bucket every second. A value of 0 means that no capacity is automatically re-added. (For example, only successful attempts result in incrementing capacity). A value of 0 requires <code>useCircuitBreakerMode</code> to be <code>TRUE</code> . |
| <code>retryCost</code>                  | 5             | The amount to decrement from the bucket for an attempt following a transient failure. The same amount is re-incremented back to the bucket if the attempt is successful.                                                                                                               |

| Parameter                          | Default value | Description                                                                                                                                                                                                                                                                                                            |
|------------------------------------|---------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <code>timeoutRetryCost</code>      | 10            | The amount to decrement from the bucket for an attempt following a timeout or throttling failure. The same amount is re-incremented back to the bucket if the attempt is successful.                                                                                                                                   |
| <code>useCircuitBreakerMode</code> | TRUE          | Determines the behavior when an attempt to decrement capacity would result in the bucket's capacity to fall below zero. When TRUE, the token bucket will throw an exception indicating that no more retry capacity exists. When FALSE, the token bucket will delay the attempt until sufficient capacity has refilled. |

## Adaptive retries

As an alternative to the standard retry strategy, the adaptive retry strategy is an advanced approach that seeks the ideal request rate to minimize throttling errors.

### Important

Adaptive retries is an advanced retry mode. Using this retry strategy is not normally recommended.

Adaptive retries includes all the features of standard retries. It adds a client-side rate limiter that measures the rate of throttled requests compared to non-throttled requests. It also limits traffic to attempt to stay within a safe bandwidth, ideally causing zero throttling errors.

The rate adapts in real time to changing service conditions and traffic patterns and might increase or decrease the rate of traffic accordingly. Critically, the rate limiter might delay initial attempts in high-traffic scenarios.

You select the adaptive retry strategy by providing an additional parameter to the `retryStrategy` method. The rate limiter parameters are configurable in the [rateLimiter DSL block](#).

```
val dynamoDb = DynamoDbClient.fromEnvironment {
    retryStrategy(AdaptiveRetryStrategy) {
        maxAttempts = 10
        rateLimiter {
            minFillRate = 1.0
            smoothing = 0.75
        }
    }
}
```

### Note

The adaptive retry strategy assumes that the client works against a single resource (for example, one DynamoDB table or one Amazon S3 bucket).

If you use a single client for multiple resources, throttling or outages associated with one resource result in increased latency and failures when the client accesses all other resources. When you use the adaptive retry strategy, we recommend that you use a single client for each resource.

## Observability

Observability is the extent to which a system's current state can be inferred from the data it emits. The data emitted is commonly referred to as telemetry.

The AWS SDK for Kotlin can provide all three common telemetry signals: metrics, traces, and logs. You can wire up a [TelemetryProvider](#) to send telemetry data to an observability backend (such as [AWS X-Ray](#) or [Amazon CloudWatch](#)) and then act on it.

By default, only logging is enabled and other telemetry signals are disabled in the SDK. This topic explains how to enable and configure telemetry output.



**⚠ Important**

`TelemetryProvider` is currently an experimental API that must be opted in to use.

## Configure a `TelemetryProvider`

You can configure a `TelemetryProvider` in your application globally for all service clients or for individual clients. The following examples use a hypothetical `getConfiguredProvider()` function to demonstrate the `TelemetryProvider` API operations. The [the section called “Telemetry providers”](#) section describes information for implementations provided by the SDK. If a provider isn’t supported, you can implement your own support or [open a feature request on GitHub](#).

### Configure the default global telemetry provider

By default, every service client attempts to use the globally available telemetry provider. This way, you can set the provider once, and all clients will use it. This should be done only once, before you instantiate any service clients.

To use the global telemetry provider, first update your project dependencies to add the telemetry defaults module as shown in the following Gradle snippet.

```
val smithyKotlinVersion = "1.2.2"

dependencies {
    implementation("aws.smithy.kotlin:telemetry-defaults:$smithyKotlinVersion")
    ...
}
```

Then set the global telemetry provider before creating a service client as shown in the following code.

```
import aws.sdk.kotlin.services.s3.S3Client
import aws.smithy.kotlin.runtime.telemetry.GlobalTelemetryProvider
import kotlinx.coroutines.runBlocking

fun main() = runBlocking {
    val myTelemetryProvider = getConfiguredProvider()
    GlobalTelemetryProvider.set(myTelemetryProvider)
}
```

```

    S3Client.fromEnvironment().use { s3 ->
        ...
    }
}

fun getConfiguredProvider(): TelemetryProvider {
    TODO("TODO - configure a provider")
}

```

## Configure a telemetry provider for a specific service client

You can configure an individual service client with a specific telemetry provider (other than the global one). This is shown in the following example.

```

import aws.sdk.kotlin.services.s3.S3Client
import kotlinx.coroutines.runBlocking

fun main() = runBlocking {
    S3Client.fromEnvironment{
        telemetryProvider = getConfiguredProvider()
    }.use { s3 ->
        ...
    }
}

fun getConfiguredProvider(): TelemetryProvider {
    TODO("TODO - configure a provider")
}

```

## Metrics

The following table lists the telemetry metrics that the SDK emits. [Configure a telemetry provider](#) to make the metrics observable.

### What metrics are emitted?

| Metric name                 | Units | Type      | Attributes                 | Description                               |
|-----------------------------|-------|-----------|----------------------------|-------------------------------------------|
| smithy.client.call.duration | s     | Histogram | rpc.service,<br>rpc.method | Overall call duration (including retries) |

| Metric name                                       | Units     | Type            | Attributes                              | Description                                                                                                                                         |
|---------------------------------------------------|-----------|-----------------|-----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
| smithy.client.call.attempts                       | {attempt} | Monotor Counter | rpc.service, rpc.method                 | The number of attempts for an individual operation                                                                                                  |
| smithy.client.call.errors                         | {error}   | Monotor Counter | rpc.service, rpc.method, exception.type | The number of errors for an operation                                                                                                               |
| smithy.client.call.attempt_duration               | s         | Histogram       | rpc.service, rpc.method                 | The time it takes to connect to the service, send the request, and get back HTTP status code and headers (including time queued waiting to be sent) |
| smithy.client.call.resolve_endpoint_duration      | s         | Histogram       | rpc.service, rpc.method                 | The time it takes to resolve an endpoint (endpoint resolver, not DNS) for the request                                                               |
| smithy.client.call.serialization_duration         | s         | Histogram       | rpc.service, rpc.method                 | The time it takes to serialize a message body                                                                                                       |
| smithy.client.call.deserialization_duration       | s         | Histogram       | rpc.service, rpc.method                 | The time it takes to deserialize a message body                                                                                                     |
| smithy.client.call.auth.signing_duration          | s         | Histogram       | rpc.service, rpc.method, auth.scheme_id | The time it takes to sign a request                                                                                                                 |
| smithy.client.call.auth.resolve_identity_duration | s         | Histogram       | rpc.service, rpc.method, auth.scheme_id | The time it takes to acquire an identity (such as AWS credentials or a bearer token) from an Identity Provider                                      |

| Metric name                                     | Units         | Type                 | Attributes                | Description                                                                             |
|-------------------------------------------------|---------------|----------------------|---------------------------|-----------------------------------------------------------------------------------------|
| smithy.client.http.connections.acquire_duration | s             | Histogram            |                           | The time it takes a request to acquire a connection                                     |
| smithy.client.http.connections.limit            | {connections} | [Async]UpDownCounter |                           | The maximum open connections allowed/configured for the HTTP client                     |
| smithy.client.http.connections.usage            | {connections} | [Async]UpDownCounter | state: idle   acquired    | Current state of connections pool                                                       |
| smithy.client.http.connections.uptime           | s             | Histogram            |                           | The amount of time a connection has been open                                           |
| smithy.client.http.requests.usage               | {requests}    | [Async]UpDownCounter | state: queued   in-flight | The current state of HTTP client request concurrency                                    |
| smithy.client.http.requests.queued_duration     | s             | Histogram            |                           | The amount of time a request spent queued and waiting to be executed by the HTTP client |
| smithy.client.http.bytes_sent                   | By            | Monotonic Counter    | server.address            | The total number of bytes sent by the HTTP client                                       |

| Metric name                       | Units | Type            | Attributes     | Description                                           |
|-----------------------------------|-------|-----------------|----------------|-------------------------------------------------------|
| smithy.client.http.bytes_received | By    | Monotor Counter | server.address | The total number of bytes received by the HTTP client |

Following are the column descriptions:

- **Metric name**–The name of the emitted metric.
- **Units**–The unit of measure for the metric. Units are given in the [UCUM](#) case sensitive ("c/s") notation.
- **Type**–The type of instrument used to capture the metric.
- **Description**–A description of what the metric is measuring.
- **Attributes**–The set of attributes (dimensions) emitted with the metric.

## Logging

The AWS SDK for Kotlin configures an [SLF4J](#) compatible logger as the default `LoggerProvider` of the telemetry provider. With SLF4J, which is an abstraction layer, you can use of any one of several logging systems at runtime. Supported logging systems include the [Java Logging APIs](#), [Log4j 2](#), and [Logback](#).

### Warning

We recommend that you only use wire logging for debugging purposes. (Wire logging is discussed below.) Turn it off in your production environments because it can log sensitive data such as email addresses, security tokens, API keys, passwords, and AWS Secrets Manager secrets. Wire logging logs the full request or response without encryption, even for an HTTPS call.

For large requests (such as uploading a file to Amazon S3) or responses, verbose wire logging can also significantly impact your application's performance.

## Example Log4j 2 logging configuration

While any SLF4J-compatible log library may be used, this example enables log output from the SDK in JVM programs using Log4j 2:

### Gradle dependencies

```
implementation("org.apache.logging.log4j:log4j-slf4j2-impl:2.21.1")
```

### Log4j 2 configuration file

Create a file named `log4j2.xml` in your resources directory (for example, `<project-dir>/src/main/resources`). Add the following XML configuration to the file:

```
<Configuration status="ERROR">
  <Appenders>
    <Console name="Out">
      <PatternLayout pattern="%d{YYYY-MM-dd HH:mm:ss} %-5p %c:%L %X - %encode{%m}
{CRLF}%n"/>
    </Console>
  </Appenders>
  <Loggers>
    <Root level="info">
      <AppenderRef ref="Out"/>
    </Root>
  </Loggers>
</Configuration>
```

This configuration includes the `%X` specifier in the `pattern` attribute that enables MDC (mapped diagnostic context) logging.

The SDK adds the following MDC elements for each operation.

#### **rpc**

The name of the invoked RPC, for example `S3.GetObject`.

#### **sdkInvocationId**

A unique ID assigned by the service client for the operation. The ID correlates all logging events related to the invocation of a single operation.

## Specify log mode for wire-level messages

By default, the AWS SDK for Kotlin doesn't log wire-level messages because they might contain sensitive data from API requests and responses. However, sometimes you need this level of detail for debugging purposes.

With the Kotlin SDK, you can set a log mode in code or using environment settings to enable debug messaging for the following:

- HTTP requests
- HTTP responses

The log mode is backed by a bit-field where each bit is a flag (mode) and values are additive. You can combine one request mode and one response mode.

### Set log mode in code

To opt into additional logging, set the `LogMode` property when you construct a service client.

The following example shows how to enable logging of requests (with the body) and the response (without the body).

```
import aws.smithy.kotlin.runtime.client.LogMode

// ...

val client = DynamoDbClient {
    // ...
    logMode = LogMode.LogRequestWithBody + LogMode.LogResponse
}
```

A log mode value set during service client construction, overrides any log mode value set from the environment.

### Set log mode from the environment

To set a log mode globally for all service clients not explicitly configured in code, use one of the following:

- JVM system property: `sdk.logMode`
- Environment variable: `SDK_LOG_MODE`

The following case-insensitive values are available:

- LogRequest
- LogRequestWithBody
- LogResponse
- LogResponseWithBody

To create a combined log mode using settings from the environment, you separate the values with a pipe (|) symbol.

For example, the following examples set the same log mode as the previous example.

```
# Environment variable.  
export SDK_LOG_MODE=LogRequestWithBody|LogResponse
```

```
# JVM system property.  
java -Dsdk.logMode=LogRequestWithBody|LogResponse ...
```

### Note

You must also configure a compatible SLF4J logger and set the logging level to DEBUG to enable wire-level logging.

## Telemetry providers

The SDK currently supports [OpenTelemetry](#) (OTel) as a provider. The SDK might offer additional telemetry providers in the future.

### Topics

- [Configure the OpenTelemetry-based telemetry provider](#)

## Configure the OpenTelemetry-based telemetry provider

The SDK for Kotlin provides an implementation of the `TelemetryProvider` interface backed by OpenTelemetry.



## Prerequisites

Update your project dependencies to add the OpenTelemetry provider as shown in the following Gradle snippet.

```
val otelVersion = "1.31.0-alpha"
val smithyKotlinVersion = "0.28.2"

dependencies {
    implementation("aws.smithy.kotlin:telemetry-provider-otel:$smithyKotlinVersion")

    // OPTIONAL: If you use log4j, the following entry enables the ability to export
    // logs through OTel.
    runtimeOnly("io.opentelemetry.instrumentation:opentelemetry-log4j-appender-2.17:
$otelVersion")
}
```

## Configure the SDK

The following code configures a service client by using the OpenTelemetry telemetry provider.

```
import aws.sdk.kotlin.services.s3.S3Client
import aws.smithy.kotlin.runtime.telemetry.otel.OpenTelemetryProvider
import io.opentelemetry.api.GlobalOpenTelemetry
import kotlinx.coroutines.runBlocking

fun main() = runBlocking {
    val otelProvider = OpenTelemetryProvider(GlobalOpenTelemetry.get())

    S3Client.fromEnvironment().use { s3 ->
        telemetryProvider = otelProvider
        ...
    }
}
```

### Note

A discussion of how to configure the OpenTelemetry SDK is outside of the scope of this guide. The [OpenTelemetry Java documentation](#) contains configuration information on the various approaches: [manually](#), automatically through the [Java agent](#), or the (optional) [collector](#).

## Resources

The following resources are available to help you get started with OpenTelemetry.

- [AWS Distro for OpenTelemetry](#) - AWS OTeL Distro homepage
- [aws-otel-java-instrumentation](#) - AWS Distro for OpenTelemetry Java Instrumentation Library
- [aws-otel-lambda](#) - AWS managed OpenTelemetry Lambda layers
- [aws-otel-collector](#) - AWS Distro for OpenTelemetry Collector
- [AWS Observability Best Practices](#) - General best practices for observability specific to AWS

## Override service client configuration

After a [service client is created](#), the service client uses a fixed configuration for all operations. However, sometimes you might need to override the configuration for one or more specific operations.

Each service client has a `withConfig` extension so that you can modify a copy of the existing configuration. The `withConfig` extension returns a new service client with a modified configuration. The original client exists independently and uses its original configuration.

The following example shows the creation of an `S3Client` instance that calls two operations.

```
val s3 = S3Client.fromEnvironment {
    logMode = LogMode.LogRequest
    region = "us-west-2"
    // ...other configuration settings...
}

s3.listBuckets { ... }
s3.listObjectsV2 { ... }
```

The following snippet shows how to override the configuration for a single `listObjectV2` operation.

```
s3.withConfig {
    region = "eu-central-1"
}.use { overriddenS3 ->
    overriddenS3.listObjectsV2 { ... }
}
```

The operation calls on the `s3` client use the original configuration that was specified when the client was created. Its configuration includes [request logging](#) and `us-west-2` region for the Region.

The `listObjectsV2` invocation on the `overriddenS3` client uses same settings as the original `s3` client except for the Region, which is now `eu-central-1`.

## Lifecycle of an overridden client

In the previous example, the `s3` client and the `overriddenS3` client are independent of each other. Operations can be invoked on either client for as long as they remain open. Each uses a separate configuration, but they can share underlying resources (such as an HTTP engine) unless those are also overridden.

You close a client with an overridden configuration and the original client separately. You can close a client with overridden configuration before or after you close its original client. Unless you need to use a client with overridden configuration for a long time, we recommend that you wrap its lifecycle with the `use` method. The `use` method ensures that the client is closed if exceptions occur.

## Resources shared between clients

When you create a service client by using `withConfig`, it might share resources with the original client. In contrast, when you create a client by using [fromEnvironment](#) or you [explicitly configure it](#), the client uses independent resources. Resources such as HTTP engines and credentials providers are shared unless they are overridden in the `withConfig` block.

Because the lifecycle of each client is independent, shared resources remain open and usable until the last client is closed. Therefore, it is important for you to close overridden service clients when you no longer need them. This prevents shared resources from remaining open and consuming system resources such as memory, connection, and CPU cycles.

The following example shows both shared and independent resources.

The `s3` and `overriddenS3` clients share the same credentials provider instance, including its caching configuration. Calls made by `overriddenS3` reuse credentials if the cached value is still current from calls made by the `s3` client.

The HTTP engine is not shared between the two clients. Each client has an independent HTTP engine because it was overridden in the `withConfig` call.

```
val s3 = S3Client.fromEnvironment {
    region = "us-west-2"
    credentialsProvider = CachedCredentialsProvider(CredentialsProviderChain(...))
    httpClientEngine = OkHttpEngine { ... }
}

s3.listBuckets { ... }

s3.withConfig {
    httpClientEngine = CrtHttpEngine { ... }
}.use { overriddenS3 ->
    overriddenS3.listObjectsV2 { ... }
}
```

# Use the SDK

This section provides basic information required to use the AWS SDK for Kotlin.

## Topics

- [Make requests](#)
- [Coroutines](#)
- [Streaming operations](#)
- [Pagination](#)
- [Waiters](#)
- [Error handling](#)
- [Presign requests](#)

## Make requests

Use a service client to make requests to an AWS service. The AWS SDK for Kotlin provides Domain Specific Languages (DSLs) following a [type-safe builder](#) pattern to create requests. Nested structures of requests are also accessible through their DSLs.

The following example shows how to create an Amazon DynamoDB [createTable](#) operation input:

```
val ddb = DynamoDbClient.fromEnvironment()

val req = CreateTableRequest {
    tableName = name
    keySchema = listOf(
        KeySchemaElement {
            attributeName = "year"
            keyType = KeyType.Hash
        },
        KeySchemaElement {
            attributeName = "title"
            keyType = KeyType.Range
        }
    )
}
```

```
attributeDefinitions = listOf(
    AttributeDefinition {
        attributeName = "year"
        attributeType = ScalarAttributeType.N
    },
    AttributeDefinition {
        attributeName = "title"
        attributeType = ScalarAttributeType.S
    }
)

// You can configure the `provisionedThroughput` member
// by using the `ProvisionedThroughput.Builder` directly:
provisionedThroughput {
    readCapacityUnits = 10
    writeCapacityUnits = 10
}

val resp = ddb.createTable(req)
```

## Service interface DSL overloads

Each non-streaming operation on the service client interface has a DSL overload so that you don't have to create a separate request.

Example of creating an Amazon Simple Storage Service (Amazon S3) bucket with the overloaded function:

```
s3Client.createBucket { // this: CreateBucketRequest.Builder
    bucket = newBucketName
}
```

This is equivalent to:

```
val request = CreateBucketRequest { // this: CreateBucketRequest.Builder
    bucket = newBucketName
}

s3client.createBucket(request)
```

## Requests with no required inputs

Operations that don't have required inputs can be called without having to pass a request object. This is often possible with list-type operations, such as the Amazon S3 `listBuckets` API operation.

For example, the following three statements are equivalent:

```
s3Client.listBuckets(ListBucketsRequest {
    // Construct the request object directly.
})
s3Client.listBuckets {
    // DSL builder without explicitly setting any arguments.
}
s3Client.listBuckets()
```

## Coroutines

The AWS SDK for Kotlin is asynchronous by default. The SDK for Kotlin uses suspend functions for all operations, which are meant to be called from a coroutine.

For a more in-depth guide to coroutines, see the [official Kotlin documentation](#).

## Making concurrent requests

The [async](#) coroutine builder can be used to launch concurrent requests where you care about the results. `async` returns a [Deferred](#), which represents a light-weight, non-blocking future that represents a promise to provide a result later.

If you don't care about the results (only that an operation completed), you can use the [launch](#) coroutine builder. `launch` is conceptually similar to `async`. The difference is that `launch` returns a [Job](#) and does not carry any resulting value, while `async` returns a `Deferred`.

The following is an example of making concurrent requests to Amazon S3 using the [headObject](#) operation to get the content size of two keys:

```
import kotlinx.coroutines.async
import kotlinx.coroutines.runBlocking
import kotlin.system.measureTimeMillis
import aws.sdk.kotlin.services.s3.S3Client
```

```
fun main(): Unit = runBlocking {  
  
    val s3 = S3Client { region = "us-east-2" }  
  
    val myBucket = "<your-bucket-name-here>"  
    val key1 = "<your-object-key-here>"  
    val key2 = "<your-second-object-key-here>"  
  
    val resp1 = async {  
        s3.headObject{  
            bucket = myBucket  
            key = key1  
        }  
    }  
  
    val resp2 = async {  
        s3.headObject{  
            bucket = myBucket  
            key = key2  
        }  
    }  
  
    val elapsed = measureTimeMillis {  
        val totalContentSize = resp1.await().contentLength +  
resp2.await().contentLength  
        println("content length of $key1 + $key2 = $totalContentSize")  
    }  
  
    println("requests completed in $elapsed ms")  
  
}
```

## Making blocking requests

To make service calls from existing code that doesn't use coroutines and implements a different threading model, you can use the [runBlocking](#) coroutine builder. An example of a different threading model is using Java's traditional executors/futures approach. You might need to use this approach if you're blending Java and Kotlin code or libraries.

As its name suggests, this `runBlocking` builder launches a new coroutine and blocks the current thread until it completes.



**⚠ Warning**

`runBlocking` should not generally be used from a coroutine. It is designed to bridge regular blocking code to libraries that are written in suspending style (such as in main functions and tests).

## Streaming operations

In the AWS SDK for Kotlin, binary data (streams) are represented as a [ByteStream](#) type, which is an abstract read-only stream of bytes.

## Streaming responses

Responses with a binary stream (such as the Amazon Simple Storage Service (Amazon S3) [GetObject](#) API operation) are handled differently from other methods. These methods take a lambda function that handles the response rather than returning the response directly. This limits the scope of the response to the function and simplifies lifetime management for both the caller and the SDK runtime.

After the lambda function returns, any resources like the underlying HTTP connection are released. (The `ByteStream` should not be accessed after the lambda returns and should not be passed out of the closure.) The result of the call is whatever the lambda returns.

The following code example shows the [getObject](#) function receiving a lambda parameter, which handles the response.

```
val s3Client = S3Client.fromEnvironment()
val req = GetObjectRequest { ... }

val path = Paths.get("/tmp/download.txt")

// S3Client.getObject has the following signature:
// suspend fun <T> getObject(input: GetObjectRequest, block: suspend
// (GetObjectResponse) -> T): T

val contentSize = s3Client.getObject(req) { resp ->
    // resp is valid until the end of the block.
    // Do not attempt to store or process the stream after the block returns.
```

```
// resp.body is of type ByteStream.
val rc = resp.body?.writeToFile(path)
    rc
}
println("wrote $contentSize bytes to $path")
```

The `ByteStream` type has the following extensions for common ways of consuming it:

- `ByteStream.writeToFile(file: File): Long`
- `ByteStream.writeToFile(path: Path): Long`
- `ByteStream.toByteArray(): ByteArray`
- `ByteStream.decodeToString(): String`

All of these are defined in the `aws.smithy.kotlin.runtime.content` package.

## Streaming requests

To supply a `ByteStream`, there are also several convenience methods, including the following:

- `ByteStream.fromFile(file: File)`
- `File.asByteStream(): ByteStream`
- `Path.asByteStream(): ByteStream`
- `ByteStream.fromBytes(bytes: ByteArray)`
- `ByteStream.fromString(str: String)`

All of these are defined in the `aws.smithy.kotlin.runtime.content` package.

The following code example shows the use of `ByteStream` convenience methods that provide the `body` property in the creation of a [PutObjectRequest](#):

```
val req = PutObjectRequest {
    ...
    body = ByteStream.fromFile(file)
    // body = ByteStream.fromBytes(byteArray)
    // body = ByteStream.fromString("string")
    // etc
}
```

# Pagination

Many AWS operations return paginated results when the payload is too large to return in a single response. The AWS SDK for Kotlin includes [extensions](#) to the service client interface that auto paginate the results for you. You only have to write the code that processes the results.

Pagination is exposed as a [Flow<T>](#) so that you can take advantage of Kotlin's idiomatic transforms for asynchronous collections (such as `map`, `filter`, and `take`). Exceptions are transparent, which makes error handling feel like a regular API call, and cancellation adheres to the general cooperative cancellation of coroutines. For more information, see [flows](#) and [flow exceptions](#) in the official guide.

## Note

The following examples use Amazon S3. However, the concepts are the same for any service that has one or more paginated APIs. All pagination extensions are defined in the `aws.sdk.kotlin.<service>.paginators` package (such as `aws.sdk.kotlin.dynamodb.paginators`).

The following code example shows how you can process the paginated response from the [listObjectsV2Paginated](#) function call.

## Imports

```
import aws.sdk.kotlin.services.s3.S3Client
import aws.sdk.kotlin.services.s3.paginators.listObjectsV2Paginated
import kotlinx.coroutines.flow.*
```

## Code

```
val s3 = S3Client.fromEnvironment()
val req = ListObjectsV2Request {
    bucket = "<my-bucket>"
    maxKeys = 1
}

s3.listObjectsV2Paginated(req) // Flow<ListObjectsV2Response>
    .transform { it.contents?.forEach { obj -> emit(obj) } }
```

```
.collect { obj ->
    println("key: ${obj.key}; size: ${obj.size}")
}
```

## Waiters

Waiters are a client-side abstraction used to poll a resource until a desired state is reached, or until it is determined that the resource will not enter the desired state. This is a common task when working with services that are eventually consistent, like Amazon Simple Storage Service (Amazon S3), or services that asynchronously create resources, like Amazon EC2.

Writing logic to continuously poll the status of a resource can be cumbersome and error-prone. The goal of waiters is to move this responsibility out of customer code and into the AWS SDK for Kotlin, which has in-depth knowledge of the timing aspects for the AWS operation.

### Note

The following examples use Amazon S3. However, the concepts are the same for any AWS service that has one or more waiters defined. All extensions are defined in the `aws.sdk.kotlin.<service>.waiters` package (such as `aws.sdk.kotlin.dynamodb.waiters`). They also follow a standard naming convention (`waitUntil<Condition>`).

The following code example shows the use of a waiter function that allows you to avoid writing polling logic.

### Imports

```
import aws.sdk.kotlin.services.s3.S3Client
import aws.sdk.kotlin.services.s3.waiters.waitUntilBucketExists
```

### Code

```
val s3 = S3Client.fromEnvironment()

// This initiates creating an S3 bucket and potentially returns before the bucket
exists.
```

```
s3.createBucket { bucket = "my-bucket" }

// When this function returns, the bucket either exists or an exception
// is thrown.
s3.waitForBucketExists { bucket = "my-bucket" }

// The bucket now exists.
```

### Note

Each wait method returns an `Outcome` instance that can be used to get at the final response that corresponds to reaching the desired condition. An outcome also contains additional details like the number of attempts made to reach the desired state.

## Error handling

Understanding how and when the AWS SDK for Kotlin throws exceptions is important to building high-quality applications using the SDK. The following sections describe the different cases of exceptions that are thrown by the SDK and how to handle them appropriately.

### Service exceptions

The most common exception is `AwsServiceException`, from which all service-specific exceptions (such as `S3Exception`) inherit. This exception represents an error response from an AWS service. For example, if you try to terminate an Amazon EC2 instance that doesn't exist, Amazon EC2 returns an error response. The error response details are included in the `AwsServiceException` that's thrown.

When you encounter an `AwsServiceException`, this means that your request was successfully sent to the AWS service but could not be processed. This can be because of errors in the request's parameters or because of issues on the service side.

### Client exceptions

`ClientException` indicates that a problem occurred inside the AWS SDK for Kotlin client code, either while trying to send a request to AWS or while trying to parse a response from AWS. A `ClientException` is generally more severe than an `AwsServiceException` and indicates that a

major problem is preventing the client from processing service calls to AWS services. For example, the AWS SDK for Kotlin throws a `ClientException` if it fails to parse a response from a service.

## Error metadata

Every service exception and client exception has the `sdkErrorMetadata` property. This is a typed property bag that can be used to retrieve additional details about the error.

Several predefined extensions exist to the `AwsErrorMetadata` type directly, including but not limited to the following:

- `sdkErrorMetadata.requestId` – the unique request id
- `sdkErrorMetadata.errorMessage` – the human readable message (usually matches the `Exception.message`, but might contain more information if the exception was unknown to the service)
- `sdkErrorMetadata.protocolResponse` – The raw protocol response

The following example demonstrates accessing the error metadata.

```
try {
    s3Client.listBuckets { ... }
} catch (ex: S3Exception) {
    val awsRequestId = ex.sdkErrorMetadata.requestId
    val httpResp = ex.sdkErrorMetadata.protocolResponse as? HttpResponse

    println("requestId was: $awsRequestId")
    println("http status code was: ${httpResp?.status}")
}
```

## Presign requests

You can presign requests for some AWS API operations so that another caller can use the request later without presenting their own credentials.

For example, assume that Alice has access to an Amazon Simple Storage Service (Amazon S3) object and she wants to temporarily share object access with Bob. Alice can generate a presigned `GetObject` request to share with Bob so that he can download the object without requiring access to Alice's credentials.

## Presigning basics

The SDK for Kotlin provides extension methods on service clients to presign requests. All presigned requests require a duration that represents how long the signed request is valid. After the duration ends, the presigned request expires and raises an authentication error if executed.

The following code shows an example that creates a presigned `GetObject` request for Amazon S3. The request is valid for 24 hours after creation.

```
val s3 = S3Client.fromEnvironment()

val unsignedRequest = GetObjectRequest {
    bucket = "foo"
    key = "bar"
}

val presignedRequest = s3.presignGetObject(unsignedRequest, 24.hours)
```

The [presignGetObject](#) extension method returns an [HttpRequest](#) object. The request object contains the presigned URL where the operation can be invoked. Another caller can use the URL (or the entire request) in a different codebase or programming language environment.

After creating the presigned request, use an HTTP client to invoke a request. The API to invoke an HTTP GET request depends on the HTTP client. The following example uses the Kotlin [URL.readText](#) method.

```
val objectContents = URL(presignedRequest.url.toString()).readText()
println(objectContents)
```

## Advanced presigning configuration

In the SDK, each method that can presign requests has an overload that you can use to provide advanced configuration options, such as a specific signer implementation or detailed signing parameters.

The following example shows an Amazon S3 `GetObject` request that uses the CRT signer variant and specifies a future signing date.

```
val s3 = S3Client.fromEnvironment()
```

```
val unsignedRequest = GetObjectRequest {
    bucket = "foo"
    key = "bar"
}

val presignedRequest = s3.presignGetObject(unsignedRequest, signer = CrtAwsSigner) {
    signingDate = Instant.now() + 24.hours
    expiresAfter = 8.hours
}
```

The returned presigned request is forward-dated 24 hours and is not valid before then. It expires 8 hours after that.

## Presigning POST and PUT requests

Many operations that are presignable require only a URL and must be executed as HTTP GET requests. Some operations, however, take a body and must be executed as an HTTP POST or HTTP PUT request along with headers in some cases. Presigning these requests is identical to presigning GET requests, but invoking the presigned request is more complicated.

Here is an example of presigning an S3 PutObject request:

```
val s3 = S3Client.fromEnvironment()

val unsignedRequest = PutObjectRequest {
    bucket = "foo"
    key = "bar"
}

val presignedRequest = s3.presignPutObject(unsignedRequest, 24.hours)
```

The returned `HttpRequest` has a method value of `HttpMethod.PUT` and includes a URL and headers that must be included in the future invocation of the HTTP request. You can pass this request to a caller that can execute it in a different codebase or programming language environment.

After creating the presigned POST or PUT request, use an HTTP client to invoke a request. The API to invoke a POST or PUT request URL depends on the HTTP client used. The following example uses an [OkHttp HTTP client](#) and includes a body that contains `Hello world`.

```
val putRequest = Request
```



```

    .Builder()
    .url(presignedRequest.url.toString())
    .apply {
        presignedRequest.headers.forEach { key, values ->
            header(key, values.joinToString(", "))
        }
    }
    .put("Hello world".toRequestBody())
    .build()

```

```
val response = okHttp.newCall(putRequest).execute()
```

## Operations the SDK can presign

The SDK for Kotlin currently supports presigning the following API operations that need to be called with the associated HTTP method.

| AWS service                | Operation         | SDK extension method                     | Use HTTP method |
|----------------------------|-------------------|------------------------------------------|-----------------|
| Amazon S3                  | GetObject         | <a href="#">presignGetObject</a>         | HTTP GET        |
| Amazon S3                  | PutObject         | <a href="#">presignPutObject</a>         | HTTP PUT        |
| Amazon S3                  | UploadPart        | <a href="#">presignUploadPart</a>        | HTTP PUT        |
| AWS Security Token Service | GetCallerIdentity | <a href="#">presignGetCallerIdentity</a> | HTTP POST       |
| Amazon Polly               | SynthesizeSpeech  | <a href="#">presignSynthesizeSpeech</a>  | HTTP POST       |

# Work with AWS services using the AWS SDK for Kotlin

This chapter contains information about how to work with AWS services by using the SDK for Kotlin.

## Contents

- [Work with Amazon S3 using the AWS SDK for Kotlin](#)
  - [Amazon S3 checksums with AWS SDK for Kotlin](#)
    - [Upload an object](#)
      - [Use a pre-calculated checksum value](#)
      - [Multipart uploads](#)
    - [Download an object](#)
      - [Asynchronous validation](#)
  - [Work with Amazon S3 Multi-Region Access Points by using the SDK for Kotlin](#)
    - [Work with Multi-Region Access Points](#)
    - [Work with objects and Multi-Region Access Points](#)

## Work with Amazon S3 using the AWS SDK for Kotlin

Your main interface to the Amazon Simple Storage Service for the Kotlin SDK is the [S3Client](#). Use the `S3Client` like other service clients in the SDK to make [requests](#) to Amazon S3.

Resources to help you use the Kotlin SDK with S3 are:

- the Kotlin SDK [API reference for S3](#).
- the [S3 service User Guide](#) and [service API reference](#).

The following topics present guided code examples for select Kotlin SDK APIs that work with S3.

## Topics

- [Amazon S3 checksums with AWS SDK for Kotlin](#)
- [Work with Amazon S3 Multi-Region Access Points by using the SDK for Kotlin](#)

## Amazon S3 checksums with AWS SDK for Kotlin

Amazon Simple Storage Service (Amazon S3) provides the ability to specify a checksum when you upload an object. When you specify a checksum, it is stored with the object and can be validated when the object is downloaded.

Checksums provide an additional layer of data integrity when you transfer files. With checksums, you can verify data consistency by confirming that the received file matches the original file. For more information about checksums with Amazon S3, see the [Amazon Simple Storage Service User Guide](#).

Amazon S3 currently supports four checksum algorithms: SHA-1, SHA-256, CRC-32, and CRC-32C. You have the flexibility to choose the algorithm that best fits your needs and let the SDK calculate the checksum. Alternatively, you can specify their own pre-computed checksum value by using one of the four supported algorithms.

We discuss checksums in two request phases: uploading an object and downloading an object.

### Upload an object

You upload objects to Amazon S3 with the SDK for Kotlin by using the [putObject](#) function with a request parameter. The request data type provides the `checksumAlgorithm` property to enable checksum computation. Valid values for the algorithm are CRC32, CRC32C, SHA1, and SHA256.

The following code snippet shows a request to upload an object with a CRC-32 checksum. When the SDK sends the request, it calculates the CRC-32 checksum and uploads the object. Amazon S3 stores the checksum with the object.

```
val request = PutObjectRequest {  
    bucket = "bucket"  
    key = "key"  
    checksumAlgorithm = ChecksumAlgorithm.CRC32  
}
```

If the checksum that the SDK calculates doesn't match the checksum that Amazon S3 calculates when it receives the request, an error is returned.

### Use a pre-calculated checksum value

A pre-calculated checksum value provided with the request disables automatic computation by the SDK and uses the provided value instead.

The following example shows a request with a pre-calculated SHA-256 checksum.

```
val request = PutObjectRequest {
    bucket = "bucket"
    key = "key"
    body = ByteStream.fromFile(File("file_to_upload.txt"))
    checksumAlgorithm = ChecksumAlgorithm.SHA256
    checksumSha256 = "cfb6d06da6e6f51c22ae3e549e33959dbb754db75a93665b8b579605464ce299"
}
```

If Amazon S3 determines the checksum value is incorrect for the specified algorithm, the service returns an error response.

## Multipart uploads

You can also use checksums with multipart uploads. You must specify the checksum algorithm in the `CreateMultipartUpload` request and in each `UploadPart` request. As a final step, you must specify the checksum of each part in the `CompleteMultipartUpload`. The following example shows how to create a multipart upload with the checksum algorithm specified.

```
val multipartUpload = s3.createMultipartUpload {
    bucket = "bucket"
    key = "key"
    checksumAlgorithm = ChecksumAlgorithm.Sha1
}

val partFilesToUpload = listOf("data-part1.csv", "data-part2.csv", "data-part3.csv")

val completedParts = partFilesToUpload
    .mapIndexed { i, fileName ->
        val uploadPartResponse = s3.uploadPart {
            bucket = "bucket"
            key = "key"
            body = ByteStream.fromFile(File(fileName))
            uploadId = multipartUpload.uploadId
            partNumber = i + 1 // Part numbers begin at 1.
            checksumAlgorithm = ChecksumAlgorithm.Sha1
        }

        CompletedPart {
            eTag = uploadPartResponse.eTag
            partNumber = i + 1
            checksumSha1 = uploadPartResponse.checksumSha1
        }
    }
```

```
    }  
  }  
  
  s3.completeMultipartUpload {  
    uploadId = multipartUpload.uploadId  
    bucket = "bucket"  
    key = "key"  
    multipartUpload {  
      parts = completedParts  
    }  
  }  
}
```

## Download an object

When you use the [getObject](#) method to download an object, the SDK automatically validates the checksum when the `checksumMode` property of the builder for the `GetObjectRequest` is set to `ChecksumMode.Enabled`.

The request in the following snippet directs the SDK to validate the checksum in the response by calculating the checksum and comparing the values.

```
val request = GetObjectRequest {  
  bucket = "bucket"  
  key = "key"  
  checksumMode = ChecksumMode.Enabled  
}
```

If the object wasn't uploaded with a checksum, no validation takes place.

An object in Amazon S3 can have multiple checksums, but only one checksum is validated on download. The following precedence—based on the efficiency of the checksum algorithm—determines which checksum the SDK validates:

1. CRC-32C
2. CRC-32
3. SHA-1
4. SHA-256

For example, if a response contains both CRC-32 and SHA-256 checksums, only the CRC-32 checksum is validated.

## Asynchronous validation

Because the SDK for Kotlin uses streaming responses when it downloads an object from Amazon S3, the checksum will be calculated as you consume the object. Therefore, you *must* consume the object so that the checksum is validated.

The following example shows how to validate a checksum by fully consuming the response.

```
val request = GetObjectRequest {
    bucket = "bucket"
    key = "key"
    checksumMode = checksumMode.Enabled
}

val response = s3Client.getObject(request) {
    println(response.body?.decodeToString()) // Fully consume the object.
    // The checksum is valid.
}
```

By contrast, the code in the following example doesn't use the object in any way, so the checksum is not validated.

```
s3Client.getObject(request) {
    println("Got the object.")
}
```

If the checksum calculated by the SDK does not match the expected checksum sent with the response, the SDK throws a `ChecksumMismatchException`.

## Work with Amazon S3 Multi-Region Access Points by using the SDK for Kotlin

Amazon S3 Multi-Region Access Points provide a global endpoint that applications can use to fulfill requests from Amazon S3 buckets located in multiple AWS Regions. You can use Multi-Region Access Points to build multi-Region applications with the same architecture used in a single Region, and then run those applications anywhere in the world.

The Amazon S3 User Guide contains more background information about [Multi-Region Access Points](#).

## Work with Multi-Region Access Points

To create a Multi-Region Access Point, start by specifying one bucket in each AWS Region that you want to serve requests. The following snippet creates two buckets.

### Create buckets

The following function creates two buckets to work with the Multi-Region Access Point. One bucket is in Region `us-east-1` and the other is in Region `us-west-1`.

The creation of the S3 client that passed in as the first argument is shown in the first example under [the section called "Work with objects"](#).

```
suspend fun setUpTwoBuckets(
    s3: S3Client,
    bucketName1: String,
    bucketName2: String,
) {
    println("Create two buckets in different regions.")
    // The shared aws config file configures the default Region to be us-
east-1.
    s3.createBucket(
        CreateBucketRequest {
            bucket = bucketName1
        },
    )
    s3.waitUntilBucketExists {
        bucket = bucketName1
    }
    println(" Bucket [$bucketName1] created.")

    // Override the S3Client to work with us-west-1 for the second bucket.
    s3.withConfig {
        region = "us-west-1"
    }.use { s3West ->
        s3West.createBucket(
            CreateBucketRequest {
                bucket = bucketName2
                createBucketConfiguration = CreateBucketConfiguration {
                    locationConstraint = BucketLocationConstraint.UsWest1
                }
            },
        )
    }
}
```

```
s3West.waitUntilBucketExists {
    bucket = bucketName2
}
println(" Bucket [$bucketName2] created.")
}
}
```

You use the Kotlin SDK's [S3 control client](#) to create, delete, and get information about Multi-Region Access Points.

Add a dependency on the S3 control artifact as shown in the following snippet.

```
...
implementation("aws.sdk.kotlin:s3control:1.0.52")
...
```

The previous snippet shows the use of version `1.0.52`. Replace `1.0.52` with the [latest version](#) or the version that you want to use.

Configure the S3 control client to work with AWS Region `us-west-2` as shown in the following code. All S3 control client operations must target the `us-west-2` region.

```
suspend fun createS3ControlClient(): S3ControlClient {
    // Configure your S3ControlClient to send requests to US West (Oregon).
    val s3Control = S3ControlClient.fromEnvironment {
        region = "us-west-2"
    }
    return s3Control
}
```

Use the S3 control client to create a Multi-Region Access Point by specifying the bucket names (created previously) as shown in the following code.

```
suspend fun createMrap(
    s3Control: S3ControlClient,
    accountIdParam: String,
    bucketName1: String,
    bucketName2: String,
    mrapName: String,
): String {
    println("Creating MRAP ...")
```



```

val createMrapResponse: CreateMultiRegionAccessPointResponse =
    s3Control.createMultiRegionAccessPoint {
        accountId = accountIdParam
        clientToken = UUID.randomUUID().toString()
        details {
            name = mrapName
            regions = listOf(
                Region {
                    bucket = bucketName1
                },
                Region {
                    bucket = bucketName2
                },
            )
        }
    }
val requestToken: String? = createMrapResponse.requestTokenArn

// Use the request token to check for the status of the
CreateMultiRegionAccessPoint operation.
if (requestToken != null) {
    waitForSucceededStatus(s3Control, requestToken, accountIdParam)
    println("MRAP created")
}

val getMrapResponse =
    s3Control.getMultiRegionAccessPoint(
        input = GetMultiRegionAccessPointRequest {
            accountId = accountIdParam
            name = mrapName
        },
    )
val mrapAlias = getMrapResponse.accessPoint?.alias
return "arn:aws:s3:::$accountIdParam:accesspoint/$mrpAlias"
}

```

Because the creation of a Multi-Region Access Point is an asynchronous operation, you use the token that you receive from the immediate response to check on the status of the creation process. After the status check returns a success message, you can use the `GetMultiRegionAccessPoint` operation to get the Multi-Region Access Point's alias. The alias is the last component of the ARN, which you need for object-level operations.

## Use token to check status

Use the `DescribeMultiRegionAccessPointOperation` to check the status of the last operation. After the `requestStatus` value becomes "SUCCEEDED", you can work with the Multi-Region Access Point.

```
suspend fun waitForSucceededStatus(
    s3Control: S3ControlClient,
    requestToken: String,
    accountIdParam: String,
    timeBetweenChecks: Duration = 1.minutes,
) {
    var describeResponse: DescribeMultiRegionAccessPointOperationResponse
    describeResponse = s3Control.describeMultiRegionAccessPointOperation(
        input = DescribeMultiRegionAccessPointOperationRequest {
            accountId = accountIdParam
            requestTokenArn = requestToken
        },
    )

    var status: String? = describeResponse.asyncOperation?.requestStatus
    while (status != "SUCCEEDED") {
        delay(timeBetweenChecks)
        describeResponse = s3Control.describeMultiRegionAccessPointOperation(
            input = DescribeMultiRegionAccessPointOperationRequest {
                accountId = accountIdParam
                requestTokenArn = requestToken
            },
        )
        status = describeResponse.asyncOperation?.requestStatus
        println(status)
    }
}
```

## Work with objects and Multi-Region Access Points

You use the [S3 client](#) to work with objects in Multi-Region Access Points. Many of the operations that you use on objects in buckets you can use on Multi-Region Access Points. For more information and a full list of operations, see [Multi-Region Access Point compatibility with S3 operations](#).

Operations with Multi-Region Access Points are signed with the Asymmetric Sigv4 (Sigv4a) signing algorithm. Support for Sigv4a in the AWS SDK for Kotlin currently requires signing with the CRT signer which is a separate dependency. To configure support for Sigv4a, add the following dependencies to your project.

```
...
implementation("aws.smithy.kotlin:aws-signing-crt:1.0.10")
implementation("aws.smithy.kotlin:http-auth-aws:1.0.10")
implementation("aws.sdk.kotlin:s3:1.0.52")
...
```

The previous snippet shows the use of version `1.0.10`. Replace `1.0.10` with the [latest version](#) or the version you want to use.

After you add the dependencies, configure the S3 client to use the Sigv4a signing algorithm as shown in the following code.

```
suspend fun createS3Client(): S3Client {
    // Configure your S3Client to use the Asymmetric Sigv4 (Sigv4a) signing
    algorithm.
    val sigV4AScheme = SigV4AsymmetricAuthScheme(CrtAwsSigner)
    val s3 = S3Client.fromEnvironment {
        authSchemes = listOf(sigV4AScheme)
    }
    return s3
}
```

After you configure the S3 client, operations that S3 supports for Multi-Region Access Points work the same. The only difference is that the bucket parameter must be the ARN of the Multi-Region Access Point. You can get the ARN from the Amazon S3 console or programmatically as shown previously in the `createMrap` function that returns an ARN.

The following code example shows the ARN used in a `GetObject` operation.

```
suspend fun getObjectFromMrap(
    s3: S3Client,
    mrapArn: String,
    keyName: String,
): String? {
    val request = GetObjectRequest {
```

```
        bucket = mrapArn // Use the ARN instead of the bucket name for object
operations.
        key = keyName
    }

    var stringObj: String? = null
    s3.getObject(request) { resp ->
        stringObj = resp.body?.decodeToString()
        if (stringObj != null) {
            println("Successfully read $keyName from $mrapArn")
        }
    }
    return stringObj
}
```

# SDK for Kotlin code examples

The code examples in this topic show you how to use the AWS SDK for Kotlin with AWS.

*Basics* are code examples that show you how to perform the essential operations within a service.

*Actions* are code excerpts from larger programs and must be run in context. While actions show you how to call individual service functions, you can see actions in context in their related scenarios.

*Scenarios* are code examples that show you how to accomplish specific tasks by calling multiple functions within a service or combined with other AWS services.

## Services

- [API Gateway examples using SDK for Kotlin](#)
- [Aurora examples using SDK for Kotlin](#)
- [Auto Scaling examples using SDK for Kotlin](#)
- [Amazon Bedrock examples using SDK for Kotlin](#)
- [CloudWatch examples using SDK for Kotlin](#)
- [CloudWatch Logs examples using SDK for Kotlin](#)
- [Amazon Cognito Identity Provider examples using SDK for Kotlin](#)
- [Amazon Comprehend examples using SDK for Kotlin](#)
- [DynamoDB examples using SDK for Kotlin](#)
- [Amazon EC2 examples using SDK for Kotlin](#)
- [Amazon ECR examples using SDK for Kotlin](#)
- [OpenSearch Service examples using SDK for Kotlin](#)
- [EventBridge examples using SDK for Kotlin](#)
- [AWS Glue examples using SDK for Kotlin](#)
- [IAM examples using SDK for Kotlin](#)
- [AWS IoT examples using SDK for Kotlin](#)
- [AWS IoT data examples using SDK for Kotlin](#)
- [Amazon Keyspaces examples using SDK for Kotlin](#)

- [AWS KMS examples using SDK for Kotlin](#)
- [Lambda examples using SDK for Kotlin](#)
- [MediaConvert examples using SDK for Kotlin](#)
- [Amazon Pinpoint examples using SDK for Kotlin](#)
- [Amazon RDS examples using SDK for Kotlin](#)
- [Amazon RDS Data Service examples using SDK for Kotlin](#)
- [Amazon Redshift examples using SDK for Kotlin](#)
- [Amazon Rekognition examples using SDK for Kotlin](#)
- [Route 53 domain registration examples using SDK for Kotlin](#)
- [Amazon S3 examples using SDK for Kotlin](#)
- [SageMaker examples using SDK for Kotlin](#)
- [Secrets Manager examples using SDK for Kotlin](#)
- [Amazon SES examples using SDK for Kotlin](#)
- [Amazon SNS examples using SDK for Kotlin](#)
- [Amazon SQS examples using SDK for Kotlin](#)
- [Step Functions examples using SDK for Kotlin](#)
- [AWS Support examples using SDK for Kotlin](#)
- [Amazon Translate examples using SDK for Kotlin](#)

## API Gateway examples using SDK for Kotlin

The following code examples show you how to perform actions and implement common scenarios by using the AWS SDK for Kotlin with API Gateway.

*Scenarios* are code examples that show you how to accomplish specific tasks by calling multiple functions within a service or combined with other AWS services.

Each example includes a link to the complete source code, where you can find instructions on how to set up and run the code in context.

### Topics

- [Scenarios](#)

## Scenarios

### Create a serverless application to manage photos

The following code example shows how to create a serverless application that lets users manage photos using labels.

#### SDK for Kotlin

Shows how to develop a photo asset management application that detects labels in images using Amazon Rekognition and stores them for later retrieval.

For complete source code and instructions on how to set up and run, see the full example on [GitHub](#).

For a deep dive into the origin of this example see the post on [AWS Community](#).

#### Services used in this example

- API Gateway
- DynamoDB
- Lambda
- Amazon Rekognition
- Amazon S3
- Amazon SNS

## Aurora examples using SDK for Kotlin

The following code examples show you how to perform actions and implement common scenarios by using the AWS SDK for Kotlin with Aurora.

*Basics* are code examples that show you how to perform the essential operations within a service.

*Actions* are code excerpts from larger programs and must be run in context. While actions show you how to call individual service functions, you can see actions in context in their related scenarios.

*Scenarios* are code examples that show you how to accomplish specific tasks by calling multiple functions within a service or combined with other AWS services.

Each example includes a link to the complete source code, where you can find instructions on how to set up and run the code in context.

## Topics

- [Basics](#)
- [Actions](#)
- [Scenarios](#)

## Basics

### Learn the basics

The following code example shows how to:

- Create a custom Aurora DB cluster parameter group and set parameter values.
- Create a DB cluster that uses the parameter group.
- Create a DB instance that contains a database.
- Take a snapshot of the DB cluster, then clean up resources.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
/**
```

```
Before running this Kotlin code example, set up your development environment, including your credentials.
```

```
For more information, see the following documentation topic:
```

```
https://docs.aws.amazon.com/sdk-for-kotlin/latest/developer-guide/setup.html
```

```
This example requires an AWS Secrets Manager secret that contains the database credentials. If you do not create a secret, this example will not work. For more details, see:
```



[https://docs.aws.amazon.com/secretsmanager/latest/userguide/integrating\\_how-services-use-secrets\\_RS.html](https://docs.aws.amazon.com/secretsmanager/latest/userguide/integrating_how-services-use-secrets_RS.html)

This Kotlin example performs the following tasks:

1. Returns a list of the available DB engines.
2. Creates a custom DB parameter group.
3. Gets the parameter groups.
4. Gets the parameters in the group.
5. Modifies the `auto_increment_increment` parameter.
6. Displays the updated parameter value.
7. Gets a list of allowed engine versions.
8. Creates an Aurora DB cluster database.
9. Waits for DB instance to be ready.
10. Gets a list of instance classes available for the selected engine.
11. Creates a database instance in the cluster.
12. Waits for the database instance in the cluster to be ready.
13. Creates a snapshot.
14. Waits for DB snapshot to be ready.
15. Deletes the DB instance.
16. Deletes the DB cluster.
17. Deletes the DB cluster group.

```
*/
```

```
var slTime: Long = 20
```

```
suspend fun main(args: Array<String>) {
```

```
    val usage = """
```

```
        Usage:
```

```
            <dbClusterGroupName> <dbParameterGroupFamily>
```

```
<dbInstanceClusterIdentifier> <dbName> <dbSnapshotIdentifier> <secretName>
```

```
        Where:
```

```
            dbClusterGroupName - The database group name.
```

```
            dbParameterGroupFamily - The database parameter group name.
```

```
            dbInstanceClusterIdentifier - The database instance identifier.
```

```
            dbName - The database name.
```

```
            dbSnapshotIdentifier - The snapshot identifier.
```

```
            secretName - The name of the AWS Secrets Manager secret that contains  
the database credentials.
```

```
        """
```

```
        if (args.size != 7) {
```

```
            println(usage)
```

```
            exitProcess(1)
```

```
}

val dbClusterGroupName = args[0]
val dbParameterGroupFamily = args[1]
val dbInstanceClusterIdentifier = args[2]
val dbInstanceIdentifier = args[3]
val dbName = args[4]
val dbSnapshotIdentifier = args[5]
val secretName = args[6]

val gson = Gson()
val user = gson.fromJson(getSecretValues(secretName).toString(),
User::class.java)
val username = user.username
val userPassword = user.password

println("1. Return a list of the available DB engines")
describeAuroraDBEngines()

println("2. Create a custom parameter group")
createDBClusterParameterGroup(dbClusterGroupName, dbParameterGroupFamily)

println("3. Get the parameter group")
describeDbClusterParameterGroups(dbClusterGroupName)

println("4. Get the parameters in the group")
describeDbClusterParameters(dbClusterGroupName, 0)

println("5. Modify the auto_increment_offset parameter")
modifyDBClusterParas(dbClusterGroupName)

println("6. Display the updated parameter value")
describeDbClusterParameters(dbClusterGroupName, -1)

println("7. Get a list of allowed engine versions")
getAllowedClusterEngines(dbParameterGroupFamily)

println("8. Create an Aurora DB cluster database")
val arnClusterVal = createDBCluster(dbClusterGroupName, dbName,
dbInstanceClusterIdentifier, username, userPassword)
println("The ARN of the cluster is $arnClusterVal")

println("9. Wait for DB instance to be ready")
waitForClusterInstanceReady(dbInstanceClusterIdentifier)
```

```
println("10. Get a list of instance classes available for the selected engine")
val instanceClass = getListInstanceClasses()

println("11. Create a database instance in the cluster.")
val clusterDBARN = createDBInstanceCluster(dbInstanceIdentifier,
dbInstanceClusterIdentifier, instanceClass)
println("The ARN of the database is $clusterDBARN")

println("12. Wait for DB instance to be ready")
waitDBAuroraInstanceReady(dbInstanceIdentifier)

println("13. Create a snapshot")
createDBClusterSnapshot(dbInstanceClusterIdentifier, dbSnapshotIdentifier)

println("14. Wait for DB snapshot to be ready")
waitSnapshotReady(dbSnapshotIdentifier, dbInstanceClusterIdentifier)

println("15. Delete the DB instance")
deleteDBInstance(dbInstanceIdentifier)

println("16. Delete the DB cluster")
deleteCluster(dbInstanceClusterIdentifier)

println("17. Delete the DB cluster group")
if (clusterDBARN != null) {
    deleteDBClusterGroup(dbClusterGroupName, clusterDBARN)
}
println("The Scenario has successfully completed.")
}

@Throws(InterruptedExcetion::class)
suspend fun deleteDBClusterGroup(
    dbClusterGroupName: String,
    clusterDBARN: String,
) {
    var isDataDel = false
    var didFind: Boolean
    var instanceARN: String

    RdsClient { region = "us-west-2" }.use { rdsClient ->
        // Make sure that the database has been deleted.
        while (!isDataDel) {
            val response = rdsClient.describeDbInstances()
```

```

        val instanceList = response.dbInstances
        val listSize = instanceList?.size
        isDataDel = false
        didFind = false
        var index = 1
        if (instanceList != null) {
            for (instance in instanceList) {
                instanceARN = instance.dbInstanceArn.toString()
                if (instanceARN.compareTo(clusterDBARN) == 0) {
                    println("$clusterDBARN still exists")
                    didFind = true
                }
                if (index == listSize && !didFind) {
                    // Went through the entire list and did not find the
database ARN.
                    isDataDel = true
                }
                delay(slTime * 1000)
                index++
            }
        }
        val clusterParameterGroupRequest =
            DeleteDbClusterParameterGroupRequest {
                dbClusterParameterGroupName = dbClusterGroupName
            }

        rdsClient.deleteDbClusterParameterGroup(clusterParameterGroupRequest)
        println("$dbClusterGroupName was deleted.")
    }
}

suspend fun deleteCluster(dbInstanceClusterIdentifier: String) {
    val deleteDbClusterRequest =
        DeleteDbClusterRequest {
            dbClusterIdentifier = dbInstanceClusterIdentifier
            skipFinalSnapshot = true
        }

    RdsClient { region = "us-west-2" }.use { rdsClient ->
        rdsClient.deleteDbCluster(deleteDbClusterRequest)
        println("$dbInstanceClusterIdentifier was deleted!")
    }
}
}

```

```
suspend fun deleteDBInstance(dbInstanceIdentifierVal: String) {
    val deleteDbInstanceRequest =
        DeleteDbInstanceRequest {
            dbInstanceIdentifier = dbInstanceIdentifierVal
            deleteAutomatedBackups = true
            skipFinalSnapshot = true
        }

    RdsClient { region = "us-west-2" }.use { rdsClient ->
        val response = rdsClient.deleteDbInstance(deleteDbInstanceRequest)
        print("The status of the database is
        ${response.dbInstance?.dbInstanceStatus}")
    }
}

suspend fun waitSnapshotReady(
    dbSnapshotIdentifier: String?,
    dbInstanceClusterIdentifier: String?,
) {
    var snapshotReady = false
    var snapshotReadyStr: String
    println("Waiting for the snapshot to become available.")

    val snapshotsRequest =
        DescribeDbClusterSnapshotsRequest {
            dbClusterSnapshotIdentifier = dbSnapshotIdentifier
            dbClusterIdentifier = dbInstanceClusterIdentifier
        }

    RdsClient { region = "us-west-2" }.use { rdsClient ->
        while (!snapshotReady) {
            val response = rdsClient.describeDbClusterSnapshots(snapshotsRequest)
            val snapshotList = response.dbClusterSnapshots
            if (snapshotList != null) {
                for (snapshot in snapshotList) {
                    snapshotReadyStr = snapshot.status.toString()
                    if (snapshotReadyStr.contains("available")) {
                        snapshotReady = true
                    } else {
                        println(".")
                        delay(s1Time * 5000)
                    }
                }
            }
        }
    }
}
```

```

        }
    }
}
println("The Snapshot is available!")
}

suspend fun createDBClusterSnapshot(
    dbInstanceClusterIdentifier: String?,
    dbSnapshotIdentifier: String?,
) {
    val snapshotRequest =
        CreateDbClusterSnapshotRequest {
            dbClusterIdentifier = dbInstanceClusterIdentifier
            dbClusterSnapshotIdentifier = dbSnapshotIdentifier
        }

    RdsClient { region = "us-west-2" }.use { rdsClient ->
        val response = rdsClient.createDbClusterSnapshot(snapshotRequest)
        println("The Snapshot ARN is
        ${response.dbClusterSnapshot?.dbClusterSnapshotArn}")
    }
}

suspend fun waitDBAuroraInstanceReady(dbInstanceIdentifierVal: String?) {
    var instanceReady = false
    var instanceReadyStr: String
    println("Waiting for instance to become available.")
    val instanceRequest =
        DescribeDbInstancesRequest {
            dbInstanceIdentifier = dbInstanceIdentifierVal
        }

    var endpoint = ""
    RdsClient { region = "us-west-2" }.use { rdsClient ->
        while (!instanceReady) {
            val response = rdsClient.describeDbInstances(instanceRequest)
            response.dbInstances?.forEach { instance ->
                instanceReadyStr = instance.dbInstanceStatus.toString()
                if (instanceReadyStr.contains("available")) {
                    endpoint = instance.endpoint?.address.toString()
                    instanceReady = true
                } else {
                    print(".")
                    delay(sleepTime * 1000)
                }
            }
        }
    }
}

```

```

        }
    }
}

println("Database instance is available! The connection endpoint is $endpoint")
}

suspend fun createDBInstanceCluster(
    dbInstanceIdentifierVal: String?,
    dbInstanceClusterIdentifierVal: String?,
    instanceClassVal: String?,
): String? {
    val instanceRequest =
        CreateDbInstanceRequest {
            dbInstanceIdentifier = dbInstanceIdentifierVal
            dbClusterIdentifier = dbInstanceClusterIdentifierVal
            engine = "aurora-mysql"
            dbInstanceClass = instanceClassVal
        }

    RdsClient { region = "us-west-2" }.use { rdsClient ->
        val response = rdsClient.createDbInstance(instanceRequest)
        print("The status is ${response.dbInstance?.dbInstanceStatus}")
        return response.dbInstance?.dbInstanceArn
    }
}

suspend fun getListInstanceClasses(): String {
    val optionsRequest =
        DescribeOrderableDbInstanceOptionsRequest {
            engine = "aurora-mysql"
            maxRecords = 20
        }
    var instanceClass = ""
    RdsClient { region = "us-west-2" }.use { rdsClient ->
        val response = rdsClient.describeOrderableDbInstanceOptions(optionsRequest)
        response.orderableDbInstanceOptions?.forEach { instanceOption ->
            instanceClass = instanceOption.dbInstanceClass.toString()
            println("The instance class is ${instanceOption.dbInstanceClass}")
            println("The engine version is ${instanceOption.engineVersion}")
        }
    }
    return instanceClass
}
}

```

```
// Waits until the database instance is available.
suspend fun waitForClusterInstanceReady(dbClusterIdentifierVal: String?) {
    var instanceReady = false
    var instanceReadyStr: String
    println("Waiting for instance to become available.")

    val instanceRequest =
        DescribeDbClustersRequest {
            dbClusterIdentifier = dbClusterIdentifierVal
        }

    RdsClient { region = "us-west-2" }.use { rdsClient ->
        while (!instanceReady) {
            val response = rdsClient.describeDbClusters(instanceRequest)
            response.dbClusters?.forEach { cluster ->
                instanceReadyStr = cluster.status.toString()
                if (instanceReadyStr.contains("available")) {
                    instanceReady = true
                } else {
                    print(".")
                    delay(sleepTime * 1000)
                }
            }
        }
    }
    println("Database cluster is available!")
}

suspend fun createDBCluster(
    dbParameterGroupFamilyVal: String?,
    dbName: String?,
    dbClusterIdentifierVal: String?,
    userName: String?,
    password: String?,
): String? {
    val clusterRequest =
        CreateDbClusterRequest {
            databaseName = dbName
            dbClusterIdentifier = dbClusterIdentifierVal
            dbClusterParameterGroupName = dbParameterGroupFamilyVal
            engine = "aurora-mysql"
            masterUsername = userName
            masterUserPassword = password
        }
}
```



```

    }

    RdsClient { region = "us-west-2" }.use { rdsClient ->
        val response = rdsClient.createDbCluster(clusterRequest)
        return response.dbCluster?.dbClusterArn
    }
}

// Get a list of allowed engine versions.
suspend fun getAllowedClusterEngines(dbParameterGroupFamilyVal: String?) {
    val versionsRequest =
        DescribeDbEngineVersionsRequest {
            dbParameterGroupFamily = dbParameterGroupFamilyVal
            engine = "aurora-mysql"
        }

    RdsClient { region = "us-west-2" }.use { rdsClient ->
        val response = rdsClient.describeDbEngineVersions(versionsRequest)
        response.dbEngineVersions?.forEach { dbEngine ->
            println("The engine version is ${dbEngine.engineVersion}")
            println("The engine description is ${dbEngine.dbEngineDescription}")
        }
    }
}

// Modify the auto_increment_offset parameter.
suspend fun modifyDBClusterParas(dClusterGroupName: String?) {
    val parameter1 =
        Parameter {
            parameterName = "auto_increment_offset"
            applyMethod = ApplyMethod.fromValue("immediate")
            parameterValue = "5"
        }

    val paraList = ArrayList<Parameter>()
    paraList.add(parameter1)
    val groupRequest =
        ModifyDbClusterParameterGroupRequest {
            dbClusterParameterGroupName = dClusterGroupName
            parameters = paraList
        }

    RdsClient { region = "us-west-2" }.use { rdsClient ->
        val response = rdsClient.modifyDbClusterParameterGroup(groupRequest)
    }
}

```

```

        println("The parameter group ${response.dbClusterParameterGroupName} was
successfully modified")
    }
}

suspend fun describeDbClusterParameters(
    dbClusterGroupName: String?,
    flag: Int,
) {
    val dbParameterGroupsRequest: DescribeDbClusterParametersRequest
    dbParameterGroupsRequest =
        if (flag == 0) {
            DescribeDbClusterParametersRequest {
                dbClusterParameterGroupName = dbClusterGroupName
            }
        } else {
            DescribeDbClusterParametersRequest {
                dbClusterParameterGroupName = dbClusterGroupName
                source = "user"
            }
        }

    RdsClient { region = "us-west-2" }.use { rdsClient ->
        val response =
rdsClient.describeDbClusterParameters(dbParameterGroupsRequest)
        response.parameters?.forEach { para ->
            // Only print out information about either auto_increment_offset or
auto_increment_increment.
            val paraName = para.parameterName
            if (paraName != null) {
                if (paraName.compareTo("auto_increment_offset") == 0 ||
paraName.compareTo("auto_increment_increment ") == 0) {
                    println("*** The parameter name is $paraName")
                    println("*** The parameter value is ${para.parameterValue}")
                    println("*** The parameter data type is ${para.dataType}")
                    println("*** The parameter description is ${para.description}")
                    println("*** The parameter allowed values is
${para.allowedValues}")
                }
            }
        }
    }
}
}

```

```
suspend fun describeDbClusterParameterGroups(dbClusterGroupName: String?) {
    val groupsRequest =
        DescribeDbClusterParameterGroupsRequest {
            dbClusterParameterGroupName = dbClusterGroupName
            maxRecords = 20
        }

    RdsClient { region = "us-west-2" }.use { rdsClient ->
        val response = rdsClient.describeDbClusterParameterGroups(groupsRequest)
        response.dbClusterParameterGroups?.forEach { group ->
            println("The group name is ${group.dbClusterParameterGroupName}")
            println("The group ARN is ${group.dbClusterParameterGroupArn}")
        }
    }
}

suspend fun createDBClusterParameterGroup(
    dbClusterGroupNameVal: String?,
    dbParameterGroupFamilyVal: String?,
) {
    val groupRequest =
        CreateDbClusterParameterGroupRequest {
            dbClusterParameterGroupName = dbClusterGroupNameVal
            dbParameterGroupFamily = dbParameterGroupFamilyVal
            description = "Created by using the AWS SDK for Kotlin"
        }

    RdsClient { region = "us-west-2" }.use { rdsClient ->
        val response = rdsClient.createDbClusterParameterGroup(groupRequest)
        println("The group name is
${response.dbClusterParameterGroup?.dbClusterParameterGroupName}")
    }
}

suspend fun describeAuroraDBEngines() {
    val engineVersionsRequest =
        DescribeDbEngineVersionsRequest {
            engine = "aurora-mysql"
            defaultOnly = true
            maxRecords = 20
        }

    RdsClient { region = "us-west-2" }.use { rdsClient ->
        val response = rdsClient.describeDbEngineVersions(engineVersionsRequest)
    }
}
```

```
        response.dbEngineVersions?.forEach { engine0b ->
            println("The name of the DB parameter group family for the database
engine is ${engine0b.dbParameterGroupFamily}")
            println("The name of the database engine ${engine0b.engine}")
            println("The version number of the database engine
${engine0b.engineVersion}")
        }
    }
}
```

- For API details, see the following topics in *AWS SDK for Kotlin API reference*.

- [CreateDBCluster](#)
- [CreateDBClusterParameterGroup](#)
- [CreateDBClusterSnapshot](#)
- [CreateDBInstance](#)
- [DeleteDBCluster](#)
- [DeleteDBClusterParameterGroup](#)
- [DeleteDBInstance](#)
- [DescribeDBClusterParameterGroups](#)
- [DescribeDBClusterParameters](#)
- [DescribeDBClusterSnapshots](#)
- [DescribeDBClusters](#)
- [DescribeDBEngineVersions](#)
- [DescribeDBInstances](#)
- [DescribeOrderableDBInstanceOptions](#)
- [ModifyDBClusterParameterGroup](#)

## Actions

### CreateDBCluster

The following code example shows how to use CreateDBCluster.

## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun createDBCluster(
    dbParameterGroupFamilyVal: String?,
    dbName: String?,
    dbClusterIdentifierVal: String?,
    userName: String?,
    password: String?,
): String? {
    val clusterRequest =
        CreateDbClusterRequest {
            databaseName = dbName
            dbClusterIdentifier = dbClusterIdentifierVal
            dbClusterParameterGroupName = dbParameterGroupFamilyVal
            engine = "aurora-mysql"
            masterUsername = userName
            masterUserPassword = password
        }

    RdsClient { region = "us-west-2" }.use { rdsClient ->
        val response = rdsClient.createDbCluster(clusterRequest)
        return response.dbCluster?.dbClusterArn
    }
}
```

- For API details, see [CreateDBCluster](#) in *AWS SDK for Kotlin API reference*.

## CreateDBClusterParameterGroup

The following code example shows how to use `CreateDBClusterParameterGroup`.

## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun createDBClusterParameterGroup(
    dbClusterGroupNameVal: String?,
    dbParameterGroupFamilyVal: String?,
) {
    val groupRequest =
        CreateDbClusterParameterGroupRequest {
            dbClusterParameterGroupName = dbClusterGroupNameVal
            dbParameterGroupFamily = dbParameterGroupFamilyVal
            description = "Created by using the AWS SDK for Kotlin"
        }

    RdsClient { region = "us-west-2" }.use { rdsClient ->
        val response = rdsClient.createDbClusterParameterGroup(groupRequest)
        println("The group name is
    ${response.dbClusterParameterGroup?.dbClusterParameterGroupName}")
    }
}
```

- For API details, see [CreateDBClusterParameterGroup](#) in *AWS SDK for Kotlin API reference*.

## CreateDBClusterSnapshot

The following code example shows how to use `CreateDBClusterSnapshot`.

## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun createDBClusterSnapshot(
    dbInstanceClusterIdentifier: String?,
    dbSnapshotIdentifier: String?,
) {
    val snapshotRequest =
        CreateDbClusterSnapshotRequest {
            dbClusterIdentifier = dbInstanceClusterIdentifier
            dbClusterSnapshotIdentifier = dbSnapshotIdentifier
        }

    RdsClient { region = "us-west-2" }.use { rdsClient ->
        val response = rdsClient.createDbClusterSnapshot(snapshotRequest)
        println("The Snapshot ARN is
    ${response.dbClusterSnapshot?.dbClusterSnapshotArn}")
    }
}
```

- For API details, see [CreateDBClusterSnapshot](#) in *AWS SDK for Kotlin API reference*.

## CreateDBInstance

The following code example shows how to use CreateDBInstance.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun createDBInstanceCluster(
    dbInstanceIdentifierVal: String?,
    dbInstanceClusterIdentifierVal: String?,
    instanceClassVal: String?,
): String? {
    val instanceRequest =
        CreateDbInstanceRequest {
            dbInstanceIdentifier = dbInstanceIdentifierVal
            dbClusterIdentifier = dbInstanceClusterIdentifierVal
        }
}
```

```
        engine = "aurora-mysql"
        dbInstanceClass = instanceClassVal
    }

    RdsClient { region = "us-west-2" }.use { rdsClient ->
        val response = rdsClient.createDbInstance(instanceRequest)
        print("The status is ${response.dbInstance?.dbInstanceStatus}")
        return response.dbInstance?.dbInstanceArn
    }
}
```

- For API details, see [CreateDBInstance](#) in *AWS SDK for Kotlin API reference*.

## DeleteDBCluster

The following code example shows how to use DeleteDBCluster.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun deleteCluster(dbInstanceClusterIdentifier: String) {
    val deleteDbClusterRequest =
        DeleteDbClusterRequest {
            dbClusterIdentifier = dbInstanceClusterIdentifier
            skipFinalSnapshot = true
        }

    RdsClient { region = "us-west-2" }.use { rdsClient ->
        rdsClient.deleteDbCluster(deleteDbClusterRequest)
        println("$dbInstanceClusterIdentifier was deleted!")
    }
}
```

- For API details, see [DeleteDBCluster](#) in *AWS SDK for Kotlin API reference*.



## DeleteDBClusterParameterGroup

The following code example shows how to use DeleteDBClusterParameterGroup.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
@Throws(InterruptedExcetion::class)
suspend fun deleteDBClusterGroup(
    dbClusterGroupName: String,
    clusterDBARN: String,
) {
    var isDataDel = false
    var didFind: Boolean
    var instanceARN: String

    RdsClient { region = "us-west-2" }.use { rdsClient ->
        // Make sure that the database has been deleted.
        while (!isDataDel) {
            val response = rdsClient.describeDbInstances()
            val instanceList = response.dbInstances
            val listSize = instanceList?.size
            isDataDel = false
            didFind = false
            var index = 1
            if (instanceList != null) {
                for (instance in instanceList) {
                    instanceARN = instance.dbInstanceArn.toString()
                    if (instanceARN.compareTo(clusterDBARN) == 0) {
                        println("$clusterDBARN still exists")
                        didFind = true
                    }
                }
                if (index == listSize && !didFind) {
                    // Went through the entire list and did not find the
                    database ARN.

                    isDataDel = true
                }
            }
            delay(slTime * 1000)
        }
    }
}
```

```

        index++
    }
}
}
val clusterParameterGroupRequest =
    DeleteDbClusterParameterGroupRequest {
        dbClusterParameterGroupName = dbClusterGroupName
    }

rdsClient.deleteDbClusterParameterGroup(clusterParameterGroupRequest)
println("$dbClusterGroupName was deleted.")
}
}

```

- For API details, see [DeleteDBClusterParameterGroup](#) in *AWS SDK for Kotlin API reference*.

## DeleteDBInstance

The following code example shows how to use DeleteDBInstance.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```

suspend fun deleteDBInstance(dbInstanceIdentifierVal: String) {
    val deleteDbInstanceRequest =
        DeleteDbInstanceRequest {
            dbInstanceIdentifier = dbInstanceIdentifierVal
            deleteAutomatedBackups = true
            skipFinalSnapshot = true
        }

    RdsClient { region = "us-west-2" }.use { rdsClient ->
        val response = rdsClient.deleteDbInstance(deleteDbInstanceRequest)
        print("The status of the database is
        ${response.dbInstance?.dbInstanceStatus}")
    }
}

```

```
}  
}
```

- For API details, see [DeleteDBInstance](#) in *AWS SDK for Kotlin API reference*.

## DescribeDBClusterParameterGroups

The following code example shows how to use `DescribeDBClusterParameterGroups`.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).


```
suspend fun describeDbClusterParameterGroups(dbClusterGroupName: String?) {  
    val groupsRequest =  
        DescribeDbClusterParameterGroupsRequest {  
            dbClusterParameterGroupName = dbClusterGroupName  
            maxRecords = 20  
        }  
  
    RdsClient { region = "us-west-2" }.use { rdsClient ->  
        val response = rdsClient.describeDbClusterParameterGroups(groupsRequest)  
        response.dbClusterParameterGroups?.forEach { group ->  
            println("The group name is ${group.dbClusterParameterGroupName}")  
            println("The group ARN is ${group.dbClusterParameterGroupArn}")  
        }  
    }  
}
```

- For API details, see [DescribeDBClusterParameterGroups](#) in *AWS SDK for Kotlin API reference*.

## DescribeDBClusterParameters

The following code example shows how to use `DescribeDBClusterParameters`.

## SDK for Kotlin

 **Note**

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun describeDbClusterParameters(
    dbClusterGroupName: String?,
    flag: Int,
) {
    val dbParameterGroupsRequest: DescribeDbClusterParametersRequest
    dbParameterGroupsRequest =
        if (flag == 0) {
            DescribeDbClusterParametersRequest {
                dbClusterParameterGroupName = dbClusterGroupName
            }
        } else {
            DescribeDbClusterParametersRequest {
                dbClusterParameterGroupName = dbClusterGroupName
                source = "user"
            }
        }

    RdsClient { region = "us-west-2" }.use { rdsClient ->
        val response =
            rdsClient.describeDbClusterParameters(dbParameterGroupsRequest)
        response.parameters?.forEach { para ->
            // Only print out information about either auto_increment_offset or
            auto_increment_increment.
            val paraName = para.parameterName
            if (paraName != null) {
                if (paraName.compareTo("auto_increment_offset") == 0 ||
                    paraName.compareTo("auto_increment_increment ") == 0) {
                    println("**** The parameter name is $paraName")
                    println("**** The parameter value is ${para.parameterValue}")
                    println("**** The parameter data type is ${para.dataType}")
                    println("**** The parameter description is ${para.description}")
                    println("**** The parameter allowed values is
                    ${para.allowedValues}")
                }
            }
        }
    }
}
```

```

    }
  }
}

```

- For API details, see [DescribeDBClusterParameters](#) in *AWS SDK for Kotlin API reference*.

## DescribeDBClusterSnapshots

The following code example shows how to use DescribeDBClusterSnapshots.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```

suspend fun waitSnapshotReady(
    dbSnapshotIdentifier: String?,
    dbInstanceClusterIdentifier: String?,
) {
    var snapshotReady = false
    var snapshotReadyStr: String
    println("Waiting for the snapshot to become available.")

    val snapshotsRequest =
        DescribeDbClusterSnapshotsRequest {
            dbClusterSnapshotIdentifier = dbSnapshotIdentifier
            dbClusterIdentifier = dbInstanceClusterIdentifier
        }

    RdsClient { region = "us-west-2" }.use { rdsClient ->
        while (!snapshotReady) {
            val response = rdsClient.describeDbClusterSnapshots(snapshotsRequest)
            val snapshotList = response.dbClusterSnapshots
            if (snapshotList != null) {
                for (snapshot in snapshotList) {
                    snapshotReadyStr = snapshot.status.toString()
                }
            }
        }
    }
}

```

```

        if (snapshotReadyStr.contains("available")) {
            snapshotReady = true
        } else {
            println(".")
            delay(slTime * 5000)
        }
    }
}
}
println("The Snapshot is available!")
}
}

```

- For API details, see [DescribeDBClusterSnapshots](#) in *AWS SDK for Kotlin API reference*.

## DescribeDBClusters

The following code example shows how to use DescribeDBClusters.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```

suspend fun describeDbClusterParameters(
    dbClusterGroupName: String?,
    flag: Int,
) {
    val dbParameterGroupsRequest: DescribeDbClusterParametersRequest
    dbParameterGroupsRequest =
        if (flag == 0) {
            DescribeDbClusterParametersRequest {
                dbClusterParameterGroupName = dbClusterGroupName
            }
        } else {
            DescribeDbClusterParametersRequest {
                dbClusterParameterGroupName = dbClusterGroupName
            }
        }
}

```



```
suspend fun getAllowedClusterEngines(dbParameterGroupFamilyVal: String?) {
    val versionsRequest =
        DescribeDbEngineVersionsRequest {
            dbParameterGroupFamily = dbParameterGroupFamilyVal
            engine = "aurora-mysql"
        }

    RdsClient { region = "us-west-2" }.use { rdsClient ->
        val response = rdsClient.describeDbEngineVersions(versionsRequest)
        response.dbEngineVersions?.forEach { dbEngine ->
            println("The engine version is ${dbEngine.engineVersion}")
            println("The engine description is ${dbEngine.dbEngineDescription}")
        }
    }
}
```

- For API details, see [DescribeDBEngineVersions](#) in *AWS SDK for Kotlin API reference*.

## DescribeDBInstances

The following code example shows how to use DescribeDBInstances.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun waitDBAuroraInstanceReady(dbInstanceIdentifierVal: String?) {
    var instanceReady = false
    var instanceReadyStr: String
    println("Waiting for instance to become available.")
    val instanceRequest =
        DescribeDbInstancesRequest {
            dbInstanceIdentifier = dbInstanceIdentifierVal
        }

    var endpoint = ""
    RdsClient { region = "us-west-2" }.use { rdsClient ->
```



```

    while (!instanceReady) {
        val response = rdsClient.describeDbInstances(instanceRequest)
        response.dbInstances?.forEach { instance ->
            instanceReadyStr = instance.dbInstanceStatus.toString()
            if (instanceReadyStr.contains("available")) {
                endpoint = instance.endpoint?.address.toString()
                instanceReady = true
            } else {
                print(".")
                delay(sleepTime * 1000)
            }
        }
    }
}
println("Database instance is available! The connection endpoint is $endpoint")
}

```

- For API details, see [DescribeDBInstances](#) in *AWS SDK for Kotlin API reference*.

## ModifyDBClusterParameterGroup

The following code example shows how to use `ModifyDBClusterParameterGroup`.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```

// Modify the auto_increment_offset parameter.
suspend fun modifyDBClusterParas(dClusterGroupName: String?) {
    val parameter1 =
        Parameter {
            parameterName = "auto_increment_offset"
            applyMethod = ApplyMethod.fromValue("immediate")
            parameterValue = "5"
        }

    val paraList = ArrayList<Parameter>()
}

```

```
paraList.add(parameter1)
val groupRequest =
    ModifyDbClusterParameterGroupRequest {
        dbClusterParameterGroupName = dClusterGroupName
        parameters = paraList
    }

RdsClient { region = "us-west-2" }.use { rdsClient ->
    val response = rdsClient.modifyDbClusterParameterGroup(groupRequest)
    println("The parameter group ${response.dbClusterParameterGroupName} was
successfully modified")
}
}
```

- For API details, see [ModifyDBClusterParameterGroup](#) in *AWS SDK for Kotlin API reference*.

## Scenarios

### Create an Aurora Serverless work item tracker

The following code example shows how to create a web application that tracks work items in an Amazon Aurora Serverless database and uses Amazon Simple Email Service (Amazon SES) to send reports.

#### SDK for Kotlin

Shows how to create a web application that tracks and reports on work items stored in an Amazon RDS database.

For complete source code and instructions on how to set up a Spring REST API that queries Amazon Aurora Serverless data and for use by a React application, see the full example on [GitHub](#).

#### Services used in this example

- Aurora
- Amazon RDS
- Amazon RDS Data Service
- Amazon SES

# Auto Scaling examples using SDK for Kotlin

The following code examples show you how to perform actions and implement common scenarios by using the AWS SDK for Kotlin with Auto Scaling.

*Basics* are code examples that show you how to perform the essential operations within a service.

*Actions* are code excerpts from larger programs and must be run in context. While actions show you how to call individual service functions, you can see actions in context in their related scenarios.

Each example includes a link to the complete source code, where you can find instructions on how to set up and run the code in context.

## Topics

- [Basics](#)
- [Actions](#)

## Basics

### Learn the basics

The following code example shows how to:

- Create an Amazon EC2 Auto Scaling group with a launch template and Availability Zones, and get information about running instances.
- Enable Amazon CloudWatch metrics collection.
- Update the group's desired capacity and wait for an instance to start.
- Terminate an instance in the group.
- List scaling activities that occur in response to user requests and capacity changes.
- Get statistics for CloudWatch metrics, then clean up resources.

## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun main(args: Array<String>) {
    val usage = """
Usage:
    <groupName> <launchTemplateName> <serviceLinkedRoleARN> <vpcZoneId>

Where:
    groupName - The name of the Auto Scaling group.
    launchTemplateName - The name of the launch template.
    serviceLinkedRoleARN - The Amazon Resource Name (ARN) of the service-linked
role that the Auto Scaling group uses.
    vpcZoneId - A subnet Id for a virtual private cloud (VPC) where instances in
the Auto Scaling group can be created.
    """

    if (args.size != 4) {
        println(usage)
        exitProcess(1)
    }

    val groupName = args[0]
    val launchTemplateName = args[1]
    val serviceLinkedRoleARN = args[2]
    val vpcZoneId = args[3]

    println("**** Create an Auto Scaling group named $groupName")
    createAutoScalingGroup(groupName, launchTemplateName, serviceLinkedRoleARN,
vpcZoneId)

    println("Wait 1 min for the resources, including the instance. Otherwise, an
empty instance Id is returned")
    delay(60000)

    val instanceId = getSpecificAutoScaling(groupName)
    if (instanceId.compareTo("") == 0) {
        println("Error - no instance Id value")
        exitProcess(1)
    } else {
        println("The instance Id value is $instanceId")
    }

    println("**** Describe Auto Scaling with the Id value $instanceId")
    describeAutoScalingInstance(instanceId)
}
```

```
println("**** Enable metrics collection $instanceId")
enableMetricsCollection(groupName)

println("**** Update an Auto Scaling group to maximum size of 3")
updateAutoScalingGroup(groupName, launchTemplateName, serviceLinkedRoleARN)

println("**** Describe all Auto Scaling groups to show the current state of the
groups")
describeAutoScalingGroups(groupName)

println("**** Describe account details")
describeAccountLimits()

println("Wait 1 min for the resources, including the instance. Otherwise, an
empty instance Id is returned")
delay(60000)

println("**** Set desired capacity to 2")
setDesiredCapacity(groupName)

println("**** Get the two instance Id values and state")
getAutoScalingGroups(groupName)

println("**** List the scaling activities that have occurred for the group")
describeScalingActivities(groupName)

println("**** Terminate an instance in the Auto Scaling group")
terminateInstanceInAutoScalingGroup(instanceId)

println("**** Stop the metrics collection")
disableMetricsCollection(groupName)

println("**** Delete the Auto Scaling group")
deleteSpecificAutoScalingGroup(groupName)
}

suspend fun describeAutoScalingGroups(groupName: String) {
    val groupsReques =
        DescribeAutoScalingGroupsRequest {
            autoScalingGroupNames = listOf(groupName)
            maxRecords = 10
        }
    AutoScalingClient { region = "us-east-1" }.use { autoScalingClient ->
```

```
        val response = autoScalingClient.describeAutoScalingGroups(groupsReques)
        response.autoScalingGroups?.forEach { group ->
            println("The service to use for the health checks:
${group.healthCheckType}")
        }
    }
}

suspend fun disableMetricsCollection(groupName: String) {
    val disableMetricsCollectionRequest =
        DisableMetricsCollectionRequest {
            autoScalingGroupName = groupName
            metrics = listOf("GroupMaxSize")
        }

    AutoScalingClient { region = "us-east-1" }.use { autoScalingClient ->
        autoScalingClient.disableMetricsCollection(disableMetricsCollectionRequest)
        println("The disable metrics collection operation was successful")
    }
}

suspend fun describeScalingActivities(groupName: String?) {
    val scalingActivitiesRequest =
        DescribeScalingActivitiesRequest {
            autoScalingGroupName = groupName
            maxRecords = 10
        }

    AutoScalingClient { region = "us-east-1" }.use { autoScalingClient ->
        val response =
            autoScalingClient.describeScalingActivities(scalingActivitiesRequest)
        response.activities?.forEach { activity ->
            println("The activity Id is ${activity.activityId}")
            println("The activity details are ${activity.details}")
        }
    }
}

suspend fun getAutoScalingGroups(groupName: String) {
    val scalingGroupsRequest =
        DescribeAutoScalingGroupsRequest {
            autoScalingGroupNames = listOf(groupName)
        }
}
```

```
AutoScalingClient { region = "us-east-1" }.use { autoScalingClient ->
    val response =
    autoScalingClient.describeAutoScalingGroups(scalingGroupsRequest)
        response.autoScalingGroups?.forEach { group ->
            println("The group name is ${group.autoScalingGroupName}")
            println("The group ARN is ${group.autoScalingGroupArn}")
            group.instances?.forEach { instance ->
                println("The instance id is ${instance.instanceId}")
                println("The lifecycle state is " + instance.lifecycleState)
            }
        }
    }
}

suspend fun setDesiredCapacity(groupName: String) {
    val capacityRequest =
        SetDesiredCapacityRequest {
            autoScalingGroupName = groupName
            desiredCapacity = 2
        }

    AutoScalingClient { region = "us-east-1" }.use { autoScalingClient ->
        autoScalingClient.setDesiredCapacity(capacityRequest)
        println("You set the DesiredCapacity to 2")
    }
}

suspend fun updateAutoScalingGroup(
    groupName: String,
    launchTemplateNameVal: String,
    serviceLinkedRoleARNVal: String,
) {
    val templateSpecification =
        LaunchTemplateSpecification {
            launchTemplateName = launchTemplateNameVal
        }

    val groupRequest =
        UpdateAutoScalingGroupRequest {
            maxSize = 3
            serviceLinkedRoleArn = serviceLinkedRoleARNVal
            autoScalingGroupName = groupName
            launchTemplate = templateSpecification
        }
}
```

```
val groupsRequestWaiter =
    DescribeAutoScalingGroupsRequest {
        autoScalingGroupNames = listOf(groupName)
    }

AutoScalingClient { region = "us-east-1" }.use { autoScalingClient ->
    autoScalingClient.updateAutoScalingGroup(groupRequest)
    autoScalingClient.waitUntilGroupExists(groupsRequestWaiter)
    println("You successfully updated the Auto Scaling group $groupName")
}

suspend fun createAutoScalingGroup(
    groupName: String,
    launchTemplateNameVal: String,
    serviceLinkedRoleARNVal: String,
    vpcZoneIdVal: String,
) {
    val templateSpecification =
        LaunchTemplateSpecification {
            launchTemplateName = launchTemplateNameVal
        }

    val request =
        CreateAutoScalingGroupRequest {
            autoScalingGroupName = groupName
            availabilityZones = listOf("us-east-1a")
            launchTemplate = templateSpecification
            maxSize = 1
            minSize = 1
            vpcZoneIdentifier = vpcZoneIdVal
            serviceLinkedRoleArn = serviceLinkedRoleARNVal
        }

    // This object is required for the waiter call.
    val groupsRequestWaiter =
        DescribeAutoScalingGroupsRequest {
            autoScalingGroupNames = listOf(groupName)
        }

    AutoScalingClient { region = "us-east-1" }.use { autoScalingClient ->
        autoScalingClient.createAutoScalingGroup(request)
        autoScalingClient.waitUntilGroupExists(groupsRequestWaiter)
    }
}
```



```
        println("$groupName was created!")
    }
}

suspend fun describeAutoScalingInstance(id: String) {
    val describeAutoScalingInstancesRequest =
        DescribeAutoScalingInstancesRequest {
            instanceIds = listOf(id)
        }

    AutoScalingClient { region = "us-east-1" }.use { autoScalingClient ->
        val response =
            autoScalingClient.describeAutoScalingInstances(describeAutoScalingInstancesRequest)
            response.autoScalingInstances?.forEach { group ->
                println("The instance lifecycle state is: ${group.lifecycleState}")
            }
        }
}

suspend fun enableMetricsCollection(groupName: String?) {
    val collectionRequest =
        EnableMetricsCollectionRequest {
            autoScalingGroupName = groupName
            metrics = listOf("GroupMaxSize")
            granularity = "1Minute"
        }

    AutoScalingClient { region = "us-east-1" }.use { autoScalingClient ->
        autoScalingClient.enableMetricsCollection(collectionRequest)
        println("The enable metrics collection operation was successful")
    }
}

suspend fun getSpecificAutoScaling(groupName: String): String {
    var instanceId = ""
    val scalingGroupsRequest =
        DescribeAutoScalingGroupsRequest {
            autoScalingGroupNames = listOf(groupName)
        }

    AutoScalingClient { region = "us-east-1" }.use { autoScalingClient ->
        val response =
            autoScalingClient.describeAutoScalingGroups(scalingGroupsRequest)
            response.autoScalingGroups?.forEach { group ->
```

```
        println("The group name is ${group.autoScalingGroupName}")
        println("The group ARN is ${group.autoScalingGroupArn}")

        group.instances?.forEach { instance ->
            instanceId = instance.instanceId.toString()
        }
    }
}
return instanceId
}

suspend fun describeAccountLimits() {
    AutoScalingClient { region = "us-east-1" }.use { autoScalingClient ->
        val response =
        autoScalingClient.describeAccountLimits(DescribeAccountLimitsRequest {})
        println("The max number of Auto Scaling groups is
        ${response.maxNumberOfAutoScalingGroups}")
        println("The current number of Auto Scaling groups is
        ${response.numberOfWorkingAutoScalingGroups}")
    }
}

suspend fun terminateInstanceInAutoScalingGroup(instanceIdVal: String) {
    val request =
        TerminateInstanceInAutoScalingGroupRequest {
            instanceId = instanceIdVal
            shouldDecrementDesiredCapacity = false
        }

    AutoScalingClient { region = "us-east-1" }.use { autoScalingClient ->
        autoScalingClient.terminateInstanceInAutoScalingGroup(request)
        println("You have terminated instance $instanceIdVal")
    }
}

suspend fun deleteSpecificAutoScalingGroup(groupName: String) {
    val deleteAutoScalingGroupRequest =
        DeleteAutoScalingGroupRequest {
            autoScalingGroupName = groupName
            forceDelete = true
        }

    AutoScalingClient { region = "us-east-1" }.use { autoScalingClient ->
        autoScalingClient.deleteAutoScalingGroup(deleteAutoScalingGroupRequest)
    }
}
```

```
        println("You successfully deleted $groupName")
    }
}
```

- For API details, see the following topics in *AWS SDK for Kotlin API reference*.
  - [CreateAutoScalingGroup](#)
  - [DeleteAutoScalingGroup](#)
  - [DescribeAutoScalingGroups](#)
  - [DescribeAutoScalingInstances](#)
  - [DescribeScalingActivities](#)
  - [DisableMetricsCollection](#)
  - [EnableMetricsCollection](#)
  - [SetDesiredCapacity](#)
  - [TerminateInstanceInAutoScalingGroup](#)
  - [UpdateAutoScalingGroup](#)

## Actions

### CreateAutoScalingGroup

The following code example shows how to use `CreateAutoScalingGroup`.

#### SDK for Kotlin

##### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun createAutoScalingGroup(
    groupName: String,
    launchTemplateNameVal: String,
    serviceLinkedRoleARNVal: String,
    vpcZoneIdVal: String,
) {
```

```
val templateSpecification =
    LaunchTemplateSpecification {
        launchTemplateName = launchTemplateNameVal
    }

val request =
    CreateAutoScalingGroupRequest {
        autoScalingGroupName = groupName
        availabilityZones = listOf("us-east-1a")
        launchTemplate = templateSpecification
        maxSize = 1
        minSize = 1
        vpcZoneIdentifier = vpcZoneIdVal
        serviceLinkedRoleArn = serviceLinkedRoleARNVal
    }

// This object is required for the waiter call.
val groupsRequestWaiter =
    DescribeAutoScalingGroupsRequest {
        autoScalingGroupNames = listOf(groupName)
    }

AutoScalingClient { region = "us-east-1" }.use { autoScalingClient ->
    autoScalingClient.createAutoScalingGroup(request)
    autoScalingClient.waitUntilGroupExists(groupsRequestWaiter)
    println("$groupName was created!")
}
}
```

- For API details, see [CreateAutoScalingGroup](#) in *AWS SDK for Kotlin API reference*.

## DeleteAutoScalingGroup

The following code example shows how to use `DeleteAutoScalingGroup`.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun deleteSpecificAutoScalingGroup(groupName: String) {
    val deleteAutoScalingGroupRequest =
        DeleteAutoScalingGroupRequest {
            autoScalingGroupName = groupName
            forceDelete = true
        }

    AutoScalingClient { region = "us-east-1" }.use { autoScalingClient ->
        autoScalingClient.deleteAutoScalingGroup(deleteAutoScalingGroupRequest)
        println("You successfully deleted $groupName")
    }
}
```

- For API details, see [DeleteAutoScalingGroup](#) in *AWS SDK for Kotlin API reference*.

## DescribeAutoScalingGroups

The following code example shows how to use DescribeAutoScalingGroups.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun getAutoScalingGroups(groupName: String) {
    val scalingGroupsRequest =
        DescribeAutoScalingGroupsRequest {
            autoScalingGroupNames = listOf(groupName)
        }

    AutoScalingClient { region = "us-east-1" }.use { autoScalingClient ->
        val response =
            autoScalingClient.describeAutoScalingGroups(scalingGroupsRequest)
        response.autoScalingGroups?.forEach { group ->
            println("The group name is ${group.autoScalingGroupName}")
            println("The group ARN is ${group.autoScalingGroupArn}")
            group.instances?.forEach { instance ->
```

```
        println("The instance id is ${instance.instanceId}")
        println("The lifecycle state is " + instance.lifecycleState)
    }
}
}
```

- For API details, see [DescribeAutoScalingGroups](#) in *AWS SDK for Kotlin API reference*.

## DescribeAutoScalingInstances

The following code example shows how to use `DescribeAutoScalingInstances`.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun describeAutoScalingInstance(id: String) {
    val describeAutoScalingInstancesRequest =
        DescribeAutoScalingInstancesRequest {
            instanceIds = listOf(id)
        }

    AutoScalingClient { region = "us-east-1" }.use { autoScalingClient ->
        val response =
            autoScalingClient.describeAutoScalingInstances(describeAutoScalingInstancesRequest)
        response.autoScalingInstances?.forEach { group ->
            println("The instance lifecycle state is: ${group.lifecycleState}")
        }
    }
}
```

- For API details, see [DescribeAutoScalingInstances](#) in *AWS SDK for Kotlin API reference*.

## DescribeScalingActivities

The following code example shows how to use DescribeScalingActivities.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun describeAutoScalingGroups(groupName: String) {
    val groupsReques =
        DescribeAutoScalingGroupsRequest {
            autoScalingGroupNames = listOf(groupName)
            maxRecords = 10
        }

    AutoScalingClient { region = "us-east-1" }.use { autoScalingClient ->
        val response = autoScalingClient.describeAutoScalingGroups(groupsReques)
        response.autoScalingGroups?.forEach { group ->
            println("The service to use for the health checks:
                ${group.healthCheckType}")
        }
    }
}
```

- For API details, see [DescribeScalingActivities](#) in *AWS SDK for Kotlin API reference*.

## DisableMetricsCollection

The following code example shows how to use DisableMetricsCollection.

## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun disableMetricsCollection(groupName: String) {
    val disableMetricsCollectionRequest =
        DisableMetricsCollectionRequest {
            autoScalingGroupName = groupName
            metrics = listOf("GroupMaxSize")
        }

    AutoScalingClient { region = "us-east-1" }.use { autoScalingClient ->
        autoScalingClient.disableMetricsCollection(disableMetricsCollectionRequest)
        println("The disable metrics collection operation was successful")
    }
}
```

- For API details, see [DisableMetricsCollection](#) in *AWS SDK for Kotlin API reference*.

## EnableMetricsCollection

The following code example shows how to use `EnableMetricsCollection`.

## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun enableMetricsCollection(groupName: String?) {
    val collectionRequest =
        EnableMetricsCollectionRequest {
```



```
        autoScalingGroupName = groupName
        metrics = listOf("GroupMaxSize")
        granularity = "1Minute"
    }

    AutoScalingClient { region = "us-east-1" }.use { autoScalingClient ->
        autoScalingClient.enableMetricsCollection(collectionRequest)
        println("The enable metrics collection operation was successful")
    }
}
```

- For API details, see [EnableMetricsCollection](#) in *AWS SDK for Kotlin API reference*.

## SetDesiredCapacity

The following code example shows how to use SetDesiredCapacity.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun setDesiredCapacity(groupName: String) {
    val capacityRequest =
        SetDesiredCapacityRequest {
            autoScalingGroupName = groupName
            desiredCapacity = 2
        }

    AutoScalingClient { region = "us-east-1" }.use { autoScalingClient ->
        autoScalingClient.setDesiredCapacity(capacityRequest)
        println("You set the DesiredCapacity to 2")
    }
}
```

- For API details, see [SetDesiredCapacity](#) in *AWS SDK for Kotlin API reference*.

## TerminateInstanceInAutoScalingGroup

The following code example shows how to use `TerminateInstanceInAutoScalingGroup`.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun terminateInstanceInAutoScalingGroup(instanceIdVal: String) {
    val request =
        TerminateInstanceInAutoScalingGroupRequest {
            instanceId = instanceIdVal
            shouldDecrementDesiredCapacity = false
        }

    AutoScalingClient { region = "us-east-1" }.use { autoScalingClient ->
        autoScalingClient.terminateInstanceInAutoScalingGroup(request)
        println("You have terminated instance $instanceIdVal")
    }
}
```

- For API details, see [TerminateInstanceInAutoScalingGroup](#) in *AWS SDK for Kotlin API reference*.

## UpdateAutoScalingGroup

The following code example shows how to use `UpdateAutoScalingGroup`.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun updateAutoScalingGroup(
    groupName: String,
    launchTemplateNameVal: String,
    serviceLinkedRoleARNVal: String,
) {
    val templateSpecification =
        LaunchTemplateSpecification {
            launchTemplateName = launchTemplateNameVal
        }

    val groupRequest =
        UpdateAutoScalingGroupRequest {
            maxSize = 3
            serviceLinkedRoleArn = serviceLinkedRoleARNVal
            autoScalingGroupName = groupName
            launchTemplate = templateSpecification
        }

    val groupsRequestWaiter =
        DescribeAutoScalingGroupsRequest {
            autoScalingGroupNames = listOf(groupName)
        }

    AutoScalingClient { region = "us-east-1" }.use { autoScalingClient ->
        autoScalingClient.updateAutoScalingGroup(groupRequest)
        autoScalingClient.waitUntilGroupExists(groupsRequestWaiter)
        println("You successfully updated the Auto Scaling group $groupName")
    }
}
```

- For API details, see [UpdateAutoScalingGroup](#) in *AWS SDK for Kotlin API reference*.

## Amazon Bedrock examples using SDK for Kotlin

The following code examples show you how to perform actions and implement common scenarios by using the AWS SDK for Kotlin with Amazon Bedrock.

*Actions* are code excerpts from larger programs and must be run in context. While actions show you how to call individual service functions, you can see actions in context in their related scenarios.

Each example includes a link to the complete source code, where you can find instructions on how to set up and run the code in context.

## Topics

- [Actions](#)

## Actions

### ListFoundationModels

The following code example shows how to use `ListFoundationModels`.

#### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

List the available Amazon Bedrock foundation models.

```
suspend fun listFoundationModels(): List<FoundationModelSummary>? {
    BedrockClient { region = "us-east-1" }.use { bedrockClient ->
        val response =
            bedrockClient.listFoundationModels(ListFoundationModelsRequest {})
        response.modelSummaries?.forEach { model ->
            println("=====")
            println(" Model ID: ${model.modelId}")
            println("-----")
            println(" Name: ${model.modelName}")
            println(" Provider: ${model.providerName}")
            println(" Input modalities: ${model.inputModalities}")
            println(" Output modalities: ${model.outputModalities}")
            println(" Supported customizations: ${model.customizationsSupported}")
            println(" Supported inference types: ${model.inferenceTypesSupported}")
            println("-----\n")
        }
        return response.modelSummaries
    }
}
```

```
}
```

- For API details, see [ListFoundationModels](#) in *AWS SDK for Kotlin API reference*.

## CloudWatch examples using SDK for Kotlin

The following code examples show you how to perform actions and implement common scenarios by using the AWS SDK for Kotlin with CloudWatch.

*Basics* are code examples that show you how to perform the essential operations within a service.

*Actions* are code excerpts from larger programs and must be run in context. While actions show you how to call individual service functions, you can see actions in context in their related scenarios.

Each example includes a link to the complete source code, where you can find instructions on how to set up and run the code in context.

### Get started

#### Hello CloudWatch

The following code examples show how to get started using CloudWatch.

#### SDK for Kotlin

##### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
/**
```

```
Before running this Kotlin code example, set up your development environment, including your credentials.
```

```
For more information, see the following documentation topic:
```

```
https://docs.aws.amazon.com/sdk-for-kotlin/latest/developer-guide/setup.html
```

```
*/
suspend fun main(args: Array<String>) {
    val usage = """
        Usage:
          <namespace>
        Where:
          namespace - The namespace to filter against (for example, AWS/EC2).
    """

    if (args.size != 1) {
        println(usage)
        exitProcess(0)
    }

    val namespace = args[0]
    listAllMets(namespace)
}

suspend fun listAllMets(namespaceVal: String?) {
    val request =
        ListMetricsRequest {
            namespace = namespaceVal
        }

    CloudWatchClient { region = "us-east-1" }.use { cwClient ->
        cwClient
            .listMetricsPaginated(request)
            .transform { it.metrics?.forEach { obj -> emit(obj) } }
            .collect { obj ->
                println("Name is ${obj.metricName}")
                println("Namespace is ${obj.namespace}")
            }
    }
}
```

- For API details, see [ListMetrics](#) in *AWS SDK for Kotlin API reference*.

## Topics

- [Basics](#)
- [Actions](#)

# Basics

## Learn the basics

The following code example shows how to:

- List CloudWatch namespaces and metrics.
- Get statistics for a metric and for estimated billing.
- Create and update a dashboard.
- Create and add data to a metric.
- Create and trigger an alarm, then view alarm history.
- Add an anomaly detector.
- Get a metric image, then clean up resources.

## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
/**
```

```
Before running this Kotlin code example, set up your development environment, including your credentials.
```

```
For more information, see the following documentation topic:
```

```
https://docs.aws.amazon.com/sdk-for-kotlin/latest/developer-guide/setup.html
```

```
To enable billing metrics and statistics for this example, make sure billing alerts are enabled for your account:
```

```
https://docs.aws.amazon.com/AmazonCloudWatch/latest/monitoring/monitor\_estimated\_charges\_with\_cloudwatch.html#turning\_on\_billing\_metrics
```

```
This Kotlin code example performs the following tasks:
```

1. List available namespaces from Amazon CloudWatch. Select a namespace from the list.

2. List available metrics within the selected namespace.
  3. Get statistics for the selected metric over the last day.
  4. Get CloudWatch estimated billing for the last week.
  5. Create a new CloudWatch dashboard with metrics.
  6. List dashboards using a paginator.
  7. Create a new custom metric by adding data for it.
  8. Add the custom metric to the dashboard.
  9. Create an alarm for the custom metric.
  10. Describe current alarms.
  11. Get current data for the new custom metric.
  12. Push data into the custom metric to trigger the alarm.
  13. Check the alarm state using the action DescribeAlarmsForMetric.
  14. Get alarm history for the new alarm.
  15. Add an anomaly detector for the custom metric.
  16. Describe current anomaly detectors.
  17. Get a metric image for the custom metric.
  18. Clean up the Amazon CloudWatch resources.
- \*/

```
val DASHES: String? = String(CharArray(80)).replace("\u0000", "-")

suspend fun main(args: Array<String>) {
    val usage = """
        Usage:
            <myDate> <costDateWeek> <dashboardName> <dashboardJson> <dashboardAdd>
<settings> <metricImage>

        Where:
            myDate - The start date to use to get metric statistics. (For example,
2023-01-11T18:35:24.00Z.)
            costDateWeek - The start date to use to get AWS Billing and Cost
Management statistics. (For example, 2023-01-11T18:35:24.00Z.)
            dashboardName - The name of the dashboard to create.
            dashboardJson - The location of a JSON file to use to create a
dashboard. (See Readme file.)
            dashboardAdd - The location of a JSON file to use to update a dashboard.
(See Readme file.)
            settings - The location of a JSON file from which various values are
read. (See Readme file.)
            metricImage - The location of a BMP file that is used to create a
graph.
        """

    if (args.size != 7) {
```



```
        println(usage)
        System.exit(1)
    }

    val myDate = args[0]
    val costDateWeek = args[1]
    val dashboardName = args[2]
    val dashboardJson = args[3]
    val dashboardAdd = args[4]
    val settings = args[5]
    var metricImage = args[6]
    val dataPoint = "10.0".toDouble()
    val in0b = Scanner(System.`in`)

    println(DASHES)
    println("Welcome to the Amazon CloudWatch example scenario.")
    println(DASHES)

    println(DASHES)
    println("1. List at least five available unique namespaces from Amazon
CloudWatch. Select a CloudWatch namespace from the list.")
    val list: ArrayList<String> = listNameSpaces()
    for (z in 0..4) {
        println("    ${z + 1}. ${list[z]}")
    }

    var selectedNamespace: String
    var selectedMetrics = ""
    var num = in0b.nextLine().toInt()
    println("You selected $num")

    if (1 <= num && num <= 5) {
        selectedNamespace = list[num - 1]
    } else {
        println("You did not select a valid option.")
        exitProcess(1)
    }
    println("You selected $selectedNamespace")
    println(DASHES)

    println(DASHES)
    println("2. List available metrics within the selected namespace and select one
from the list.")
    val metList = listMets(selectedNamespace)
```

```
for (z in 0..4) {
    println("    ${ z + 1}. ${metList?.get(z)}")
}
num = in0b.nextLine().toInt()
if (1 <= num && num <= 5) {
    selectedMetrics = metList!![num - 1]
} else {
    println("You did not select a valid option.")
    System.exit(1)
}
println("You selected $selectedMetrics")
val myDimension = getSpecificMet(selectedNamespace)
if (myDimension == null) {
    println("Error - Dimension is null")
    exitProcess(1)
}
println(DASHES)

println(DASHES)
println("3. Get statistics for the selected metric over the last day.")
val metricOption: String
val statTypes = ArrayList<String>()
statTypes.add("SampleCount")
statTypes.add("Average")
statTypes.add("Sum")
statTypes.add("Minimum")
statTypes.add("Maximum")

for (t in 0..4) {
    println("    ${t + 1}. ${statTypes[t]}")
}
println("Select a metric statistic by entering a number from the preceding
list:")
num = in0b.nextLine().toInt()
if (1 <= num && num <= 5) {
    metricOption = statTypes[num - 1]
} else {
    println("You did not select a valid option.")
    exitProcess(1)
}
println("You selected $metricOption")
getAndDisplayMetricStatistics(selectedNamespace, selectedMetrics, metricOption,
myDate, myDimension)
println(DASHES)
```

```
println(DASHES)
println("4. Get CloudWatch estimated billing for the last week.")
getMetricStatistics(costDateWeek)
println(DASHES)

println(DASHES)
println("5. Create a new CloudWatch dashboard with metrics.")
createDashboardWithMetrics(dashboardName, dashboardJson)
println(DASHES)

println(DASHES)
println("6. List dashboards using a paginator.")
listDashboards()
println(DASHES)

println(DASHES)
println("7. Create a new custom metric by adding data to it.")
createNewCustomMetric(dataPoint)
println(DASHES)

println(DASHES)
println("8. Add an additional metric to the dashboard.")
addMetricToDashboard(dashboardAdd, dashboardName)
println(DASHES)

println(DASHES)
println("9. Create an alarm for the custom metric.")
val alarmName: String = createAlarm(settings)
println(DASHES)

println(DASHES)
println("10. Describe 10 current alarms.")
describeAlarms()
println(DASHES)

println(DASHES)
println("11. Get current data for the new custom metric.")
getCustomMetricData(settings)
println(DASHES)

println(DASHES)
println("12. Push data into the custom metric to trigger the alarm.")
addMetricDataForAlarm(settings)
```

```
println(DASHES)

println(DASHES)
println("13. Check the alarm state using the action DescribeAlarmsForMetric.")
checkForMetricAlarm(settings)
println(DASHES)

println(DASHES)
println("14. Get alarm history for the new alarm.")
getAlarmHistory(settings, myDate)
println(DASHES)

println(DASHES)
println("15. Add an anomaly detector for the custom metric.")
addAnomalyDetector(settings)
println(DASHES)

println(DASHES)
println("16. Describe current anomaly detectors.")
describeAnomalyDetectors(settings)
println(DASHES)

println(DASHES)
println("17. Get a metric image for the custom metric.")
getAndOpenMetricImage(metricImage)
println(DASHES)

println(DASHES)
println("18. Clean up the Amazon CloudWatch resources.")
deleteDashboard(dashboardName)
deleteAlarm(alarmName)
deleteAnomalyDetector(settings)
println(DASHES)

println(DASHES)
println("The Amazon CloudWatch example scenario is complete.")
println(DASHES)
}

suspend fun deleteAnomalyDetector(fileName: String) {
    // Read values from the JSON file.
    val parser = JsonFactory().createParser(File(fileName))
    val rootNode = ObjectMapper().readTree<JsonNode>(parser)
    val customMetricNamespace = rootNode.findValue("customMetricNamespace").asText()
```

```
val customMetricName = rootNode.findValue("customMetricName").asText()

val singleMetricAnomalyDetectorVal =
    SingleMetricAnomalyDetector {
        metricName = customMetricName
        namespace = customMetricNamespace
        stat = "Maximum"
    }

val request =
    DeleteAnomalyDetectorRequest {
        singleMetricAnomalyDetector = singleMetricAnomalyDetectorVal
    }

CloudWatchClient { region = "us-east-1" }.use { cwClient ->
    cwClient.deleteAnomalyDetector(request)
    println("Successfully deleted the Anomaly Detector.")
}
}

suspend fun deleteAlarm(alarmNameVal: String) {
    val request =
        DeleteAlarmsRequest {
            alarmNames = listOf(alarmNameVal)
        }

    CloudWatchClient { region = "us-east-1" }.use { cwClient ->
        cwClient.deleteAlarms(request)
        println("Successfully deleted alarm $alarmNameVal")
    }
}

suspend fun deleteDashboard(dashboardName: String) {
    val dashboardsRequest =
        DeleteDashboardsRequest {
            dashboardNames = listOf(dashboardName)
        }

    CloudWatchClient { region = "us-east-1" }.use { cwClient ->
        cwClient.deleteDashboards(dashboardsRequest)
        println("$dashboardName was successfully deleted.")
    }
}

suspend fun getAndOpenMetricImage(fileName: String) {
```

```
println("Getting Image data for custom metric.")
val myJSON = """{
    "title": "Example Metric Graph",
    "view": "timeSeries",
    "stacked ": false,
    "period": 10,
    "width": 1400,
    "height": 600,
    "metrics": [
        [
            "AWS/Billing",
            "EstimatedCharges",
            "Currency",
            "USD"
        ]
    ]
}"""

val imageRequest =
    GetMetricWidgetImageRequest {
        metricWidget = myJSON
    }

CloudWatchClient { region = "us-east-1" }.use { cwClient ->
    val response = cwClient.getMetricWidgetImage(imageRequest)
    val bytes = response.metricWidgetImage
    if (bytes != null) {
        File(fileName).writeBytes(bytes)
    }
}
println("You have successfully written data to $fileName")
}

suspend fun describeAnomalyDetectors(fileName: String) {
    // Read values from the JSON file.
    val parser = JsonFactory().createParser(File(fileName))
    val rootNode = ObjectMapper().readTree<JsonNode>(parser)
    val customMetricNamespace = rootNode.findValue("customMetricNamespace").asText()
    val customMetricName = rootNode.findValue("customMetricName").asText()

    val detectorsRequest =
        DescribeAnomalyDetectorsRequest {
            maxResults = 10
            metricName = customMetricName
```

```

        namespace = customMetricNamespace
    }
    CloudWatchClient { region = "us-east-1" }.use { cwClient ->
        val response = cwClient.describeAnomalyDetectors(detectorsRequest)
        response.anomalyDetectors?.forEach { detector ->
            println("Metric name:
${detector.singleMetricAnomalyDetector?.metricName}")
            println("State: ${detector.stateValue}")
        }
    }
}

suspend fun addAnomalyDetector(fileName: String?) {
    // Read values from the JSON file.
    val parser = JsonFactory().createParser(File(fileName))
    val rootNode = ObjectMapper().readTree<JsonNode>(parser)
    val customMetricNamespace = rootNode.findValue("customMetricNamespace").asText()
    val customMetricName = rootNode.findValue("customMetricName").asText()

    val singleMetricAnomalyDetectorVal =
        SingleMetricAnomalyDetector {
            metricName = customMetricName
            namespace = customMetricNamespace
            stat = "Maximum"
        }

    val anomalyDetectorRequest =
        PutAnomalyDetectorRequest {
            singleMetricAnomalyDetector = singleMetricAnomalyDetectorVal
        }

    CloudWatchClient { region = "us-east-1" }.use { cwClient ->
        cwClient.putAnomalyDetector(anomalyDetectorRequest)
        println("Added anomaly detector for metric $customMetricName.")
    }
}

suspend fun getAlarmHistory(
    fileName: String,
    date: String,
) {
    // Read values from the JSON file.
    val parser = JsonFactory().createParser(File(fileName))
    val rootNode = ObjectMapper().readTree<JsonNode>(parser)

```

```

val alarmNameVal = rootNode.findValue("exampleAlarmName").asText()
val start = Instant.parse(date)
val endDateVal = Instant.now()

val historyRequest =
    DescribeAlarmHistoryRequest {
        startDate =
            aws.smithy.kotlin.runtime.time
                .Instant(start)
        endDate =
            aws.smithy.kotlin.runtime.time
                .Instant(endDateVal)
        alarmName = alarmNameVal
        historyItemType = HistoryItemType.Action
    }

CloudWatchClient {
    credentialsProvider = EnvironmentCredentialsProvider()
    region = "us-east-1"
}.use { cwClient ->
    val response = cwClient.describeAlarmHistory(historyRequest)
    val historyItems = response.alarmHistoryItems
    if (historyItems != null) {
        if (historyItems.isEmpty()) {
            println("No alarm history data found for $alarmNameVal.")
        } else {
            for (item in historyItems) {
                println("History summary ${item.historySummary}")
                println("Time stamp: ${item.timestamp}")
            }
        }
    }
}

suspend fun checkForMetricAlarm(fileName: String?) {
    // Read values from the JSON file.
    val parser = JsonFactory().createParser(File(fileName))
    val rootNode = ObjectMapper().readTree<JsonNode>(parser)
    val customMetricNamespace = rootNode.findValue("customMetricNamespace").asText()
    val customMetricName = rootNode.findValue("customMetricName").asText()
    var hasAlarm = false
    var retries = 10

```



```

val metricRequest =
    DescribeAlarmsForMetricRequest {
        metricName = customMetricName
        namespace = customMetricNamespace
    }
CloudWatchClient { region = "us-east-1" }.use { cwClient ->
    while (!hasAlarm && retries > 0) {
        val response = cwClient.describeAlarmsForMetric(metricRequest)
        if (response.metricAlarms?.count()!! > 0) {
            hasAlarm = true
        }
        retries--
        delay(20000)
        println(".")
    }
    if (!hasAlarm) {
        println("No Alarm state found for $customMetricName after 10 retries.")
    } else {
        println("Alarm state found for $customMetricName.")
    }
}
}

suspend fun addMetricDataForAlarm(fileName: String?) {
    // Read values from the JSON file.
    val parser = JsonFactory().createParser(File(fileName))
    val rootNode = ObjectMapper().readTree<JsonNode>(parser)
    val customMetricNamespace = rootNode.findValue("customMetricNamespace").asText()
    val customMetricName = rootNode.findValue("customMetricName").asText()

    // Set an Instant object.
    val time =
        ZonedDateTime.now(ZoneOffset.UTC).format(DateTimeFormatter.ISO_INSTANT)
    val instant = Instant.parse(time)
    val datum =
        MetricDatum {
            metricName = customMetricName
            unit = StandardUnit.None
            value = 1001.00
            timestamp =
                aws.smithy.kotlin.runtime.time
                    .Instant(instant)
        }
}

```

```
    val datum2 =
        MetricDatum {
            metricName = customMetricName
            unit = StandardUnit.None
            value = 1002.00
            timestamp =
                aws.smithy.kotlin.runtime.time
                    .Instant(instant)
        }

    val metricDataList = ArrayList<MetricDatum>()
    metricDataList.add(datum)
    metricDataList.add(datum2)

    val request =
        PutMetricDataRequest {
            namespace = customMetricNamespace
            metricData = metricDataList
        }

    CloudWatchClient { region = "us-east-1" }.use { cwClient ->
        cwClient.putMetricData(request)
        println("Added metric values for for metric $customMetricName")
    }
}

suspend fun getCustomMetricData(fileName: String) {
    // Read values from the JSON file.
    val parser = JsonFactory().createParser(File(fileName))
    val rootNode = ObjectMapper().readTree<JsonNode>(parser)
    val customMetricNamespace = rootNode.findValue("customMetricNamespace").asText()
    val customMetricName = rootNode.findValue("customMetricName").asText()

    // Set the date.
    val nowDate = Instant.now()
    val hours: Long = 1
    val minutes: Long = 30
    val date2 =
        nowDate.plus(hours, ChronoUnit.HOURS).plus(
            minutes,
            ChronoUnit.MINUTES,
        )

    val met =
```

```
        Metric {
            metricName = customMetricName
            namespace = customMetricNamespace
        }

    val metStat =
        MetricStat {
            stat = "Maximum"
            period = 1
            metric = met
        }

    val dataQuery =
        MetricDataQuery {
            metricStat = metStat
            id = "foo2"
            returnData = true
        }

    val dq = ArrayList<MetricDataQuery>()
    dq.add(dataQuery)
    val getMetReq =
        GetMetricDataRequest {
            maxDatapoints = 10
            scanBy = ScanBy.TimestampDescending
            startTime =
                aws.smithy.kotlin.runtime.time
                    .Instant(nowDate)
            endTime =
                aws.smithy.kotlin.runtime.time
                    .Instant(date2)
            metricDataQueries = dq
        }

    CloudWatchClient { region = "us-east-1" }.use { cwClient ->
        val response = cwClient.getMetricData(getMetReq)
        response.metricDataResults?.forEach { item ->
            println("The label is ${item.label}")
            println("The status code is ${item.statusCode}")
        }
    }
}

suspend fun describeAlarms() {
```

```

val typeList = ArrayList<AlarmType>()
typeList.add(AlarmType.MetricAlarm)
val alarmsRequest =
    DescribeAlarmsRequest {
        alarmTypes = typeList
        maxRecords = 10
    }

CloudWatchClient { region = "us-east-1" }.use { cwClient ->
    val response = cwClient.describeAlarms(alarmsRequest)
    response.metricAlarms?.forEach { alarm ->
        println("Alarm name: ${alarm.alarmName}")
        println("Alarm description: ${alarm.alarmDescription}")
    }
}
}

suspend fun createAlarm(fileName: String): String {
    // Read values from the JSON file.
    val parser = JsonFactory().createParser(File(fileName))
    val rootNode: JsonNode = ObjectMapper().readTree(parser)
    val customMetricNamespace = rootNode.findValue("customMetricNamespace").asText()
    val customMetricName = rootNode.findValue("customMetricName").asText()
    val alarmNameVal = rootNode.findValue("exampleAlarmName").asText()
    val emailTopic = rootNode.findValue("emailTopic").asText()
    val accountId = rootNode.findValue("accountId").asText()
    val region2 = rootNode.findValue("region").asText()

    // Create a List for alarm actions.
    val alarmActionObs: MutableList<String> = ArrayList()
    alarmActionObs.add("arn:aws:sns:$region2:$accountId:$emailTopic")
    val alarmRequest =
        PutMetricAlarmRequest {
            alarmActions = alarmActionObs
            alarmDescription = "Example metric alarm"
            alarmName = alarmNameVal
            comparisonOperator = ComparisonOperator.GreaterThanOrEqualToThreshold
            threshold = 100.00
            metricName = customMetricName
            namespace = customMetricNamespace
            evaluationPeriods = 1
            period = 10
            statistic = Statistic.Maximum
            datapointsToAlarm = 1
        }
}

```

```
        treatMissingData = "ignore"
    }

    CloudWatchClient { region = "us-east-1" }.use { cwClient ->
        cwClient.putMetricAlarm(alarmRequest)
        println("$alarmNameVal was successfully created!")
        return alarmNameVal
    }
}

suspend fun addMetricToDashboard(
    fileNameVal: String,
    dashboardNameVal: String,
) {
    val dashboardRequest =
        PutDashboardRequest {
            dashboardName = dashboardNameVal
            dashboardBody = readFileAsString(fileNameVal)
        }

    CloudWatchClient { region = "us-east-1" }.use { cwClient ->
        cwClient.putDashboard(dashboardRequest)
        println("$dashboardNameVal was successfully updated.")
    }
}

suspend fun createNewCustomMetric(dataPoint: Double) {
    val dimension =
        Dimension {
            name = "UNIQUE_PAGES"
            value = "URLS"
        }

    // Set an Instant object.
    val time =
        ZonedDateTime.now(ZoneOffset.UTC).format(DateTimeFormatter.ISO_INSTANT)
    val instant = Instant.parse(time)
    val datum =
        MetricDatum {
            metricName = "PAGES_VISITED"
            unit = StandardUnit.None
            value = dataPoint
            timestamp =
                aws.smithy.kotlin.runtime.time
```

```

        .Instant(instant)
        dimensions = listOf(dimension)
    }

    val request =
        PutMetricDataRequest {
            namespace = "SITE/TRAFFIC"
            metricData = listOf(datum)
        }

    CloudWatchClient { region = "us-east-1" }.use { cwClient ->
        cwClient.putMetricData(request)
        println("Added metric values for for metric PAGES_VISITED")
    }
}

suspend fun listDashboards() {
    CloudWatchClient { region = "us-east-1" }.use { cwClient ->
        cwClient
            .listDashboardsPaginated({})
            .transform { it.dashboardEntries?.forEach { obj -> emit(obj) } }
            .collect { obj ->
                println("Name is ${obj.dashboardName}")
                println("Dashboard ARN is ${obj.dashboardArn}")
            }
    }
}

suspend fun createDashboardWithMetrics(
    dashboardNameVal: String,
    fileNameVal: String,
) {
    val dashboardRequest =
        PutDashboardRequest {
            dashboardName = dashboardNameVal
            dashboardBody = readFileAsString(fileNameVal)
        }

    CloudWatchClient { region = "us-east-1" }.use { cwClient ->
        val response = cwClient.putDashboard(dashboardRequest)
        println("$dashboardNameVal was successfully created.")
        val messages = response.dashboardValidationMessages
        if (messages != null) {
            if (messages.isEmpty()) {

```

```
        println("There are no messages in the new Dashboard")
    } else {
        for (message in messages) {
            println("Message is: ${message.message}")
        }
    }
}
}
}

fun readFileAsString(file: String): String =
    String(Files.readAllBytes(Paths.get(file)))

suspend fun getMetricStatistics(costDateWeek: String?) {
    val start = Instant.parse(costDateWeek)
    val endDate = Instant.now()
    val dimension =
        Dimension {
            name = "Currency"
            value = "USD"
        }

    val dimensionList: MutableList<Dimension> = ArrayList()
    dimensionList.add(dimension)

    val statisticsRequest =
        GetMetricStatisticsRequest {
            metricName = "EstimatedCharges"
            namespace = "AWS/Billing"
            dimensions = dimensionList
            statistics = listOf(Statistic.Maximum)
            startTime =
                aws.smithy.kotlin.runtime.time
                    .Instant(start)
            endTime =
                aws.smithy.kotlin.runtime.time
                    .Instant(endDate)
            period = 86400
        }
    CloudWatchClient { region = "us-east-1" }.use { cwClient ->
        val response = cwClient.getMetricStatistics(statisticsRequest)
        val data: List<Datapoint>? = response.datapoints
        if (data != null) {
            if (!data.isEmpty()) {
```

```

        for (datapoint in data) {
            println("Timestamp: ${datapoint.timestamp} Maximum value:
${datapoint.maximum}")
        }
    } else {
        println("The returned data list is empty")
    }
}
}
}

suspend fun getAndDisplayMetricStatistics(
    namespaceVal: String,
    metVal: String,
    metricOption: String,
    date: String,
    myDimension: Dimension,
) {
    val start = Instant.parse(date)
    val endDate = Instant.now()
    val statisticsRequest =
        GetMetricStatisticsRequest {
            endTime =
                aws.smithy.kotlin.runtime.time
                    .Instant(endDate)
            startTime =
                aws.smithy.kotlin.runtime.time
                    .Instant(start)
            dimensions = listOf(myDimension)
            metricName = metVal
            namespace = namespaceVal
            period = 86400
            statistics = listOf(Statistic.fromValue(metricOption))
        }

    CloudWatchClient { region = "us-east-1" }.use { cwClient ->
        val response = cwClient.getMetricStatistics(statisticsRequest)
        val data = response.datapoints
        if (data != null) {
            if (data.isNotEmpty()) {
                for (datapoint in data) {
                    println("Timestamp: ${datapoint.timestamp} Maximum value:
${datapoint.maximum}")
                }
            }
        }
    }
}

```



```
        } else {
            println("The returned data list is empty")
        }
    }
}

suspend fun listMets(namespaceVal: String?): ArrayList<String>? {
    val metList = ArrayList<String>()
    val request =
        ListMetricsRequest {
            namespace = namespaceVal
        }
    CloudWatchClient { region = "us-east-1" }.use { cwClient ->
        val reponse = cwClient.listMetrics(request)
        reponse.metrics?.forEach { metrics ->
            val data = metrics.metricName
            if (!metList.contains(data)) {
                metList.add(data!!)
            }
        }
    }
    return metList
}

suspend fun getSpecificMet(namespaceVal: String?): Dimension? {
    val request =
        ListMetricsRequest {
            namespace = namespaceVal
        }
    CloudWatchClient { region = "us-east-1" }.use { cwClient ->
        val response = cwClient.listMetrics(request)
        val myList = response.metrics
        if (myList != null) {
            return myList[0].dimensions?.get(0)
        }
    }
    return null
}

suspend fun listNameSpaces(): ArrayList<String> {
    val nameSpaceList = ArrayList<String>()
    CloudWatchClient { region = "us-east-1" }.use { cwClient ->
        val response = cwClient.listMetrics(ListMetricsRequest {})
    }
}
```

```
        response.metrics?.forEach { metrics ->
            val data = metrics.namespace
            if (!nameSpaceList.contains(data)) {
                nameSpaceList.add(data!!)
            }
        }
    }
    return nameSpaceList
}
```

- For API details, see the following topics in *AWS SDK for Kotlin API reference*.

- [DeleteAlarms](#)
- [DeleteAnomalyDetector](#)
- [DeleteDashboards](#)
- [DescribeAlarmHistory](#)
- [DescribeAlarms](#)
- [DescribeAlarmsForMetric](#)
- [DescribeAnomalyDetectors](#)
- [GetMetricData](#)
- [GetMetricStatistics](#)
- [GetMetricWidgetImage](#)
- [ListMetrics](#)
- [PutAnomalyDetector](#)
- [PutDashboard](#)
- [PutMetricAlarm](#)
- [PutMetricData](#)

## Actions

### DeleteAlarms

The following code example shows how to use DeleteAlarms.

## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun deleteAlarm(alarmNameVal: String) {
    val request =
        DeleteAlarmsRequest {
            alarmNames = listOf(alarmNameVal)
        }

    CloudWatchClient { region = "us-east-1" }.use { cwClient ->
        cwClient.deleteAlarms(request)
        println("Successfully deleted alarm $alarmNameVal")
    }
}
```

- For API details, see [DeleteAlarms](#) in *AWS SDK for Kotlin API reference*.

## DeleteAnomalyDetector

The following code example shows how to use DeleteAnomalyDetector.

## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun deleteAnomalyDetector(fileName: String) {
    // Read values from the JSON file.
    val parser = JsonFactory().createParser(File(fileName))
    val rootNode = ObjectMapper().readTree<JsonNode>(parser)
```

```
val customMetricNamespace = rootNode.findValue("customMetricNamespace").asText()
val customMetricName = rootNode.findValue("customMetricName").asText()

val singleMetricAnomalyDetectorVal =
    SingleMetricAnomalyDetector {
        metricName = customMetricName
        namespace = customMetricNamespace
        stat = "Maximum"
    }

val request =
    DeleteAnomalyDetectorRequest {
        singleMetricAnomalyDetector = singleMetricAnomalyDetectorVal
    }

CloudWatchClient { region = "us-east-1" }.use { cwClient ->
    cwClient.deleteAnomalyDetector(request)
    println("Successfully deleted the Anomaly Detector.")
}
}
```

- For API details, see [DeleteAnomalyDetector](#) in *AWS SDK for Kotlin API reference*.

## DeleteDashboards

The following code example shows how to use DeleteDashboards.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun deleteDashboard(dashboardName: String) {
    val dashboardsRequest =
        DeleteDashboardsRequest {
            dashboardNames = listOf(dashboardName)
        }
}
```

```
CloudWatchClient { region = "us-east-1" }.use { cwClient ->
    cwClient.deleteDashboards(dashboardsRequest)
    println("$dashboardName was successfully deleted.")
}
}
```

- For API details, see [DeleteDashboards](#) in *AWS SDK for Kotlin API reference*.

## DescribeAlarmHistory

The following code example shows how to use DescribeAlarmHistory.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun getAlarmHistory(
    fileName: String,
    date: String,
) {
    // Read values from the JSON file.
    val parser = JsonFactory().createParser(File(fileName))
    val rootNode = ObjectMapper().readTree<JsonNode>(parser)
    val alarmNameVal = rootNode.findValue("exampleAlarmName").asText()
    val start = Instant.parse(date)
    val endDateVal = Instant.now()

    val historyRequest =
        DescribeAlarmHistoryRequest {
            startDate =
                aws.smithy.kotlin.runtime.time
                    .Instant(start)
            endDate =
                aws.smithy.kotlin.runtime.time
                    .Instant(endDateVal)
            alarmName = alarmNameVal
            historyItemType = HistoryItemType.Action
        }
}
```

```

    }

    CloudWatchClient {
        credentialsProvider = EnvironmentCredentialsProvider()
        region = "us-east-1"
    }.use { cwClient ->
        val response = cwClient.describeAlarmHistory(historyRequest)
        val historyItems = response.alarmHistoryItems
        if (historyItems != null) {
            if (historyItems.isEmpty()) {
                println("No alarm history data found for $alarmNameVal.")
            } else {
                for (item in historyItems) {
                    println("History summary ${item.historySummary}")
                    println("Time stamp: ${item.timestamp}")
                }
            }
        }
    }
}

```

- For API details, see [DescribeAlarmHistory](#) in *AWS SDK for Kotlin API reference*.

## DescribeAlarms

The following code example shows how to use DescribeAlarms.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```

suspend fun describeAlarms() {
    val typeList = ArrayList<AlarmType>()
    typeList.add(AlarmType.MetricAlarm)
    val alarmsRequest =
        DescribeAlarmsRequest {
            alarmTypes = typeList
        }
}

```

```

        maxRecords = 10
    }

    CloudWatchClient { region = "us-east-1" }.use { cwClient ->
        val response = cwClient.describeAlarms(alarmsRequest)
        response.metricAlarms?.forEach { alarm ->
            println("Alarm name: ${alarm.alarmName}")
            println("Alarm description: ${alarm.alarmDescription}")
        }
    }
}

```

- For API details, see [DescribeAlarms](#) in *AWS SDK for Kotlin API reference*.

## DescribeAlarmsForMetric

The following code example shows how to use `DescribeAlarmsForMetric`.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```

suspend fun checkForMetricAlarm(fileName: String?) {
    // Read values from the JSON file.
    val parser = JsonFactory().createParser(File(fileName))
    val rootNode = ObjectMapper().readTree<JsonNode>(parser)
    val customMetricNamespace = rootNode.findValue("customMetricNamespace").asText()
    val customMetricName = rootNode.findValue("customMetricName").asText()
    var hasAlarm = false
    var retries = 10

    val metricRequest =
        DescribeAlarmsForMetricRequest {
            metricName = customMetricName
            namespace = customMetricNamespace
        }
    CloudWatchClient { region = "us-east-1" }.use { cwClient ->

```

```
while (!hasAlarm && retries > 0) {
    val response = cwClient.describeAlarmsForMetric(metricRequest)
    if (response.metricAlarms?.count()!! > 0) {
        hasAlarm = true
    }
    retries--
    delay(20000)
    println(".")
}
if (!hasAlarm) {
    println("No Alarm state found for $customMetricName after 10 retries.")
} else {
    println("Alarm state found for $customMetricName.")
}
}
```

- For API details, see [DescribeAlarmsForMetric](#) in *AWS SDK for Kotlin API reference*.

## DescribeAnomalyDetectors

The following code example shows how to use `DescribeAnomalyDetectors`.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun describeAnomalyDetectors(fileName: String) {
    // Read values from the JSON file.
    val parser = JsonFactory().createParser(File(fileName))
    val rootNode = ObjectMapper().readTree<JsonNode>(parser)
    val customMetricNamespace = rootNode.findValue("customMetricNamespace").asText()
    val customMetricName = rootNode.findValue("customMetricName").asText()

    val detectorsRequest =
        DescribeAnomalyDetectorsRequest {
            maxResults = 10
        }
}
```



```

        metricName = customMetricName
        namespace = customMetricNamespace
    }
    CloudWatchClient { region = "us-east-1" }.use { cwClient ->
        val response = cwClient.describeAnomalyDetectors(detectorsRequest)
        response.anomalyDetectors?.forEach { detector ->
            println("Metric name:
                ${detector.singleMetricAnomalyDetector?.metricName}")
            println("State: ${detector.stateValue}")
        }
    }
}

```

- For API details, see [DescribeAnomalyDetectors](#) in *AWS SDK for Kotlin API reference*.

## DisableAlarmActions

The following code example shows how to use `DisableAlarmActions`.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```

suspend fun disableActions(alarmName: String) {
    val request =
        DisableAlarmActionsRequest {
            alarmNames = listOf(alarmName)
        }
    CloudWatchClient { region = "us-east-1" }.use { cwClient ->
        cwClient.disableAlarmActions(request)
        println("Successfully disabled actions on alarm $alarmName")
    }
}

```

- For API details, see [DisableAlarmActions](#) in *AWS SDK for Kotlin API reference*.

## EnableAlarmActions

The following code example shows how to use `EnableAlarmActions`.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun enableActions(alarm: String) {
    val request =
        EnableAlarmActionsRequest {
            alarmNames = listOf(alarm)
        }

    CloudWatchClient { region = "us-east-1" }.use { cwClient ->
        cwClient.enableAlarmActions(request)
        println("Successfully enabled actions on alarm $alarm")
    }
}
```

- For API details, see [EnableAlarmActions](#) in *AWS SDK for Kotlin API reference*.

## GetMetricData

The following code example shows how to use `GetMetricData`.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun getCustomMetricData(fileName: String) {
```

```
// Read values from the JSON file.
val parser = JsonFactory().createParser(File(fileName))
val rootNode = ObjectMapper().readTree<JsonNode>(parser)
val customMetricNamespace = rootNode.findValue("customMetricNamespace").asText()
val customMetricName = rootNode.findValue("customMetricName").asText()

// Set the date.
val nowDate = Instant.now()
val hours: Long = 1
val minutes: Long = 30
val date2 =
    nowDate.plus(hours, ChronoUnit.HOURS).plus(
        minutes,
        ChronoUnit.MINUTES,
    )

val met =
    Metric {
        metricName = customMetricName
        namespace = customMetricNamespace
    }

val metStat =
    MetricStat {
        stat = "Maximum"
        period = 1
        metric = met
    }

val dataQuery =
    MetricDataQuery {
        metricStat = metStat
        id = "foo2"
        returnData = true
    }

val dq = ArrayList<MetricDataQuery>()
dq.add(dataQuery)
val getMetReq =
    GetMetricDataRequest {
        maxDatapoints = 10
        scanBy = ScanBy.TimestampDescending
        startTime =
            aws.smithy.kotlin.runtime.time
```

```

        .Instant(nowDate)
    endTime =
        aws.smithy.kotlin.runtime.time
            .Instant(date2)
    metricDataQueries = dq
}

CloudWatchClient { region = "us-east-1" }.use { cwClient ->
    val response = cwClient.getMetricData(getMetReq)
    response.metricDataResults?.forEach { item ->
        println("The label is ${item.label}")
        println("The status code is ${item.statusCode}")
    }
}
}
}

```

- For API details, see [GetMetricData](#) in *AWS SDK for Kotlin API reference*.

## GetMetricStatistics

The following code example shows how to use `GetMetricStatistics`.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```

suspend fun getAndDisplayMetricStatistics(
    namespaceVal: String,
    metVal: String,
    metricOption: String,
    date: String,
    myDimension: Dimension,
) {
    val start = Instant.parse(date)
    val endDate = Instant.now()
    val statisticsRequest =
        GetMetricStatisticsRequest {

```

```

        endTime =
            aws.smithy.kotlin.runtime.time
                .Instant(endDate)
        startTime =
            aws.smithy.kotlin.runtime.time
                .Instant(start)
        dimensions = listOf(myDimension)
        metricName = metVal
        namespace = nameSpaceVal
        period = 86400
        statistics = listOf(Statistic.fromValue(metricOption))
    }

    CloudWatchClient { region = "us-east-1" }.use { cwClient ->
        val response = cwClient.getMetricStatistics(statisticsRequest)
        val data = response.datapoints
        if (data != null) {
            if (data.isNotEmpty()) {
                for (datapoint in data) {
                    println("Timestamp: ${datapoint.timestamp} Maximum value:
${datapoint.maximum}")
                }
            } else {
                println("The returned data list is empty")
            }
        }
    }
}

```

- For API details, see [GetMetricStatistics](#) in *AWS SDK for Kotlin API reference*.

## GetMetricWidgetImage

The following code example shows how to use `GetMetricWidgetImage`.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun getAndOpenMetricImage(fileName: String) {
    println("Getting Image data for custom metric.")
    val myJSON = """{
        "title": "Example Metric Graph",
        "view": "timeSeries",
        "stacked ": false,
        "period": 10,
        "width": 1400,
        "height": 600,
        "metrics": [
            [
                "AWS/Billing",
                "EstimatedCharges",
                "Currency",
                "USD"
            ]
        ]
    }"""

    val imageRequest =
        GetMetricWidgetImageRequest {
            metricWidget = myJSON
        }

    CloudWatchClient { region = "us-east-1" }.use { cwClient ->
        val response = cwClient.getMetricWidgetImage(imageRequest)
        val bytes = response.metricWidgetImage
        if (bytes != null) {
            File(fileName).writeBytes(bytes)
        }
    }
    println("You have successfully written data to $fileName")
}
```

- For API details, see [GetMetricWidgetImage](#) in *AWS SDK for Kotlin API reference*.

## ListDashboards

The following code example shows how to use ListDashboards.

## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun listDashboards() {
    CloudWatchClient { region = "us-east-1" }.use { cwClient ->
        cwClient
            .listDashboardsPaginated({})
            .transform { it.dashboardEntries?.forEach { obj -> emit(obj) } }
            .collect { obj ->
                println("Name is ${obj.dashboardName}")
                println("Dashboard ARN is ${obj.dashboardArn}")
            }
    }
}
```

- For API details, see [ListDashboards](#) in *AWS SDK for Kotlin API reference*.

## ListMetrics

The following code example shows how to use `ListMetrics`.

## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun listMets(namespaceVal: String?): ArrayList<String>? {
    val metList = ArrayList<String>()
    val request =
        ListMetricsRequest {
```

```

        namespace = namespaceVal
    }
    CloudWatchClient { region = "us-east-1" }.use { cwClient ->
        val reponse = cwClient.listMetrics(request)
        reponse.metrics?.forEach { metrics ->
            val data = metrics.metricName
            if (!metList.contains(data)) {
                metList.add(data!!)
            }
        }
    }
    return metList
}

```

- For API details, see [ListMetrics](#) in *AWS SDK for Kotlin API reference*.

## PutAnomalyDetector

The following code example shows how to use PutAnomalyDetector.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```

suspend fun addAnomalyDetector(fileName: String?) {
    // Read values from the JSON file.
    val parser = JsonFactory().createParser(File(fileName))
    val rootNode = ObjectMapper().readTree<JsonNode>(parser)
    val customMetricNamespace = rootNode.findValue("customMetricNamespace").asText()
    val customMetricName = rootNode.findValue("customMetricName").asText()

    val singleMetricAnomalyDetectorVal =
        SingleMetricAnomalyDetector {
            metricName = customMetricName
            namespace = customMetricNamespace
            stat = "Maximum"
        }
}

```



```

    }

    val anomalyDetectorRequest =
        PutAnomalyDetectorRequest {
            singleMetricAnomalyDetector = singleMetricAnomalyDetectorVal
        }

    CloudWatchClient { region = "us-east-1" }.use { cwClient ->
        cwClient.putAnomalyDetector(anomalyDetectorRequest)
        println("Added anomaly detector for metric $customMetricName.")
    }
}

```

- For API details, see [PutAnomalyDetector](#) in *AWS SDK for Kotlin API reference*.

## PutDashboard

The following code example shows how to use PutDashboard.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```

suspend fun createDashboardWithMetrics(
    dashboardNameVal: String,
    fileNameVal: String,
) {
    val dashboardRequest =
        PutDashboardRequest {
            dashboardName = dashboardNameVal
            dashboardBody = readFileAsString(fileNameVal)
        }

    CloudWatchClient { region = "us-east-1" }.use { cwClient ->
        val response = cwClient.putDashboard(dashboardRequest)
        println("$dashboardNameVal was successfully created.")
    }
}

```

```
    val messages = response.dashboardValidationMessages
    if (messages != null) {
        if (messages.isEmpty()) {
            println("There are no messages in the new Dashboard")
        } else {
            for (message in messages) {
                println("Message is: ${message.message}")
            }
        }
    }
}
```

- For API details, see [PutDashboard](#) in *AWS SDK for Kotlin API reference*.

## PutMetricAlarm

The following code example shows how to use PutMetricAlarm.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun putMetricAlarm(
    alarmNameVal: String,
    instanceIdVal: String,
) {
    val dimension0b =
        Dimension {
            name = "InstanceId"
            value = instanceIdVal
        }

    val request =
        PutMetricAlarmRequest {
            alarmName = alarmNameVal
```

```

        comparisonOperator = ComparisonOperator.GreaterThanThreshold
        evaluationPeriods = 1
        metricName = "CPUUtilization"
        namespace = "AWS/EC2"
        period = 60
        statistic = Statistic.fromValue("Average")
        threshold = 70.0
        actionsEnabled = false
        alarmDescription = "An Alarm created by the Kotlin SDK when server CPU
utilization exceeds 70%"
        unit = StandardUnit.fromValue("Seconds")
        dimensions = listOf(dimension0b)
    }

    CloudWatchClient { region = "us-east-1" }.use { cwClient ->
        cwClient.putMetricAlarm(request)
        println("Successfully created an alarm with name $alarmNameVal")
    }
}

```

- For API details, see [PutMetricAlarm](#) in *AWS SDK for Kotlin API reference*.

## PutMetricData

The following code example shows how to use PutMetricData.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```

suspend fun addMetricDataForAlarm(fileName: String?) {
    // Read values from the JSON file.
    val parser = JsonFactory().createParser(File(fileName))
    val rootNode = ObjectMapper().readTree<JsonNode>(parser)
    val customMetricNamespace = rootNode.findValue("customMetricNamespace").asText()
    val customMetricName = rootNode.findValue("customMetricName").asText()
}

```

```
// Set an Instant object.
val time =
ZonedDateTime.now(ZoneOffset.UTC).format(DateTimeFormatter.ISO_INSTANT)
val instant = Instant.parse(time)
val datum =
    MetricDatum {
        metricName = customMetricName
        unit = StandardUnit.None
        value = 1001.00
        timestamp =
            aws.smithy.kotlin.runtime.time
                .Instant(instant)
    }

val datum2 =
    MetricDatum {
        metricName = customMetricName
        unit = StandardUnit.None
        value = 1002.00
        timestamp =
            aws.smithy.kotlin.runtime.time
                .Instant(instant)
    }

val metricDataList = ArrayList<MetricDatum>()
metricDataList.add(datum)
metricDataList.add(datum2)

val request =
    PutMetricDataRequest {
        namespace = customMetricNamespace
        metricData = metricDataList
    }

CloudWatchClient { region = "us-east-1" }.use { cwClient ->
    cwClient.putMetricData(request)
    println("Added metric values for for metric $customMetricName")
}
}
```

- For API details, see [PutMetricData](#) in *AWS SDK for Kotlin API reference*.

# CloudWatch Logs examples using SDK for Kotlin

The following code examples show you how to perform actions and implement common scenarios by using the AWS SDK for Kotlin with CloudWatch Logs.

*Actions* are code excerpts from larger programs and must be run in context. While actions show you how to call individual service functions, you can see actions in context in their related scenarios.

Each example includes a link to the complete source code, where you can find instructions on how to set up and run the code in context.

## Topics

- [Actions](#)

## Actions

### DeleteSubscriptionFilter

The following code example shows how to use DeleteSubscriptionFilter.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun deleteSubFilter(
    filter: String?,
    logGroup: String?,
) {
    val request =
        DeleteSubscriptionFilterRequest {
            filterName = filter
            logGroupName = logGroup
        }

    CloudWatchLogsClient { region = "us-west-2" }.use { logs ->
```

```
logs.deleteSubscriptionFilter(request)
println("Successfully deleted CloudWatch logs subscription filter named
$filter")
}
}
```

- For API details, see [DeleteSubscriptionFilter](#) in *AWS SDK for Kotlin API reference*.

## DescribeSubscriptionFilters

The following code example shows how to use DescribeSubscriptionFilters.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun describeFilters(logGroup: String) {
    val request =
        DescribeSubscriptionFiltersRequest {
            logGroupName = logGroup
            limit = 1
        }

    CloudWatchLogsClient { region = "us-west-2" }.use { cwlClient ->
        val response = cwlClient.describeSubscriptionFilters(request)
        response.subscriptionFilters?.forEach { filter ->
            println("Retrieved filter with name ${filter.filterName} pattern
            ${filter.filterPattern} and destination ${filter.destinationArn}")
        }
    }
}
```

- For API details, see [DescribeSubscriptionFilters](#) in *AWS SDK for Kotlin API reference*.

## StartLiveTail

The following code example shows how to use StartLiveTail.

### SDK for Kotlin

Include the required files.

```
import aws.sdk.kotlin.services.cloudwatchlogs.CloudWatchLogsClient
import aws.sdk.kotlin.services.cloudwatchlogs.model.StartLiveTailRequest
import aws.sdk.kotlin.services.cloudwatchlogs.model.StartLiveTailResponseStream
import kotlinx.coroutines.flow.takeWhile
```

Start the Live Tail session.

```
val client = CloudWatchLogsClient.fromEnvironment()

val request = StartLiveTailRequest {
    logGroupIdentifiers = logGroupIdentifiersVal
    logStreamNames = logStreamNamesVal
    logEventFilterPattern = logEventFilterPatternVal
}

val startTime = System.currentTimeMillis()

try {
    client.startLiveTail(request) { response ->
        val stream = response.responseStream
        if (stream != null) {
            /* Set a timeout to unsubscribe from the flow. This will:
            * 1). Close the stream
            * 2). Stop the Live Tail session
            */
            stream.takeWhile { System.currentTimeMillis() - startTime <
10000 }.collect { value ->
                if (value is StartLiveTailResponseStream.SessionStart) {
                    println(value.asSessionStart())
                } else if (value is StartLiveTailResponseStream.SessionUpdate) {
                    for (e in value.asSessionUpdate().sessionResults!!) {
                        println(e)
                    }
                } else {
```

```
                throw IllegalArgumentException("Unknown event type")
            }
        }
    } else {
        throw IllegalArgumentException("No response stream")
    }
}
} catch (e: Exception) {
    println("Exception occurred during StartLiveTail: $e")
    System.exit(1)
}
```

- For API details, see [StartLiveTail](#) in *AWS SDK for Kotlin API reference*.

## Amazon Cognito Identity Provider examples using SDK for Kotlin

The following code examples show you how to perform actions and implement common scenarios by using the AWS SDK for Kotlin with Amazon Cognito Identity Provider.

*Actions* are code excerpts from larger programs and must be run in context. While actions show you how to call individual service functions, you can see actions in context in their related scenarios.

*Scenarios* are code examples that show you how to accomplish specific tasks by calling multiple functions within a service or combined with other AWS services.

Each example includes a link to the complete source code, where you can find instructions on how to set up and run the code in context.

### Topics

- [Actions](#)
- [Scenarios](#)

## Actions

### AdminGetUser

The following code example shows how to use AdminGetUser.



## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun getAdminUser(
    userNameVal: String?,
    poolIdVal: String?,
) {
    val userRequest =
        AdminGetUserRequest {
            username = userNameVal
            userPoolId = poolIdVal
        }

    CognitoIdentityProviderClient { region = "us-east-1" }.use
    { identityProviderClient ->
        val response = identityProviderClient.adminGetUser(userRequest)
        println("User status ${response.userStatus}")
    }
}
```

- For API details, see [AdminGetUser](#) in *AWS SDK for Kotlin API reference*.

## AdminInitiateAuth

The following code example shows how to use AdminInitiateAuth.

## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun checkAuthMethod(
    clientIdVal: String,
    userNameVal: String,
    passwordVal: String,
    userPoolIdVal: String,
): AdminInitiateAuthResponse {
    val authParas = mutableMapOf<String, String>()
    authParas["USERNAME"] = userNameVal
    authParas["PASSWORD"] = passwordVal

    val authRequest =
        AdminInitiateAuthRequest {
            clientId = clientIdVal
            userPoolId = userPoolIdVal
            authParameters = authParas
            authFlow = AuthFlowType.AdminUserPasswordAuth
        }

    CognitoIdentityProviderClient { region = "us-east-1" }.use
    { identityProviderClient ->
        val response = identityProviderClient.adminInitiateAuth(authRequest)
        println("Result Challenge is ${response.challengeName}")
        return response
    }
}
```

- For API details, see [AdminInitiateAuth](#) in *AWS SDK for Kotlin API reference*.

## AdminRespondToAuthChallenge

The following code example shows how to use `AdminRespondToAuthChallenge`.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```

// Respond to an authentication challenge.
suspend fun adminRespondToAuthChallenge(
    userName: String,
    clientIdVal: String?,
    mfaCode: String,
    sessionVal: String?,
) {
    println("SOFTWARE_TOKEN_MFA challenge is generated")
    val challengeResponses0b = mutableMapOf<String, String>()
    challengeResponses0b["USERNAME"] = userName
    challengeResponses0b["SOFTWARE_TOKEN_MFA_CODE"] = mfaCode

    val adminRespondToAuthChallengeRequest =
        AdminRespondToAuthChallengeRequest {
            challengeName = ChallengeNameType.SoftwareTokenMfa
            clientId = clientIdVal
            challengeResponses = challengeResponses0b
            session = sessionVal
        }

    CognitoIdentityProviderClient { region = "us-east-1" }.use
    { identityProviderClient ->
        val respondToAuthChallengeResult =
            identityProviderClient.adminRespondToAuthChallenge(adminRespondToAuthChallengeRequest)
        println("respondToAuthChallengeResult.getAuthenticationResult()
        ${respondToAuthChallengeResult.authenticationResult}")
    }
}

```

- For API details, see [AdminRespondToAuthChallenge](#) in *AWS SDK for Kotlin API reference*.

## AssociateSoftwareToken

The following code example shows how to use AssociateSoftwareToken.

## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun getSecretForAppMFA(sessionVal: String?): String? {
    val softwareTokenRequest =
        AssociateSoftwareTokenRequest {
            session = sessionVal
        }

    CognitoIdentityProviderClient { region = "us-east-1" }.use
{ identityProviderClient ->
    val tokenResponse =
identityProviderClient.associateSoftwareToken(softwareTokenRequest)
    val secretCode = tokenResponse.secretCode
    println("Enter this token into Google Authenticator")
    println(secretCode)
    return tokenResponse.session
}
}
```

- For API details, see [AssociateSoftwareToken](#) in *AWS SDK for Kotlin API reference*.

## ConfirmSignUp

The following code example shows how to use `ConfirmSignUp`.

## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun confirmSignUp(
    clientIdVal: String?,
    codeVal: String?,
    userNameVal: String?,
) {
    val signUpRequest =
        ConfirmSignUpRequest {
            clientId = clientIdVal
            confirmationCode = codeVal
            username = userNameVal
        }

    CognitoIdentityProviderClient { region = "us-east-1" }.use
    { identityProviderClient ->
        identityProviderClient.confirmSignUp(signUpRequest)
        println("$userNameVal was confirmed")
    }
}
```

- For API details, see [ConfirmSignUp](#) in *AWS SDK for Kotlin API reference*.

## ListUsers

The following code example shows how to use ListUsers.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun listAllUsers(userPoolId: String) {
    val request =
        ListUsersRequest {
            this.userPoolId = userPoolId
        }

    CognitoIdentityProviderClient { region = "us-east-1" }.use { cognitoClient ->
```

```
val response = cognitoClient.listUsers(request)
response.users?.forEach { user ->
    println("The user name is ${user.username}")
}
}
```

- For API details, see [ListUsers](#) in *AWS SDK for Kotlin API reference*.

## ResendConfirmationCode

The following code example shows how to use ResendConfirmationCode.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun resendConfirmationCode(
    clientIdVal: String?,
    userNameVal: String?,
) {
    val codeRequest =
        ResendConfirmationCodeRequest {
            clientId = clientIdVal
            username = userNameVal
        }

    CognitoIdentityProviderClient { region = "us-east-1" }.use
    { identityProviderClient ->
        val response = identityProviderClient.resendConfirmationCode(codeRequest)
        println("Method of delivery is " +
            (response.codeDeliveryDetails?.deliveryMedium))
    }
}
```

- For API details, see [ResendConfirmationCode](#) in *AWS SDK for Kotlin API reference*.

## SignUp

The following code example shows how to use SignUp.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun signUp(
    clientIdVal: String?,
    userNameVal: String?,
    passwordVal: String?,
    emailVal: String?,
) {
    val userAttrs =
        AttributeType {
            name = "email"
            value = emailVal
        }

    val userAttrsList = mutableListOf<AttributeType>()
    userAttrsList.add(userAttrs)
    val signUpRequest =
        SignUpRequest {
            userAttributes = userAttrsList
            username = userNameVal
            clientId = clientIdVal
            password = passwordVal
        }

    CognitoIdentityProviderClient { region = "us-east-1" }.use
    { identityProviderClient ->
        identityProviderClient.signUp(signUpRequest)
        println("User has been signed up")
    }
}
```

- For API details, see [SignUp](#) in *AWS SDK for Kotlin API reference*.

## VerifySoftwareToken

The following code example shows how to use `VerifySoftwareToken`.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
// Verify the TOTP and register for MFA.
suspend fun verifyTOTP(
    sessionVal: String?,
    codeVal: String?,
) {
    val tokenRequest =
        VerifySoftwareTokenRequest {
            userCode = codeVal
            session = sessionVal
        }

    CognitoIdentityProviderClient { region = "us-east-1" }.use
    { identityProviderClient ->
        val verifyResponse =
            identityProviderClient.verifySoftwareToken(tokenRequest)
        println("The status of the token is ${verifyResponse.status}")
    }
}
```

- For API details, see [VerifySoftwareToken](#) in *AWS SDK for Kotlin API reference*.



## Scenarios

### Sign up a user with a user pool that requires MFA

The following code example shows how to:

- Sign up and confirm a user with a username, password, and email address.
- Set up multi-factor authentication by associating an MFA application with the user.
- Sign in by using a password and an MFA code.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
/**
```

```
Before running this Kotlin code example, set up your development environment, including your credentials.
```

```
For more information, see the following documentation:
```

```
https://docs.aws.amazon.com/sdk-for-kotlin/latest/developer-guide/setup.html
```

```
TIP: To set up the required user pool, run the AWS Cloud Development Kit (AWS CDK) script provided in this GitHub repo at resources/cdk/cognito_scenario_user_pool_with_mfa.
```

```
This code example performs the following operations:
```

1. Invokes the `signUp` method to sign up a user.
2. Invokes the `adminGetUser` method to get the user's confirmation status.
3. Invokes the `ResendConfirmationCode` method if the user requested another code.
4. Invokes the `confirmSignUp` method.
5. Invokes the `initiateAuth` to sign in. This results in being prompted to set up TOTP (time-based one-time password). (The response is "ChallengeName": "MFA\_SETUP").
6. Invokes the `AssociateSoftwareToken` method to generate a TOTP MFA private key. This can be used with Google Authenticator.

7. Invokes the `VerifySoftwareToken` method to verify the TOTP and register for MFA.
  8. Invokes the `AdminInitiateAuth` to sign in again. This results in being prompted to submit a TOTP (Response: "ChallengeName": "SOFTWARE\_TOKEN\_MFA").
  9. Invokes the `AdminRespondToAuthChallenge` to get back a token.
- \*/

```
suspend fun main(args: Array<String>) {
    val usage = """
        Usage:
            <clientId> <poolId>
        Where:
            clientId - The app client Id value that you can get from the AWS CDK
script.
            poolId - The pool Id that you can get from the AWS CDK script.
        """

    if (args.size != 2) {
        println(usage)
        exitProcess(1)
    }

    val clientId = args[0]
    val poolId = args[1]

    // Use the console to get data from the user.
    println("**** Enter your use name")
    val in0b = Scanner(System.`in`)
    val userName = in0b.nextLine()
    println(userName)

    println("**** Enter your password")
    val password: String = in0b.nextLine()

    println("**** Enter your email")
    val email = in0b.nextLine()

    println("**** Signing up $userName")
    signUp(clientId, userName, password, email)

    println("**** Getting $userName in the user pool")
    getAdminUser(userName, poolId)

    println("**** Confirmation code sent to $userName. Would you like to send a new
code? (Yes/No)")
}
```

```

val ans = in0b.nextLine()

if (ans.compareTo("Yes") == 0) {
    println("**** Sending a new confirmation code")
    resendConfirmationCode(clientId, userName)
}
println("**** Enter the confirmation code that was emailed")
val code = in0b.nextLine()
confirmSignUp(clientId, code, userName)

println("**** Rechecking the status of $userName in the user pool")
getAdminUser(userName, poolId)

val authResponse = checkAuthMethod(clientId, userName, password, poolId)
val mySession = authResponse.session
val newSession = getSecretForAppMFA(mySession)
println("**** Enter the 6-digit code displayed in Google Authenticator")
val myCode = in0b.nextLine()

// Verify the TOTP and register for MFA.
verifyTOTP(newSession, myCode)
println("**** Re-enter a 6-digit code displayed in Google Authenticator")
val mfaCode: String = in0b.nextLine()
val authResponse1 = checkAuthMethod(clientId, userName, password, poolId)
val session2 = authResponse1.session
adminRespondToAuthChallenge(userName, clientId, mfaCode, session2)
}

suspend fun checkAuthMethod(
    clientIdVal: String,
    userNameVal: String,
    passwordVal: String,
    userPoolIdVal: String,
): AdminInitiateAuthResponse {
    val authParas = mutableMapOf<String, String>()
    authParas["USERNAME"] = userNameVal
    authParas["PASSWORD"] = passwordVal

    val authRequest =
        AdminInitiateAuthRequest {
            clientId = clientIdVal
            userPoolId = userPoolIdVal
            authParameters = authParas
            authFlow = AuthFlowType.AdminUserPasswordAuth

```

```

    }

    CognitoIdentityProviderClient { region = "us-east-1" }.use
{ identityProviderClient ->
    val response = identityProviderClient.adminInitiateAuth(authRequest)
    println("Result Challenge is ${response.challengeName}")
    return response
}
}

suspend fun resendConfirmationCode(
    clientIdVal: String?,
    userNameVal: String?,
) {
    val codeRequest =
        ResendConfirmationCodeRequest {
            clientId = clientIdVal
            username = userNameVal
        }

    CognitoIdentityProviderClient { region = "us-east-1" }.use
{ identityProviderClient ->
    val response = identityProviderClient.resendConfirmationCode(codeRequest)
    println("Method of delivery is " +
(response.codeDeliveryDetails?.deliveryMedium))
}
}

// Respond to an authentication challenge.
suspend fun adminRespondToAuthChallenge(
    userName: String,
    clientIdVal: String?,
    mfaCode: String,
    sessionVal: String?,
) {
    println("SOFTWARE_TOKEN_MFA challenge is generated")
    val challengeResponsesOb = mutableMapOf<String, String>()
    challengeResponsesOb["USERNAME"] = userName
    challengeResponsesOb["SOFTWARE_TOKEN_MFA_CODE"] = mfaCode

    val adminRespondToAuthChallengeRequest =
        AdminRespondToAuthChallengeRequest {
            challengeName = ChallengeNameType.SoftwareTokenMfa
            clientId = clientIdVal

```

```

        challengeResponses = challengeResponsesOb
        session = sessionVal
    }

    CognitoIdentityProviderClient { region = "us-east-1" }.use
{ identityProviderClient ->
    val respondToAuthChallengeResult =
identityProviderClient.adminRespondToAuthChallenge(adminRespondToAuthChallengeRequest)
    println("respondToAuthChallengeResult.getAuthenticationResult()
${respondToAuthChallengeResult.authenticationResult}")
}
}

// Verify the TOTP and register for MFA.
suspend fun verifyTOTP(
    sessionVal: String?,
    codeVal: String?,
) {
    val tokenRequest =
        VerifySoftwareTokenRequest {
            userCode = codeVal
            session = sessionVal
        }

    CognitoIdentityProviderClient { region = "us-east-1" }.use
{ identityProviderClient ->
    val verifyResponse =
identityProviderClient.verifySoftwareToken(tokenRequest)
    println("The status of the token is ${verifyResponse.status}")
}
}

suspend fun getSecretForAppMFA(sessionVal: String?): String? {
    val softwareTokenRequest =
        AssociateSoftwareTokenRequest {
            session = sessionVal
        }

    CognitoIdentityProviderClient { region = "us-east-1" }.use
{ identityProviderClient ->
    val tokenResponse =
identityProviderClient.associateSoftwareToken(softwareTokenRequest)
    val secretCode = tokenResponse.secretCode
    println("Enter this token into Google Authenticator")
}
}

```

```
        println(secretCode)
        return tokenResponse.session
    }
}

suspend fun confirmSignUp(
    clientIdVal: String?,
    codeVal: String?,
    userNameVal: String?,
) {
    val signUpRequest =
        ConfirmSignUpRequest {
            clientId = clientIdVal
            confirmationCode = codeVal
            username = userNameVal
        }

    CognitoIdentityProviderClient { region = "us-east-1" }.use
    { identityProviderClient ->
        identityProviderClient.confirmSignUp(signUpRequest)
        println("$userNameVal was confirmed")
    }
}

suspend fun getAdminUser(
    userNameVal: String?,
    poolIdVal: String?,
) {
    val userRequest =
        AdminGetUserRequest {
            username = userNameVal
            userPoolId = poolIdVal
        }

    CognitoIdentityProviderClient { region = "us-east-1" }.use
    { identityProviderClient ->
        val response = identityProviderClient.adminGetUser(userRequest)
        println("User status ${response.userStatus}")
    }
}

suspend fun signUp(
    clientIdVal: String?,
    userNameVal: String?,
```

```
passwordVal: String?,
emailVal: String?,
) {
    val userAttrs =
        AttributeType {
            name = "email"
            value = emailVal
        }

    val userAttrsList = mutableListOf<AttributeType>()
    userAttrsList.add(userAttrs)
    val signUpRequest =
        SignUpRequest {
            userAttributes = userAttrsList
            username = userNameVal
            clientId = clientIdVal
            password = passwordVal
        }

    CognitoIdentityProviderClient { region = "us-east-1" }.use
    { identityProviderClient ->
        identityProviderClient.signUp(signUpRequest)
        println("User has been signed up")
    }
}
```

- For API details, see the following topics in *AWS SDK for Kotlin API reference*.
  - [AdminGetUser](#)
  - [AdminInitiateAuth](#)
  - [AdminRespondToAuthChallenge](#)
  - [AssociateSoftwareToken](#)
  - [ConfirmDevice](#)
  - [ConfirmSignUp](#)
  - [InitiateAuth](#)
  - [ListUsers](#)
  - [ResendConfirmationCode](#)
  - [RespondToAuthChallenge](#)
  - [SignUp](#)

- [VerifySoftwareToken](#)

## Amazon Comprehend examples using SDK for Kotlin

The following code examples show you how to perform actions and implement common scenarios by using the AWS SDK for Kotlin with Amazon Comprehend.

*Scenarios* are code examples that show you how to accomplish specific tasks by calling multiple functions within a service or combined with other AWS services.

Each example includes a link to the complete source code, where you can find instructions on how to set up and run the code in context.

### Topics

- [Scenarios](#)

## Scenarios

### Create a messaging application

The following code example shows how to create a messaging application by using Amazon SQS.

#### SDK for Kotlin

Shows how to use the Amazon SQS API to develop a Spring REST API that sends and retrieves messages.

For complete source code and instructions on how to set up and run, see the full example on [GitHub](#).

#### Services used in this example

- Amazon Comprehend
- Amazon SQS

## DynamoDB examples using SDK for Kotlin

The following code examples show you how to perform actions and implement common scenarios by using the AWS SDK for Kotlin with DynamoDB.



*Basics* are code examples that show you how to perform the essential operations within a service.

*Actions* are code excerpts from larger programs and must be run in context. While actions show you how to call individual service functions, you can see actions in context in their related scenarios.

*Scenarios* are code examples that show you how to accomplish specific tasks by calling multiple functions within a service or combined with other AWS services.

Each example includes a link to the complete source code, where you can find instructions on how to set up and run the code in context.

## Topics

- [Basics](#)
- [Actions](#)
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## Basics

### Learn the basics

The following code example shows how to:

- Create a table that can hold movie data.
- Put, get, and update a single movie in the table.
- Write movie data to the table from a sample JSON file.
- Query for movies that were released in a given year.
- Scan for movies that were released in a range of years.
- Delete a movie from the table, then delete the table.

## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

## Create a DynamoDB table.

```
suspend fun createScenarioTable(
    tableNameVal: String,
    key: String,
) {
    val attDef =
        AttributeDefinition {
            attributeName = key
            attributeType = ScalarAttributeType.N
        }

    val attDef1 =
        AttributeDefinition {
            attributeName = "title"
            attributeType = ScalarAttributeType.S
        }

    val keySchemaVal =
        KeySchemaElement {
            attributeName = key
            keyType = KeyType.Hash
        }

    val keySchemaVal1 =
        KeySchemaElement {
            attributeName = "title"
            keyType = KeyType.Range
        }

    val provisionedVal =
        ProvisionedThroughput {
            readCapacityUnits = 10
            writeCapacityUnits = 10
        }

    val request =
        CreateTableRequest {
            attributeDefinitions = listOf(attDef, attDef1)
            keySchema = listOf(keySchemaVal, keySchemaVal1)
            provisionedThroughput = provisionedVal
            tableName = tableNameVal
        }
}
```

```

DynamoDbClient { region = "us-east-1" }.use { ddb ->

    val response = ddb.createTable(request)
    ddb.waitUntilTableExists {
        // suspend call
        tableName = tableNameVal
    }
    println("The table was successfully created
    ${response.tableDescription?.tableArn}")
    }
}

```

Create a helper function to download and extract the sample JSON file.

```

// Load data into the table.
suspend fun loadData(
    tableName: String,
    fileName: String,
) {
    val parser = JsonFactory().createParser(File(fileName))
    val rootNode = ObjectMapper().readTree<JsonNode>(parser)
    val iter: Iterator<JsonNode> = rootNode.iterator()
    var currentNode: ObjectNode

    var t = 0
    while (iter.hasNext()) {
        if (t == 50) {
            break
        }

        currentNode = iter.next() as ObjectNode
        val year = currentNode.path("year").asInt()
        val title = currentNode.path("title").asText()
        val info = currentNode.path("info").toString()
        putMovie(tableName, year, title, info)
        t++
    }
}

suspend fun putMovie(
    tableNameVal: String,
    year: Int,

```

```

        title: String,
        info: String,
    ) {
        val itemValues = mutableMapOf<String, AttributeValue>()
        val strVal = year.toString()
        // Add all content to the table.
        itemValues["year"] = AttributeValue.N(strVal)
        itemValues["title"] = AttributeValue.S(title)
        itemValues["info"] = AttributeValue.S(info)

        val request =
            PutItemRequest {
                tableName = tableNameVal
                item = itemValues
            }

        DynamoDbClient { region = "us-east-1" }.use { ddb ->
            ddb.putItem(request)
            println("Added $title to the Movie table.")
        }
    }
}

```

### Get an item from a table.

```

suspend fun getMovie(
    tableNameVal: String,
    keyName: String,
    keyVal: String,
) {
    val keyToGet = mutableMapOf<String, AttributeValue>()
    keyToGet[keyName] = AttributeValue.N(keyVal)
    keyToGet["title"] = AttributeValue.S("King Kong")

    val request =
        GetItemRequest {
            key = keyToGet
            tableName = tableNameVal
        }

    DynamoDbClient { region = "us-east-1" }.use { ddb ->
        val returnedItem = ddb.getItem(request)
        val numbersMap = returnedItem.item
    }
}

```

```

        numbersMap?.forEach { key1 ->
            println(key1.key)
            println(key1.value)
        }
    }
}

```

### Full example.

```

suspend fun main(args: Array<String>) {
    val usage = """
        Usage:
            <fileName>

        Where:
            fileName - The path to the moviedata.json you can download from the
Amazon DynamoDB Developer Guide.
        """

    if (args.size != 1) {
        println(usage)
        exitProcess(1)
    }

    // Get the moviedata.json from the Amazon DynamoDB Developer Guide.
    val tableName = "Movies"
    val fileName = args[0]
    val partitionAlias = "#a"

    println("Creating an Amazon DynamoDB table named Movies with a key named id and
a sort key named title.")
    createScenarioTable(tableName, "year")
    loadData(tableName, fileName)
    getMovie(tableName, "year", "1933")
    scanMovies(tableName)
    val count = queryMovieTable(tableName, "year", partitionAlias)
    println("There are $count Movies released in 2013.")
    deleteIssuesTable(tableName)
}

suspend fun createScenarioTable(
    tableNameVal: String,

```

```
        key: String,
    ) {
        val attDef =
            AttributeDefinition {
                attributeName = key
                attributeType = ScalarAttributeType.N
            }

        val attDef1 =
            AttributeDefinition {
                attributeName = "title"
                attributeType = ScalarAttributeType.S
            }

        val keySchemaVal =
            KeySchemaElement {
                attributeName = key
                keyType = KeyType.Hash
            }

        val keySchemaVal1 =
            KeySchemaElement {
                attributeName = "title"
                keyType = KeyType.Range
            }

        val provisionedVal =
            ProvisionedThroughput {
                readCapacityUnits = 10
                writeCapacityUnits = 10
            }

        val request =
            CreateTableRequest {
                attributeDefinitions = listOf(attDef, attDef1)
                keySchema = listOf(keySchemaVal, keySchemaVal1)
                provisionedThroughput = provisionedVal
                tableName = tableNameVal
            }

        DynamoDbClient { region = "us-east-1" }.use { ddb ->

            val response = ddb.createTable(request)
            ddb.waitUntilTableExists {
```

```
        // suspend call
        tableName = tableNameVal
    }
    println("The table was successfully created
    ${response.tableDescription?.tableArn}")
    }
}

// Load data into the table.
suspend fun loadData(
    tableName: String,
    fileName: String,
) {
    val parser = JsonFactory().createParser(File(fileName))
    val rootNode = ObjectMapper().readTree<JsonNode>(parser)
    val iter: Iterator<JsonNode> = rootNode.iterator()
    var currentNode: ObjectNode

    var t = 0
    while (iter.hasNext()) {
        if (t == 50) {
            break
        }

        currentNode = iter.next() as ObjectNode
        val year = currentNode.path("year").asInt()
        val title = currentNode.path("title").asText()
        val info = currentNode.path("info").toString()
        putMovie(tableName, year, title, info)
        t++
    }
}

suspend fun putMovie(
    tableNameVal: String,
    year: Int,
    title: String,
    info: String,
) {
    val itemValues = mutableMapOf<String, AttributeValue>()
    val strVal = year.toString()
    // Add all content to the table.
    itemValues["year"] = AttributeValue.N(strVal)
    itemValues["title"] = AttributeValue.S(title)
}
```

```
    itemValues["info"] = AttributeValue.S(info)

    val request =
        PutItemRequest {
            tableName = tableNameVal
            item = itemValues
        }

    DynamoDbClient { region = "us-east-1" }.use { ddb ->
        ddb.putItem(request)
        println("Added $title to the Movie table.")
    }
}

suspend fun getMovie(
    tableNameVal: String,
    keyName: String,
    keyVal: String,
) {
    val keyToGet = mutableMapOf<String, AttributeValue>()
    keyToGet[keyName] = AttributeValue.N(keyVal)
    keyToGet["title"] = AttributeValue.S("King Kong")

    val request =
        GetItemRequest {
            key = keyToGet
            tableName = tableNameVal
        }

    DynamoDbClient { region = "us-east-1" }.use { ddb ->
        val returnedItem = ddb.getItem(request)
        val numbersMap = returnedItem.item
        numbersMap?.forEach { key1 ->
            println(key1.key)
            println(key1.value)
        }
    }
}

suspend fun deletIssuesTable(tableNameVal: String) {
    val request =
        DeleteTableRequest {
            tableName = tableNameVal
        }
}
```



```
DynamoDbClient { region = "us-east-1" }.use { ddb ->
    ddb.deleteTable(request)
    println("$tableNameVal was deleted")
}
}

suspend fun queryMovieTable(
    tableNameVal: String,
    partitionKeyName: String,
    partitionAlias: String,
): Int {
    val attrNameAlias = mutableMapOf<String, String>()
    attrNameAlias[partitionAlias] = "year"

    // Set up mapping of the partition name with the value.
    val attrValues = mutableMapOf<String, AttributeValue>()
    attrValues[":$partitionKeyName"] = AttributeValue.N("2013")

    val request =
        QueryRequest {
            tableName = tableNameVal
            keyConditionExpression = "$partitionAlias = :$partitionKeyName"
            expressionAttributeNames = attrNameAlias
            this.expressionAttributeValues = attrValues
        }

    DynamoDbClient { region = "us-east-1" }.use { ddb ->
        val response = ddb.query(request)
        return response.count
    }
}

suspend fun scanMovies(tableNameVal: String) {
    val request =
        ScanRequest {
            tableName = tableNameVal
        }

    DynamoDbClient { region = "us-east-1" }.use { ddb ->
        val response = ddb.scan(request)
        response.items?.forEach { item ->
            item.keys.forEach { key ->
                println("The key name is $key\n")
            }
        }
    }
}
```

```
        println("The value is ${item[key]}")
    }
}
}
```

- For API details, see the following topics in *AWS SDK for Kotlin API reference*.
  - [BatchWriteItem](#)
  - [CreateTable](#)
  - [DeleteItem](#)
  - [DeleteTable](#)
  - [DescribeTable](#)
  - [GetItem](#)
  - [PutItem](#)
  - [Query](#)
  - [Scan](#)
  - [UpdateItem](#)

## Actions

### CreateTable

The following code example shows how to use CreateTable.

#### SDK for Kotlin

##### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun createNewTable(
    tableNameVal: String,
    key: String,
```

```
) : String? {
    val attDef =
        AttributeDefinition {
            attributeName = key
            attributeType = ScalarAttributeType.S
        }

    val keySchemaVal =
        KeySchemaElement {
            attributeName = key
            keyType = KeyType.Hash
        }

    val provisionedVal =
        ProvisionedThroughput {
            readCapacityUnits = 10
            writeCapacityUnits = 10
        }

    val request =
        CreateTableRequest {
            attributeDefinitions = listOf(attDef)
            keySchema = listOf(keySchemaVal)
            provisionedThroughput = provisionedVal
            tableName = tableNameVal
        }

    DynamoDbClient { region = "us-east-1" }.use { ddb ->
        var tableArn: String
        val response = ddb.createTable(request)
        ddb.waitUntilTableExists {
            // suspend call
            tableName = tableNameVal
        }
        tableArn = response.tableDescription!!.tableArn.toString()
        println("Table $tableArn is ready")
        return tableArn
    }
}
```

- For API details, see [CreateTable](#) in *AWS SDK for Kotlin API reference*.

## DeleteItem

The following code example shows how to use DeleteItem.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun deleteDynamoDBItem(
    tableNameVal: String,
    keyName: String,
    keyVal: String,
) {
    val keyToGet = mutableMapOf<String, AttributeValue>()
    keyToGet[keyName] = AttributeValue.S(keyVal)

    val request =
        DeleteItemRequest {
            tableName = tableNameVal
            key = keyToGet
        }

    DynamoDbClient { region = "us-east-1" }.use { ddb ->
        ddb.deleteItem(request)
        println("Item with key matching $keyVal was deleted")
    }
}
```

- For API details, see [DeleteItem](#) in *AWS SDK for Kotlin API reference*.

## DeleteTable

The following code example shows how to use DeleteTable.

## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun deleteDynamoDBTable(tableNameVal: String) {
    val request =
        DeleteTableRequest {
            tableName = tableNameVal
        }

    DynamoDbClient { region = "us-east-1" }.use { ddb ->
        ddb.deleteTable(request)
        println("$tableNameVal was deleted")
    }
}
```

- For API details, see [DeleteTable](#) in *AWS SDK for Kotlin API reference*.

## GetItem

The following code example shows how to use `GetItem`.

## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun getSpecificItem(
    tableNameVal: String,
    keyName: String,
    keyVal: String,
```

```
) {
    val keyToGet = mutableMapOf<String, AttributeValue>()
    keyToGet[keyName] = AttributeValue.S(keyVal)

    val request =
        GetItemRequest {
            key = keyToGet
            tableName = tableNameVal
        }

    DynamoDbClient { region = "us-east-1" }.use { ddb ->
        val returnedItem = ddb.getItem(request)
        val numbersMap = returnedItem.item
        numbersMap?.forEach { key1 ->
            println(key1.key)
            println(key1.value)
        }
    }
}
```

- For API details, see [GetItem](#) in *AWS SDK for Kotlin API reference*.

## ListTables

The following code example shows how to use `ListTables`.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun listAllTables() {
    DynamoDbClient { region = "us-east-1" }.use { ddb ->
        val response = ddb.listTables(ListTablesRequest {})
        response.tableNames?.forEach { tableName ->
            println("Table name is $tableName")
        }
    }
}
```

```
}  
}
```

- For API details, see [ListTables](#) in *AWS SDK for Kotlin API reference*.

## PutItem

The following code example shows how to use PutItem.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun putItemInTable(  
    tableNameVal: String,  
    key: String,  
    keyVal: String,  
    albumTitle: String,  
    albumTitleValue: String,  
    awards: String,  
    awardVal: String,  
    songTitle: String,  
    songTitleVal: String,  
) {  
    val itemValues = mutableMapOf<String, AttributeValue>()  
  
    // Add all content to the table.  
    itemValues[key] = AttributeValue.S(keyVal)  
    itemValues[songTitle] = AttributeValue.S(songTitleVal)  
    itemValues[albumTitle] = AttributeValue.S(albumTitleValue)  
    itemValues[awards] = AttributeValue.S(awardVal)  
  
    val request =  
        PutItemRequest {  
            tableName = tableNameVal  
            item = itemValues  
        }  
}
```

```

DynamoDbClient { region = "us-east-1" }.use { ddb ->
    ddb.putItem(request)
    println(" A new item was placed into $tableNameVal.")
}
}

```

- For API details, see [PutItem](#) in *AWS SDK for Kotlin API reference*.

## Query

The following code example shows how to use Query.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```

suspend fun queryDynTable(
    tableNameVal: String,
    partitionKeyName: String,
    partitionKeyVal: String,
    partitionAlias: String,
): Int {
    val attrNameAlias = mutableMapOf<String, String>()
    attrNameAlias[partitionAlias] = partitionKeyName

    // Set up mapping of the partition name with the value.
    val attrValues = mutableMapOf<String, AttributeValue>()
    attrValues[":$partitionKeyName"] = AttributeValue.S(partitionKeyVal)

    val request =
        QueryRequest {
            tableName = tableNameVal
            keyConditionExpression = "$partitionAlias = :$partitionKeyName"
            expressionAttributeNames = attrNameAlias
            this.expressionAttributeValues = attrValues
        }
}

```



```
DynamoDbClient { region = "us-east-1" }.use { ddb ->
    val response = ddb.query(request)
    return response.count
}
}
```

- For API details, see [Query](#) in *AWS SDK for Kotlin API reference*.

## Scan

The following code example shows how to use Scan.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun scanItems(tableNameVal: String) {
    val request =
        ScanRequest {
            tableName = tableNameVal
        }

    DynamoDbClient { region = "us-east-1" }.use { ddb ->
        val response = ddb.scan(request)
        response.items?.forEach { item ->
            item.keys.forEach { key ->
                println("The key name is $key\n")
                println("The value is ${item[key]}")
            }
        }
    }
}
```

- For API details, see [Scan](#) in *AWS SDK for Kotlin API reference*.

## UpdateItem

The following code example shows how to use UpdateItem.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun updateTableItem(
    tableNameVal: String,
    keyName: String,
    keyVal: String,
    name: String,
    updateVal: String,
) {
    val itemKey = mutableMapOf<String, AttributeValue>()
    itemKey[keyName] = AttributeValue.S(keyVal)

    val updatedValues = mutableMapOf<String, AttributeValueUpdate>()
    updatedValues[name] =
        AttributeValueUpdate {
            value = AttributeValue.S(updateVal)
            action = AttributeAction.Put
        }

    val request =
        UpdateItemRequest {
            tableName = tableNameVal
            key = itemKey
            attributeUpdates = updatedValues
        }

    DynamoDbClient { region = "us-east-1" }.use { ddb ->
        ddb.updateItem(request)
        println("Item in $tableNameVal was updated")
    }
}
```

- For API details, see [UpdateItem](#) in *AWS SDK for Kotlin API reference*.

## Scenarios

### Build an app to submit data to a DynamoDB table

The following code example shows how to build an application that submits data to an Amazon DynamoDB table and notifies you when a user updates the table.

#### SDK for Kotlin

Shows how to create a native Android application that submits data using the Amazon DynamoDB Kotlin API and sends a text message using the Amazon SNS Kotlin API.

For complete source code and instructions on how to set up and run, see the full example on [GitHub](#).

#### Services used in this example

- DynamoDB
- Amazon SNS

### Create a serverless application to manage photos

The following code example shows how to create a serverless application that lets users manage photos using labels.

#### SDK for Kotlin

Shows how to develop a photo asset management application that detects labels in images using Amazon Rekognition and stores them for later retrieval.

For complete source code and instructions on how to set up and run, see the full example on [GitHub](#).

For a deep dive into the origin of this example see the post on [AWS Community](#).

#### Services used in this example

- API Gateway
- DynamoDB

- Lambda
- Amazon Rekognition
- Amazon S3
- Amazon SNS

## Create a web application to track DynamoDB data

The following code example shows how to create a web application that tracks work items in an Amazon DynamoDB table and uses Amazon Simple Email Service (Amazon SES) to send reports.

### SDK for Kotlin

Shows how to use the Amazon DynamoDB API to create a dynamic web application that tracks DynamoDB work data.

For complete source code and instructions on how to set up and run, see the full example on [GitHub](#).

### Services used in this example

- DynamoDB
- Amazon SES

## Query a table by using batches of PartiQL statements

The following code example shows how to:

- Get a batch of items by running multiple SELECT statements.
- Add a batch of items by running multiple INSERT statements.
- Update a batch of items by running multiple UPDATE statements.
- Delete a batch of items by running multiple DELETE statements.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun main() {
    val ddb = DynamoDbClient { region = "us-east-1" }
    val tableName = "MoviesPartiQLBatch"
    println("Creating an Amazon DynamoDB table named $tableName with a key named id
and a sort key named title.")
    createTablePartiQLBatch(ddb, tableName, "year")
    putRecordBatch(ddb)
    updateTableItemBatchBatch(ddb)
    deleteItemsBatch(ddb)
    deleteTablePartiQLBatch(tableName)
}

suspend fun createTablePartiQLBatch(
    ddb: DynamoDbClient,
    tableNameVal: String,
    key: String,
) {
    val attDef =
        AttributeDefinition {
            attributeName = key
            attributeType = ScalarAttributeType.N
        }

    val attDef1 =
        AttributeDefinition {
            attributeName = "title"
            attributeType = ScalarAttributeType.S
        }

    val keySchemaVal =
        KeySchemaElement {
            attributeName = key
            keyType = KeyType.Hash
        }

    val keySchemaVal1 =
        KeySchemaElement {
            attributeName = "title"
            keyType = KeyType.Range
        }

    val provisionedVal =
        ProvisionedThroughput {
```

```
        readCapacityUnits = 10
        writeCapacityUnits = 10
    }

    val request =
        CreateTableRequest {
            attributeDefinitions = listOf(attDef, attDef1)
            keySchema = listOf(keySchemaVal, keySchemaVal1)
            provisionedThroughput = provisionedVal
            tableName = tableNameVal
        }

    val response = ddb.createTable(request)
    ddb.waitUntilTableExists {
        // suspend call
        tableName = tableNameVal
    }
    println("The table was successfully created
    ${response.tableDescription?.tableArn}")
}

suspend fun putRecordBatch(ddb: DynamoDbClient) {
    val sqlStatement = "INSERT INTO MoviesPartiQBatch VALUE {'year':?, 'title' : ?,
    'info' : ?}"

    // Create three movies to add to the Amazon DynamoDB table.
    val parametersMovie1 = mutableListof<AttributeValue>()
    parametersMovie1.add(AttributeValue.N("2022"))
    parametersMovie1.add(AttributeValue.S("My Movie 1"))
    parametersMovie1.add(AttributeValue.S("No Information"))

    val statementRequestMovie1 =
        BatchStatementRequest {
            statement = sqlStatement
            parameters = parametersMovie1
        }

    // Set data for Movie 2.
    val parametersMovie2 = mutableListof<AttributeValue>()
    parametersMovie2.add(AttributeValue.N("2022"))
    parametersMovie2.add(AttributeValue.S("My Movie 2"))
    parametersMovie2.add(AttributeValue.S("No Information"))

    val statementRequestMovie2 =
```

```

        BatchStatementRequest {
            statement = sqlStatement
            parameters = parametersMovie2
        }

// Set data for Movie 3.
val parametersMovie3 = mutableListOf<AttributeValue>()
parametersMovie3.add(AttributeValue.N("2022"))
parametersMovie3.add(AttributeValue.S("My Movie 3"))
parametersMovie3.add(AttributeValue.S("No Information"))

val statementRequestMovie3 =
    BatchStatementRequest {
        statement = sqlStatement
        parameters = parametersMovie3
    }

// Add all three movies to the list.
val myBatchStatementList = mutableListOf<BatchStatementRequest>()
myBatchStatementList.add(statementRequestMovie1)
myBatchStatementList.add(statementRequestMovie2)
myBatchStatementList.add(statementRequestMovie3)

val batchRequest =
    BatchExecuteStatementRequest {
        statements = myBatchStatementList
    }
val response = ddb.batchExecuteStatement(batchRequest)
println("ExecuteStatement successful: " + response.toString())
println("Added new movies using a batch command.")
}

suspend fun updateTableItemBatchBatch(ddb: DynamoDbClient) {
    val sqlStatement =
        "UPDATE MoviesPartiQBatch SET info = 'directors\":[\"Merian C. Cooper\",
        \"Ernest B. Schoedsack' where year=? and title=?"
    val parametersRec1 = mutableListOf<AttributeValue>()
    parametersRec1.add(AttributeValue.N("2022"))
    parametersRec1.add(AttributeValue.S("My Movie 1"))
    val statementRequestRec1 =
        BatchStatementRequest {
            statement = sqlStatement
            parameters = parametersRec1
        }
}

```

```
// Update record 2.
val parametersRec2 = mutableListOf<AttributeValue>()
parametersRec2.add(AttributeValue.N("2022"))
parametersRec2.add(AttributeValue.S("My Movie 2"))
val statementRequestRec2 =
    BatchStatementRequest {
        statement = sqlStatement
        parameters = parametersRec2
    }

// Update record 3.
val parametersRec3 = mutableListOf<AttributeValue>()
parametersRec3.add(AttributeValue.N("2022"))
parametersRec3.add(AttributeValue.S("My Movie 3"))
val statementRequestRec3 =
    BatchStatementRequest {
        statement = sqlStatement
        parameters = parametersRec3
    }

// Add all three movies to the list.
val myBatchStatementList = mutableListOf<BatchStatementRequest>()
myBatchStatementList.add(statementRequestRec1)
myBatchStatementList.add(statementRequestRec2)
myBatchStatementList.add(statementRequestRec3)

val batchRequest =
    BatchExecuteStatementRequest {
        statements = myBatchStatementList
    }

val response = ddb.batchExecuteStatement(batchRequest)
println("ExecuteStatement successful: $response")
println("Updated three movies using a batch command.")
println("Items were updated!")
}

suspend fun deleteItemsBatch(ddb: DynamoDbClient) {
    // Specify three records to delete.
    val sqlStatement = "DELETE FROM MoviesPartiQBatch WHERE year = ? and title=?"
    val parametersRec1 = mutableListOf<AttributeValue>()
    parametersRec1.add(AttributeValue.N("2022"))
    parametersRec1.add(AttributeValue.S("My Movie 1"))
}
```



```
val statementRequestRec1 =
    BatchStatementRequest {
        statement = sqlStatement
        parameters = parametersRec1
    }

// Specify record 2.
val parametersRec2 = mutableListOf<AttributeValue>()
parametersRec2.add(AttributeValue.N("2022"))
parametersRec2.add(AttributeValue.S("My Movie 2"))
val statementRequestRec2 =
    BatchStatementRequest {
        statement = sqlStatement
        parameters = parametersRec2
    }

// Specify record 3.
val parametersRec3 = mutableListOf<AttributeValue>()
parametersRec3.add(AttributeValue.N("2022"))
parametersRec3.add(AttributeValue.S("My Movie 3"))
val statementRequestRec3 =
    BatchStatementRequest {
        statement = sqlStatement
        parameters = parametersRec3
    }

// Add all three movies to the list.
val myBatchStatementList = mutableListOf<BatchStatementRequest>()
myBatchStatementList.add(statementRequestRec1)
myBatchStatementList.add(statementRequestRec2)
myBatchStatementList.add(statementRequestRec3)

val batchRequest =
    BatchExecuteStatementRequest {
        statements = myBatchStatementList
    }

ddb.batchExecuteStatement(batchRequest)
println("Deleted three movies using a batch command.")
}

suspend fun deleteTablePartiQLBatch(tableNameVal: String) {
    val request =
```

```

        DeleteTableRequest {
            tableName = tableNameVal
        }

        DynamoDbClient { region = "us-east-1" }.use { ddb ->
            ddb.deleteTable(request)
            println("$tableNameVal was deleted")
        }
    }
}

```

- For API details, see [BatchExecuteStatement](#) in *AWS SDK for Kotlin API reference*.

## Query a table using PartiQL

The following code example shows how to:

- Get an item by running a SELECT statement.
- Add an item by running an INSERT statement.
- Update an item by running an UPDATE statement.
- Delete an item by running a DELETE statement.

## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```

suspend fun main(args: Array<String>) {
    val usage = """
        Usage:
            <fileName>

        Where:
            fileName - The path to the moviedata.json file You can download from the
            Amazon DynamoDB Developer Guide.
        """
}

```

```
if (args.size != 1) {
    println(usage)
    exitProcess(1)
}

val ddb = DynamoDbClient { region = "us-east-1" }
val tableName = "MoviesPartiQ"

// Get the moviedata.json from the Amazon DynamoDB Developer Guide.
val fileName = args[0]
println("Creating an Amazon DynamoDB table named MoviesPartiQ with a key named
id and a sort key named title.")
createTablePartiQL(ddb, tableName, "year")
loadDataPartiQL(ddb, fileName)

println("***** Getting data from the MoviesPartiQ table.")
getMoviePartiQL(ddb)

println("***** Putting a record into the MoviesPartiQ table.")
putRecordPartiQL(ddb)

println("***** Updating a record.")
updateTableItemPartiQL(ddb)

println("***** Querying the movies released in 2013.")
queryTablePartiQL(ddb)

println("***** Deleting the MoviesPartiQ table.")
deleteTablePartiQL(tableName)
}

suspend fun createTablePartiQL(
    ddb: DynamoDbClient,
    tableNameVal: String,
    key: String,
) {
    val attDef =
        AttributeDefinition {
            attributeName = key
            attributeType = ScalarAttributeType.N
        }

    val attDef1 =
        AttributeDefinition {
```

```
        attributeName = "title"
        attributeType = ScalarAttributeType.S
    }

    val keySchemaVal =
        KeySchemaElement {
            attributeName = key
            keyType = KeyType.Hash
        }

    val keySchemaVal1 =
        KeySchemaElement {
            attributeName = "title"
            keyType = KeyType.Range
        }

    val provisionedVal =
        ProvisionedThroughput {
            readCapacityUnits = 10
            writeCapacityUnits = 10
        }

    val request =
        CreateTableRequest {
            attributeDefinitions = listOf(attDef, attDef1)
            keySchema = listOf(keySchemaVal, keySchemaVal1)
            provisionedThroughput = provisionedVal
            tableName = tableNameVal
        }

    val response = ddb.createTable(request)
    ddb.waitUntilTableExists {
        // suspend call
        tableName = tableNameVal
    }
    println("The table was successfully created
    ${response.tableDescription?.tableArn}")
}

suspend fun loadDataPartiQL(
    ddb: DynamoDbClient,
    fileName: String,
) {
```

```

    val sqlStatement = "INSERT INTO MoviesPartiQ VALUE {'year':?, 'title' : ?,
'info' : ?}"
    val parser = JsonFactory().createParser(File(fileName))
    val rootNode = ObjectMapper().readTree<JsonNode>(parser)
    val iter: Iterator<JsonNode> = rootNode.iterator()
    var currentNode: ObjectNode
    var t = 0

    while (iter.hasNext()) {
        if (t == 200) {
            break
        }

        currentNode = iter.next() as ObjectNode
        val year = currentNode.path("year").asInt()
        val title = currentNode.path("title").asText()
        val info = currentNode.path("info").toString()

        val parameters: MutableList<AttributeValue> = ArrayList<AttributeValue>()
        parameters.add(AttributeValue.N(year.toString()))
        parameters.add(AttributeValue.S(title))
        parameters.add(AttributeValue.S(info))

        executeStatementPartiQL(ddb, sqlStatement, parameters)
        println("Added Movie $title")
        parameters.clear()
        t++
    }
}

suspend fun getMoviePartiQL(ddb: DynamoDbClient) {
    val sqlStatement = "SELECT * FROM MoviesPartiQ where year=? and title=?"
    val parameters: MutableList<AttributeValue> = ArrayList<AttributeValue>()
    parameters.add(AttributeValue.N("2012"))
    parameters.add(AttributeValue.S("The Perks of Being a Wallflower"))
    val response = executeStatementPartiQL(ddb, sqlStatement, parameters)
    println("ExecuteStatement successful: $response")
}

suspend fun putRecordPartiQL(ddb: DynamoDbClient) {
    val sqlStatement = "INSERT INTO MoviesPartiQ VALUE {'year':?, 'title' : ?,
'info' : ?}"
    val parameters: MutableList<AttributeValue> = java.util.ArrayList()
    parameters.add(AttributeValue.N("2020"))

```

```

        parameters.add(AttributeValue.S("My Movie"))
        parameters.add(AttributeValue.S("No Info"))
        executeStatementPartiQL(ddb, sqlStatement, parameters)
        println("Added new movie.")
    }

suspend fun updateTableItemPartiQL(ddb: DynamoDbClient) {
    val sqlStatement = "UPDATE MoviesPartiQ SET info = 'directors\":[\"Merian C. Cooper\", \"Ernest B. Schoedsack\"] where year=? and title=?"
    val parameters: MutableList<AttributeValue> = java.util.ArrayList()
    parameters.add(AttributeValue.N("2013"))
    parameters.add(AttributeValue.S("The East"))
    executeStatementPartiQL(ddb, sqlStatement, parameters)
    println("Item was updated!")
}

// Query the table where the year is 2013.
suspend fun queryTablePartiQL(ddb: DynamoDbClient) {
    val sqlStatement = "SELECT * FROM MoviesPartiQ where year = ?"
    val parameters: MutableList<AttributeValue> = java.util.ArrayList()
    parameters.add(AttributeValue.N("2013"))
    val response = executeStatementPartiQL(ddb, sqlStatement, parameters)
    println("ExecuteStatement successful: $response")
}

suspend fun deleteTablePartiQL(tableNameVal: String) {
    val request =
        DeleteTableRequest {
            tableName = tableNameVal
        }

    DynamoDbClient { region = "us-east-1" }.use { ddb ->
        ddb.deleteTable(request)
        println("$tableNameVal was deleted")
    }
}

suspend fun executeStatementPartiQL(
    ddb: DynamoDbClient,
    statementVal: String,
    parametersVal: List<AttributeValue>,
): ExecuteStatementResponse {
    val request =
        ExecuteStatementRequest {

```

```
        statement = statementVal
        parameters = parametersVal
    }

    return ddb.executeStatement(request)
}
```

- For API details, see [ExecuteStatement](#) in *AWS SDK for Kotlin API reference*.

## Amazon EC2 examples using SDK for Kotlin

The following code examples show you how to perform actions and implement common scenarios by using the AWS SDK for Kotlin with Amazon EC2.

*Basics* are code examples that show you how to perform the essential operations within a service.

*Actions* are code excerpts from larger programs and must be run in context. While actions show you how to call individual service functions, you can see actions in context in their related scenarios.

Each example includes a link to the complete source code, where you can find instructions on how to set up and run the code in context.

### Get started

#### Hello Amazon EC2

The following code examples show how to get started using Amazon EC2.

#### SDK for Kotlin

##### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun describeEC2SecurityGroups(groupId: String) {
    val request =
        DescribeSecurityGroupsRequest {
            groupIds = listOf(groupId)
        }
}
```

```
    }

    Ec2Client { region = "us-west-2" }.use { ec2 ->

        val response = ec2.describeSecurityGroups(request)
        response.securityGroups?.forEach { group ->
            println("Found Security Group with id ${group.groupId}, vpc id
                ${group.vpcId} and description ${group.description}")
        }
    }
}
```

- For API details, see [DescribeSecurityGroups](#) in *AWS SDK for Kotlin API reference*.

## Topics

- [Basics](#)
- [Actions](#)

## Basics

### Learn the basics

The following code example shows how to:

- Create a key pair and security group.
- Select an Amazon Machine Image (AMI) and compatible instance type, then create an instance.
- Stop and restart the instance.
- Associate an Elastic IP address with your instance.
- Connect to your instance with SSH, then clean up resources.

## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).



```
/**
Before running this Kotlin code example, set up your development environment,
including your credentials.

For more information, see the following documentation topic:
https://docs.aws.amazon.com/sdk-for-kotlin/latest/developer-guide/setup.html

This Kotlin example performs the following tasks:

1. Creates an RSA key pair and saves the private key data as a .pem file.
2. Lists key pairs.
3. Creates a security group for the default VPC.
4. Displays security group information.
5. Gets a list of Amazon Linux 2 AMIs and selects one.
6. Gets more information about the image.
7. Gets a list of instance types that are compatible with the selected AMI's
architecture.
8. Creates an instance with the key pair, security group, AMI, and an instance
type.
9. Displays information about the instance.
10. Stops the instance and waits for it to stop.
11. Starts the instance and waits for it to start.
12. Allocates an Elastic IP address and associates it with the instance.
13. Displays SSH connection info for the instance.
14. Disassociates and deletes the Elastic IP address.
15. Terminates the instance.
16. Deletes the security group.
17. Deletes the key pair.
*/

val DASHES = String(CharArray(80)).replace("\u0000", "-")

suspend fun main(args: Array<String>) {
    val usage = ""
        Usage:
            <keyName> <fileName> <groupName> <groupDesc> <vpcId> <myIpAddress>

    Where:
        keyName - A key pair name (for example, TestKeyPair).
        fileName - A file name where the key information is written to.
        groupName - The name of the security group.
        groupDesc - The description of the security group.
```

vpcId - A VPC ID. You can get this value from the AWS Management Console.

    myIpAddress - The IP address of your development machine.

```
"""
```

```
    if (args.size != 6) {  
        println(usage)  
        exitProcess(0)  
    }
```

```
    val keyName = args[0]  
    val fileName = args[1]  
    val groupName = args[2]  
    val groupDesc = args[3]  
    val vpcId = args[4]  
    val myIpAddress = args[5]  
    var newInstanceId: String? = ""
```

```
    println(DASHES)  
    println("Welcome to the Amazon EC2 example scenario.")  
    println(DASHES)
```

```
    println(DASHES)  
    println("1. Create an RSA key pair and save the private key material as a .pem  
file.")
```

```
    createKeyPairSc(keyName, fileName)  
    println(DASHES)
```

```
    println(DASHES)  
    println("2. List key pairs.")  
    describeEC2KeysSc()  
    println(DASHES)
```

```
    println(DASHES)  
    println("3. Create a security group.")  
    val groupId = createEC2SecurityGroupSc(groupName, groupDesc, vpcId, myIpAddress)  
    println(DASHES)
```

```
    println(DASHES)  
    println("4. Display security group info for the newly created security group.")  
    describeSecurityGroupsSc(groupId.toString())  
    println(DASHES)
```

```
println(DASHES)
println("5. Get a list of Amazon Linux 2 AMIs and select one with amzn2 in the
name.")
val instanceId = getParaValuesSc()
if (instanceId == "") {
    println("The instance Id value isn't valid.")
    exitProcess(0)
}
println("The instance Id is $instanceId.")
println(DASHES)

println(DASHES)
println("6. Get more information about an amzn2 image and return the AMI
value.")
val amiValue = instanceId?.let { describeImageSc(it) }
if (instanceId == "") {
    println("The instance Id value is invalid.")
    exitProcess(0)
}
println("The AMI value is $amiValue.")
println(DASHES)

println(DASHES)
println("7. Get a list of instance types.")
val instanceType = getInstanceTypesSc()
println(DASHES)

println(DASHES)
println("8. Create an instance.")
if (amiValue != null) {
    newInstanceId = runInstanceSc(instanceType, keyName, groupName, amiValue)
    println("The instance Id is $newInstanceId")
}
println(DASHES)

println(DASHES)
println("9. Display information about the running instance. ")
var ipAddress = describeEC2InstancesSc(newInstanceId)
println("You can SSH to the instance using this command:")
println("ssh -i " + fileName + "ec2-user@" + ipAddress)
println(DASHES)

println(DASHES)
println("10. Stop the instance.")
```

```
    if (newInstanceId != null) {
        stopInstanceSc(newInstanceId)
    }
    println(DASHES)

    println(DASHES)
    println("11. Start the instance.")
    if (newInstanceId != null) {
        startInstanceSc(newInstanceId)
    }
    ipAddress = describeEC2InstancesSc(newInstanceId)
    println("You can SSH to the instance using this command:")
    println("ssh -i " + fileName + "ec2-user@" + ipAddress)
    println(DASHES)

    println(DASHES)
    println("12. Allocate an Elastic IP address and associate it with the
instance.")
    val allocationId = allocateAddressSc()
    println("The allocation Id value is $allocationId")
    val associationId = associateAddressSc(newInstanceId, allocationId)
    println("The associate Id value is $associationId")
    println(DASHES)

    println(DASHES)
    println("13. Describe the instance again.")
    ipAddress = describeEC2InstancesSc(newInstanceId)
    println("You can SSH to the instance using this command:")
    println("ssh -i " + fileName + "ec2-user@" + ipAddress)
    println(DASHES)

    println(DASHES)
    println("14. Disassociate and release the Elastic IP address.")
    disassociateAddressSc(associationId)
    releaseEC2AddressSc(allocationId)
    println(DASHES)

    println(DASHES)
    println("15. Terminate the instance and use a waiter.")
    if (newInstanceId != null) {
        terminateEC2Sc(newInstanceId)
    }
    println(DASHES)
```

```
println(DASHES)
println("16. Delete the security group.")
if (groupId != null) {
    deleteEC2SecGroupSc(groupId)
}
println(DASHES)

println(DASHES)
println("17. Delete the key pair.")
deleteKeysSc(keyName)
println(DASHES)

println(DASHES)
println("You successfully completed the Amazon EC2 scenario.")
println(DASHES)
}

suspend fun deleteKeysSc(keyPair: String) {
    val request =
        DeleteKeyPairRequest {
            keyName = keyPair
        }
    Ec2Client { region = "us-west-2" }.use { ec2 ->
        ec2.deleteKeyPair(request)
        println("Successfully deleted key pair named $keyPair")
    }
}

suspend fun deleteEC2SecGroupSc(groupIdVal: String) {
    val request =
        DeleteSecurityGroupRequest {
            groupId = groupIdVal
        }
    Ec2Client { region = "us-west-2" }.use { ec2 ->
        ec2.deleteSecurityGroup(request)
        println("Successfully deleted security group with Id $groupIdVal")
    }
}

suspend fun terminateEC2Sc(instanceIdVal: String) {
    val ti =
        TerminateInstancesRequest {
            instanceIds = listOf(instanceIdVal)
        }
}
```

```
println("Wait for the instance to terminate. This will take a few minutes.")
Ec2Client { region = "us-west-2" }.use { ec2 ->
    ec2.terminateInstances(ti)
    ec2.waitForInstanceTerminated {
        // suspend call
        instanceIds = listOf(instanceIdVal)
    }
    println("$instanceIdVal is terminated!")
}
}

suspend fun releaseEC2AddressSc(allocId: String?) {
    val request =
        ReleaseAddressRequest {
            allocationId = allocId
        }

    Ec2Client { region = "us-west-2" }.use { ec2 ->
        ec2.releaseAddress(request)
        println("Successfully released Elastic IP address $allocId")
    }
}

suspend fun disassociateAddressSc(associationIdVal: String?) {
    val addressRequest =
        DisassociateAddressRequest {
            associationId = associationIdVal
        }

    Ec2Client { region = "us-west-2" }.use { ec2 ->
        ec2.disassociateAddress(addressRequest)
        println("You successfully disassociated the address!")
    }
}

suspend fun associateAddressSc(
    instanceIdVal: String?,
    allocationIdVal: String?,
): String? {
    val associateRequest =
        AssociateAddressRequest {
            instanceId = instanceIdVal
            allocationId = allocationIdVal
        }
}
```

```
    Ec2Client { region = "us-west-2" }.use { ec2 ->
        val associateResponse = ec2.associateAddress(associateRequest)
        return associateResponse.associationId
    }
}

suspend fun allocateAddressSc(): String? {
    val allocateRequest =
        AllocateAddressRequest {
            domain = DomainType.Vpc
        }
    Ec2Client { region = "us-west-2" }.use { ec2 ->
        val allocateResponse = ec2.allocateAddress(allocateRequest)
        return allocateResponse.allocationId
    }
}

suspend fun startInstanceSc(instanceId: String) {
    val request =
        StartInstancesRequest {
            instanceIds = listOf(instanceId)
        }

    Ec2Client { region = "us-west-2" }.use { ec2 ->
        ec2.startInstances(request)
        println("Waiting until instance $instanceId starts. This will take a few
minutes.")
        ec2.waitUntilInstanceRunning {
            // suspend call
            instanceIds = listOf(instanceId)
        }
        println("Successfully started instance $instanceId")
    }
}

suspend fun stopInstanceSc(instanceId: String) {
    val request =
        StopInstancesRequest {
            instanceIds = listOf(instanceId)
        }

    Ec2Client { region = "us-west-2" }.use { ec2 ->
        ec2.stopInstances(request)
    }
}
```

```

        println("Waiting until instance $instanceId stops. This will take a few
minutes.")
        ec2.waitUntilInstanceStopped {
            // suspend call
            instanceIds = listOf(instanceId)
        }
        println("Successfully stopped instance $instanceId")
    }
}

suspend fun describeEC2InstancesSc(newInstanceId: String?): String {
    var pubAddress = ""
    var isRunning = false
    val request =
        DescribeInstancesRequest {
            instanceIds = listOf(newInstanceId.toString())
        }

    while (!isRunning) {
        Ec2Client { region = "us-west-2" }.use { ec2 ->
            val response = ec2.describeInstances(request)
            val state =
                response.reservations
                    ?.get(0)
                    ?.instances
                    ?.get(0)
                    ?.state
                    ?.name
                    ?.value
            if (state != null) {
                if (state.compareTo("running") == 0) {
                    println("Image id is
${response.reservations!!.get(0).instances?.get(0)?.imageId}")
                    println("Instance type is
${response.reservations!!.get(0).instances?.get(0)?.instanceType}")
                    println("Instance state is
${response.reservations!!.get(0).instances?.get(0)?.state}")
                    pubAddress =
                        response.reservations!!
                            .get(0)
                            .instances
                            ?.get(0)
                            ?.publicIpAddress
                            .toString()
                }
            }
        }
    }
}

```



```
                println("Instance address is $pubAddress")
                isRunning = true
            }
        }
    }
}
return pubAddress
}

suspend fun runInstanceSc(
    instanceTypeVal: String,
    keyNameVal: String,
    groupNameVal: String,
    amiIdVal: String,
): String {
    val runRequest =
        RunInstancesRequest {
            instanceType = InstanceType.fromValue(instanceTypeVal)
            keyName = keyNameVal
            securityGroups = listOf(groupNameVal)
            maxCount = 1
            minCount = 1
            imageId = amiIdVal
        }

    Ec2Client { region = "us-west-2" }.use { ec2 ->
        val response = ec2.runInstances(runRequest)
        val instanceId = response.instances?.get(0)?.instanceId
        println("Successfully started EC2 Instance $instanceId based on AMI
$amiIdVal")
        return instanceId.toString()
    }
}

// Get a list of instance types.
suspend fun getInstanceTypesSc(): String {
    var instanceType = ""
    val filterObs = ArrayList<Filter>()
    val filter =
        Filter {
            name = "processor-info.supported-architecture"
            values = listOf("arm64")
        }
}
```

```
filterObs.add(filter)
val typesRequest =
    DescribeInstanceTypesRequest {
        filters = filterObs
        maxResults = 10
    }
Ec2Client { region = "us-west-2" }.use { ec2 ->
    val response = ec2.describeInstanceTypes(typesRequest)
    response.instanceTypes?.forEach { type ->
        println("The memory information of this type is
${type.memoryInfo?.sizeInMib}")
        println("Maximum number of network cards is
${type.networkInfo?.maximumNetworkCards}")
        instanceType = type.instanceType.toString()
    }
    return instanceType
}
}

// Display the Description field that corresponds to the instance Id value.
suspend fun describeImageSc(instanceId: String): String? {
    val imagesRequest =
        DescribeImagesRequest {
            imageIds = listOf(instanceId)
        }

    Ec2Client { region = "us-west-2" }.use { ec2 ->
        val response = ec2.describeImages(imagesRequest)
        println("The description of the first image is
${response.images?.get(0)?.description}")
        println("The name of the first image is ${response.images?.get(0)?.name}")

        // Return the image Id value.
        return response.images?.get(0)?.imageId
    }
}

// Get the Id value of an instance with amzn2 in the name.
suspend fun getParaValuesSc(): String? {
    val parameterRequest =
        GetParametersByPathRequest {
            path = "/aws/service/ami-amazon-linux-latest"
        }
}
```

```
SsmClient { region = "us-west-2" }.use { ssmClient ->
    val response = ssmClient.getParametersByPath(parameterRequest)
    response.parameters?.forEach { para ->
        println("The name of the para is: ${para.name}")
        println("The type of the para is: ${para.type}")
        println("")
        if (para.name?.let { filterName(it) } == true) {
            return para.value
        }
    }
}
return ""
}

fun filterName(name: String): Boolean {
    val parts = name.split("/").toTypedArray()
    val myValue = parts[4]
    return myValue.contains("amzn2")
}

suspend fun describeSecurityGroupsSc(groupId: String) {
    val request =
        DescribeSecurityGroupsRequest {
            groupIds = listOf(groupId)
        }

    Ec2Client { region = "us-west-2" }.use { ec2 ->
        val response = ec2.describeSecurityGroups(request)
        for (group in response.securityGroups!!) {
            println("Found Security Group with id " + group.groupId.toString() + "
and group VPC " + group.vpcId)
        }
    }
}

suspend fun createEC2SecurityGroupSc(
    groupNameVal: String?,
    groupDescVal: String?,
    vpcIdVal: String?,
    myIpAddress: String?,
): String? {
    val request =
        CreateSecurityGroupRequest {
            groupName = groupNameVal
```

```
        description = groupDescVal
        vpcId = vpcIdVal
    }

    Ec2Client { region = "us-west-2" }.use { ec2 ->
        val resp = ec2.createSecurityGroup(request)
        val ipRange =
            IpRange {
                cidrIp = "$myIpAddress/0"
            }

        val ipPerm =
            IpPermission {
                ipProtocol = "tcp"
                toPort = 80
                fromPort = 80
                ipRanges = listOf(ipRange)
            }

        val ipPerm2 =
            IpPermission {
                ipProtocol = "tcp"
                toPort = 22
                fromPort = 22
                ipRanges = listOf(ipRange)
            }

        val authRequest =
            AuthorizeSecurityGroupIngressRequest {
                groupName = groupNameVal
                ipPermissions = listOf(ipPerm, ipPerm2)
            }

        ec2.authorizeSecurityGroupIngress(authRequest)
        println("Successfully added ingress policy to Security Group $groupNameVal")
        return resp.groupId
    }
}

suspend fun describeEC2KeysSc() {
    Ec2Client { region = "us-west-2" }.use { ec2 ->
        val response = ec2.describeKeyPairs(DescribeKeyPairsRequest {})
        response.keyPairs?.forEach { keyPair ->
            println("Found key pair with name ${keyPair.keyName} and fingerprint
                ${ keyPair.keyFingerprint}")
        }
    }
}
```

```
    }  
  }  
}  
  
suspend fun createKeyPairSc(  
    keyNameVal: String,  
    fileNameVal: String,  
) {  
    val request =  
        CreateKeyPairRequest {  
            keyName = keyNameVal  
        }  
  
    Ec2Client { region = "us-west-2" }.use { ec2 ->  
        val response = ec2.createKeyPair(request)  
        val content = response.keyMaterial  
        if (content != null) {  
            File(fileNameVal).writeText(content)  
        }  
        println("Successfully created key pair named $keyNameVal")  
    }  
}
```

- For API details, see the following topics in *AWS SDK for Kotlin API reference*.

- [AllocateAddress](#)
- [AssociateAddress](#)
- [AuthorizeSecurityGroupIngress](#)
- [CreateKeyPair](#)
- [CreateSecurityGroup](#)
- [DeleteKeyPair](#)
- [DeleteSecurityGroup](#)
- [DescribeImages](#)
- [DescribeInstanceTypes](#)
- [DescribeInstances](#)
- [DescribeKeyPairs](#)
- [DescribeSecurityGroups](#)

- [ReleaseAddress](#)
- [RunInstances](#)
- [StartInstances](#)
- [StopInstances](#)
- [TerminateInstances](#)
- [UnmonitorInstances](#)

## Actions

### AllocateAddress

The following code example shows how to use `AllocateAddress`.

#### SDK for Kotlin

##### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun getAllocateAddress(instanceIdVal: String?): String? {
    val allocateRequest =
        AllocateAddressRequest {
            domain = DomainType.Vpc
        }

    Ec2Client { region = "us-west-2" }.use { ec2 ->
        val allocateResponse = ec2.allocateAddress(allocateRequest)
        val allocationIdVal = allocateResponse.allocationId

        val request =
            AssociateAddressRequest {
                instanceId = instanceIdVal
                allocationId = allocationIdVal
            }

        val associateResponse = ec2.associateAddress(request)
        return associateResponse.associationId
    }
}
```

```
}  
}
```

- For API details, see [AllocateAddress](#) in *AWS SDK for Kotlin API reference*.

## AssociateAddress

The following code example shows how to use AssociateAddress.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun associateAddressSc(  
    instanceIdVal: String?,  
    allocationIdVal: String?,  
): String? {  
    val associateRequest =  
        AssociateAddressRequest {  
            instanceId = instanceIdVal  
            allocationId = allocationIdVal  
        }  
  
    Ec2Client { region = "us-west-2" }.use { ec2 ->  
        val associateResponse = ec2.associateAddress(associateRequest)  
        return associateResponse.associationId  
    }  
}
```

- For API details, see [AssociateAddress](#) in *AWS SDK for Kotlin API reference*.

## AuthorizeSecurityGroupIngress

The following code example shows how to use AuthorizeSecurityGroupIngress.

## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun createEC2SecurityGroupSc(
    groupNameVal: String?,
    groupDescVal: String?,
    vpcIdVal: String?,
    myIpAddress: String?,
): String? {
    val request =
        CreateSecurityGroupRequest {
            groupName = groupNameVal
            description = groupDescVal
            vpcId = vpcIdVal
        }

    Ec2Client { region = "us-west-2" }.use { ec2 ->
        val resp = ec2.createSecurityGroup(request)
        val ipRange =
            IpRange {
                cidrIp = "$myIpAddress/0"
            }

        val ipPerm =
            IpPermission {
                ipProtocol = "tcp"
                toPort = 80
                fromPort = 80
                ipRanges = listOf(ipRange)
            }

        val ipPerm2 =
            IpPermission {
                ipProtocol = "tcp"
                toPort = 22
                fromPort = 22
                ipRanges = listOf(ipRange)
            }
    }
}
```



```
    }

    val authRequest =
        AuthorizeSecurityGroupIngressRequest {
            groupName = groupNameVal
            ipPermissions = listOf(ipPerm, ipPerm2)
        }
    ec2.authorizeSecurityGroupIngress(authRequest)
    println("Successfully added ingress policy to Security Group $groupNameVal")
    return resp.groupId
}
}
```

- For API details, see [AuthorizeSecurityGroupIngress](#) in *AWS SDK for Kotlin API reference*.

## CreateKeyPair

The following code example shows how to use `CreateKeyPair`.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun createEC2KeyPair(keyNameVal: String) {
    val request =
        CreateKeyPairRequest {
            keyName = keyNameVal
        }

    Ec2Client { region = "us-west-2" }.use { ec2 ->
        val response = ec2.createKeyPair(request)
        println("The key ID is ${response.keyPairId}")
    }
}
```

- For API details, see [CreateKeyPair](#) in *AWS SDK for Kotlin API reference*.

## CreateSecurityGroup

The following code example shows how to use CreateSecurityGroup.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun createEC2SecurityGroup(
    groupNameVal: String?,
    groupDescVal: String?,
    vpcIdVal: String?,
): String? {
    val request =
        CreateSecurityGroupRequest {
            groupName = groupNameVal
            description = groupDescVal
            vpcId = vpcIdVal
        }

    Ec2Client { region = "us-west-2" }.use { ec2 ->
        val resp = ec2.createSecurityGroup(request)
        val ipRange =
            IpRange {
                cidrIp = "0.0.0.0/0"
            }

        val ipPerm =
            IpPermission {
                ipProtocol = "tcp"
                toPort = 80
                fromPort = 80
                ipRanges = listOf(ipRange)
            }

        val ipPerm2 =
```

```
        IpPermission {
            ipProtocol = "tcp"
            toPort = 22
            fromPort = 22
            ipRanges = listOf(ipRange)
        }

        val authRequest =
            AuthorizeSecurityGroupIngressRequest {
                groupName = groupNameVal
                ipPermissions = listOf(ipPerm, ipPerm2)
            }
        ec2.authorizeSecurityGroupIngress(authRequest)
        println("Successfully added ingress policy to Security Group $groupNameVal")
        return resp.groupId
    }
}
```

- For API details, see [CreateSecurityGroup](#) in *AWS SDK for Kotlin API reference*.

## DeleteKeyPair

The following code example shows how to use DeleteKeyPair.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun deleteKeys(keyPair: String?) {
    val request =
        DeleteKeyPairRequest {
            keyName = keyPair
        }

    Ec2Client { region = "us-west-2" }.use { ec2 ->
        ec2.deleteKeyPair(request)
    }
}
```

```
        println("Successfully deleted key pair named $keyPair")
    }
}
```

- For API details, see [DeleteKeyPair](#) in *AWS SDK for Kotlin API reference*.

## DeleteSecurityGroup

The following code example shows how to use DeleteSecurityGroup.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun deleteEC2SecGroup(groupIdVal: String) {
    val request =
        DeleteSecurityGroupRequest {
            groupId = groupIdVal
        }

    Ec2Client { region = "us-west-2" }.use { ec2 ->
        ec2.deleteSecurityGroup(request)
        println("Successfully deleted Security Group with id $groupIdVal")
    }
}
```

- For API details, see [DeleteSecurityGroup](#) in *AWS SDK for Kotlin API reference*.

## DescribeInstanceTypes

The following code example shows how to use DescribeInstanceTypes.

## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
// Get a list of instance types.
suspend fun getInstanceTypesSc(): String {
    var instanceType = ""
    val filterObs = ArrayList<Filter>()
    val filter =
        Filter {
            name = "processor-info.supported-architecture"
            values = listOf("arm64")
        }

    filterObs.add(filter)
    val typesRequest =
        DescribeInstanceTypesRequest {
            filters = filterObs
            maxResults = 10
        }
    Ec2Client { region = "us-west-2" }.use { ec2 ->
        val response = ec2.describeInstanceTypes(typesRequest)
        response.instanceTypes?.forEach { type ->
            println("The memory information of this type is
                ${type.memoryInfo?.sizeInMib}")
            println("Maximum number of network cards is
                ${type.networkInfo?.maximumNetworkCards}")
            instanceType = type.instanceType.toString()
        }
        return instanceType
    }
}
```

- For API details, see [DescribeInstanceTypes](#) in *AWS SDK for Kotlin API reference*.

## DescribeInstances

The following code example shows how to use DescribeInstances.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun describeEC2Instances() {
    val request =
        DescribeInstancesRequest {
            maxResults = 6
        }

    Ec2Client { region = "us-west-2" }.use { ec2 ->
        val response = ec2.describeInstances(request)
        response.reservations?.forEach { reservation ->
            reservation.instances?.forEach { instance ->
                println("Instance Id is ${instance.instanceId}")
                println("Image id is ${instance.imageId}")
                println("Instance type is ${instance.instanceType}")
                println("Instance state name is ${instance.state?.name}")
                println("monitoring information is ${instance.monitoring?.state}")
            }
        }
    }
}
```

- For API details, see [DescribeInstances](#) in *AWS SDK for Kotlin API reference*.

## DescribeKeyPairs

The following code example shows how to use DescribeKeyPairs.

## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun describeEC2Keys() {
    Ec2Client { region = "us-west-2" }.use { ec2 ->
        val response = ec2.describeKeyPairs(DescribeKeyPairsRequest {})
        response.keyPairs?.forEach { keyPair ->
            println("Found key pair with name ${keyPair.keyName} and fingerprint
                ${ keyPair.keyFingerprint}")
        }
    }
}
```

- For API details, see [DescribeKeyPairs](#) in *AWS SDK for Kotlin API reference*.

## DescribeSecurityGroups

The following code example shows how to use DescribeSecurityGroups.

## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun describeEC2SecurityGroups(groupId: String) {
    val request =
        DescribeSecurityGroupsRequest {
            groupIds = listOf(groupId)
        }

    Ec2Client { region = "us-west-2" }.use { ec2 ->
```

```

    val response = ec2.describeSecurityGroups(request)
    response.securityGroups?.forEach { group ->
        println("Found Security Group with id ${group.groupId}, vpc id
    ${group.vpcId} and description ${group.description}")
    }
}

```

- For API details, see [DescribeSecurityGroups](#) in *AWS SDK for Kotlin API reference*.

## DisassociateAddress

The following code example shows how to use `DisassociateAddress`.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```

suspend fun disassociateAddressSc(associationIdVal: String?) {
    val addressRequest =
        DisassociateAddressRequest {
            associationId = associationIdVal
        }
    Ec2Client { region = "us-west-2" }.use { ec2 ->
        ec2.disassociateAddress(addressRequest)
        println("You successfully disassociated the address!")
    }
}

```

- For API details, see [DisassociateAddress](#) in *AWS SDK for Kotlin API reference*.

## ReleaseAddress

The following code example shows how to use `ReleaseAddress`.



## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun releaseEC2AddressSc(allocId: String?) {
    val request =
        ReleaseAddressRequest {
            allocationId = allocId
        }

    Ec2Client { region = "us-west-2" }.use { ec2 ->
        ec2.releaseAddress(request)
        println("Successfully released Elastic IP address $allocId")
    }
}
```

- For API details, see [ReleaseAddress](#) in *AWS SDK for Kotlin API reference*.

## RunInstances

The following code example shows how to use RunInstances.

## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun createEC2Instance(
    name: String,
    amiId: String,
): String? {
```

```
val request =
    RunInstancesRequest {
        imageId = amiId
        instanceType = InstanceType.T1Micro
        maxCount = 1
        minCount = 1
    }

Ec2Client { region = "us-west-2" }.use { ec2 ->
    val response = ec2.runInstances(request)
    val instanceId = response.instances?.get(0)?.instanceId
    val tag =
        Tag {
            key = "Name"
            value = name
        }

    val requestTags =
        CreateTagsRequest {
            resources = listOf(instanceId.toString())
            tags = listOf(tag)
        }
    ec2.createTags(requestTags)
    println("Successfully started EC2 Instance $instanceId based on AMI $amiId")
    return instanceId
}
}
```

- For API details, see [RunInstances](#) in *AWS SDK for Kotlin API reference*.

## StartInstances

The following code example shows how to use StartInstances.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun startInstanceSc(instanceId: String) {
    val request =
        StartInstancesRequest {
            instanceIds = listOf(instanceId)
        }

    Ec2Client { region = "us-west-2" }.use { ec2 ->
        ec2.startInstances(request)
        println("Waiting until instance $instanceId starts. This will take a few
minutes.")
        ec2.waitForInstanceRunning {
            // suspend call
            instanceIds = listOf(instanceId)
        }
        println("Successfully started instance $instanceId")
    }
}
```

- For API details, see [StartInstances](#) in *AWS SDK for Kotlin API reference*.

## StopInstances

The following code example shows how to use StopInstances.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun stopInstanceSc(instanceId: String) {
    val request =
        StopInstancesRequest {
            instanceIds = listOf(instanceId)
        }

    Ec2Client { region = "us-west-2" }.use { ec2 ->
        ec2.stopInstances(request)
    }
}
```

```
        println("Waiting until instance $instanceId stops. This will take a few
minutes.")
        ec2.waitForInstanceStopped {
            // suspend call
            instanceIds = listOf(instanceId)
        }
        println("Successfully stopped instance $instanceId")
    }
}
```

- For API details, see [StopInstances](#) in *AWS SDK for Kotlin API reference*.

## TerminateInstances

The following code example shows how to use `TerminateInstances`.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun terminateEC2(instanceID: String) {
    val request =
        TerminateInstancesRequest {
            instanceIds = listOf(instanceID)
        }

    Ec2Client { region = "us-west-2" }.use { ec2 ->
        val response = ec2.terminateInstances(request)
        response.terminatingInstances?.forEach { instance ->
            println("The ID of the terminated instance is ${instance.instanceId}")
        }
    }
}
```

- For API details, see [TerminateInstances](#) in *AWS SDK for Kotlin API reference*.

# Amazon ECR examples using SDK for Kotlin

The following code examples show you how to perform actions and implement common scenarios by using the AWS SDK for Kotlin with Amazon ECR.

*Basics* are code examples that show you how to perform the essential operations within a service.

*Actions* are code excerpts from larger programs and must be run in context. While actions show you how to call individual service functions, you can see actions in context in their related scenarios.

Each example includes a link to the complete source code, where you can find instructions on how to set up and run the code in context.

## Get started

### Hello Amazon ECR

The following code examples show how to get started using Amazon ECR.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
import aws.sdk.kotlin.services.ecr.EcrClient
import aws.sdk.kotlin.services.ecr.model.ListImagesRequest
import kotlin.system.exitProcess

suspend fun main(args: Array<String>) {
    val usage = """
        Usage: <repositoryName>

        Where:
            repositoryName - The name of the Amazon ECR repository.

    """.trimIndent()

    if (args.size != 1) {
        println(usage)
    }
}
```

```
        exitProcess(1)
    }

    val repoName = args[0]
    listImageTags(repoName)
}

suspend fun listImageTags(repoName: String?) {
    val listImages =
        ListImagesRequest {
            repositoryName = repoName
        }

    EcrClient { region = "us-east-1" }.use { ecrClient ->
        val imageResponse = ecrClient.listImages(listImages)
        imageResponse.imageIds?.forEach { imageId ->
            println("Image tag: ${imageId.imageTag}")
        }
    }
}
```

- For API details, see [listImages](#) in *AWS SDK for Kotlin API reference*.

## Topics

- [Basics](#)
- [Actions](#)

## Basics

### Learn the basics

The following code example shows how to:

- Create an Amazon ECR repository.
- Set repository policies.
- Retrieve repository URIs.
- Get Amazon ECR authorization tokens.
- Set lifecycle policies for Amazon ECR repositories.

- Push a Docker image to an Amazon ECR repository.
- Verify the existence of an image in an Amazon ECR repository.
- List Amazon ECR repositories for your account and get details about them.
- Delete Amazon ECR repositories.

## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

Run an interactive scenario demonstrating Amazon ECR features.

```
import java.util.Scanner

/**
 * Before running this Kotlin code example, set up your development environment,
 * including your credentials.
 *
 * For more information, see the following documentation topic:
 *
 * https://docs.aws.amazon.com/sdk-for-kotlin/latest/developer-guide/setup.html
 *
 * This code example requires an IAM Role that has permissions to interact with the
 * Amazon ECR service.
 *
 * To create an IAM role, see:
 *
 * https://docs.aws.amazon.com/IAM/latest/UserGuide/id_roles_create.html
 *
 * This code example requires a local docker image named echo-text. Without a local
 * image,
 * this program will not successfully run. For more information including how to
 * create the local
 * image, see:
 *
 * /getting_started_scenarios/ecr_scenario/README
 *
 */
```

```
val DASHES = String(CharArray(80)).replace("\u0000", "-")

suspend fun main(args: Array<String>) {
    val usage =
        """
        Usage: <iamRoleARN> <accountId>

        Where:
            iamRoleARN - The IAM role ARN that has the necessary permissions to
            access and manage the Amazon ECR repository.
            accountId - Your AWS account number.

        """.trimIndent()

    // if (args.size != 2) {
    //     println(usage)
    //     return
    // }

    var iamRole = "arn:aws:iam::814548047983:role/Admin"
    var localImageName: String
    var accountId = "814548047983"
    val ecrActions = ECRActions()
    val scanner = Scanner(System.`in`)

    println(
        """
        The Amazon Elastic Container Registry (ECR) is a fully-managed Docker
        container registry
        service provided by AWS. It allows developers and organizations to securely
        store, manage, and deploy Docker container images.
        ECR provides a simple and scalable way to manage container images throughout
        their lifecycle,
        from building and testing to production deployment.

        The `EcrClient` service client that is part of the AWS SDK for Kotlin
        provides a set of methods to
        programmatically interact with the Amazon ECR service. This allows
        developers to
        automate the storage, retrieval, and management of container images as part
        of their application
        deployment pipelines. With ECR, teams can focus on building and deploying
        their
    """
    )
}
```



applications without having to worry about the underlying infrastructure required to host and manage a container registry.

This scenario walks you through how to perform key operations for this service.

Let's get started...

You have two choices:

- 1 - Run the entire program.
- 2 - Delete an existing Amazon ECR repository named echo-text (created from a previous execution of this program that did not complete).

```

        """.trimIndent(),
    )

    while (true) {
        val input = scanner.nextLine()
        if (input.trim { it <= ' ' }.equals("1", ignoreCase = true)) {
            println("Continuing with the program...")
            println("")
            break
        } else if (input.trim { it <= ' ' }.equals("2", ignoreCase = true)) {
            val repoName = "echo-text"
            ecrActions.deleteECRRepository(repoName)
            return
        } else {
            // Handle invalid input.
            println("Invalid input. Please try again.")
        }
    }

    waitForInputToContinue(scanner)
    println(DASHES)
    println(
        """
        1. Create an ECR repository.
    """
    )

```

The first task is to ensure we have a local Docker image named echo-text. If this image exists, then an Amazon ECR repository is created.

An ECR repository is a private Docker container repository provided by Amazon Web Services (AWS). It is a managed service that makes it easy

```
    to store, manage, and deploy Docker container images.

    """.trimIndent(),
)

// Ensure that a local docker image named echo-text exists.
val doesExist = ecrActions.listLocalImages()
val repoName: String
if (!doesExist) {
    println("The local image named echo-text does not exist")
    return
} else {
    localImageName = "echo-text"
    repoName = "echo-text"
}

val repoArn = ecrActions.createECRRepository(repoName).toString()
println("The ARN of the ECR repository is $repoArn")
waitForInputToContinue(scanner)

println(DASHES)
println(
    """
        2. Set an ECR repository policy.

        Setting an ECR repository policy using the `setRepositoryPolicy` function is
        crucial for maintaining
        the security and integrity of your container images. The repository policy
        allows you to
        define specific rules and restrictions for accessing and managing the images
        stored within your ECR
        repository.

        """.trimIndent(),
)
waitForInputToContinue(scanner)
ecrActions.setRepoPolicy(repoName, iamRole)
waitForInputToContinue(scanner)

println(DASHES)
println(
    """
        3. Display ECR repository policy.
```

```

        Now we will retrieve the ECR policy to ensure it was successfully set.
        """".trimIndent(),
    )
    waitForInputToContinue(scanner)
    val policyText = ecrActions.getRepoPolicy(repoName)
    println("Policy Text:")
    println(policyText)
    waitForInputToContinue(scanner)

```

```

println(DASHES)
println(
    """"
    4. Retrieve an ECR authorization token.

```

You need an authorization token to securely access and interact with the Amazon ECR registry.

The `getAuthorizationToken` method of the `EcrAsyncClient` is responsible for securely accessing and interacting with an Amazon ECR repository. This operation is responsible for obtaining a valid authorization token, which is required to authenticate your requests to the ECR service.

Without a valid authorization token, you would not be able to perform any operations on the ECR repository, such as pushing, pulling, or managing your Docker images.

```

        """".trimIndent(),
    )
    waitForInputToContinue(scanner)
    ecrActions.getAuthToken()
    waitForInputToContinue(scanner)

println(DASHES)
println(
    """"
    5. Get the ECR Repository URI.

```

The URI of an Amazon ECR repository is important. When you want to deploy a container image to a container orchestration platform like Amazon Elastic Kubernetes Service (EKS)

or Amazon Elastic Container Service (ECS), you need to specify the full image URI, which includes the ECR repository URI. This allows the container runtime to pull the correct container image from the ECR repository.

```
        """.trimIndent(),
    )
    waitForInputToContinue(scanner)
    val repositoryURI: String? = ecrActions.getRepositoryURI(repoName)
    println("The repository URI is $repositoryURI")
    waitForInputToContinue(scanner)
```

```
println(DASHES)
println(
    """
    6. Set an ECR Lifecycle Policy.
```

An ECR Lifecycle Policy is used to manage the lifecycle of Docker images stored in your ECR repositories.

These policies allow you to automatically remove old or unused Docker images from your repositories, freeing up storage space and reducing costs.

```
        """.trimIndent(),
    )
    waitForInputToContinue(scanner)
    val pol = ecrActions.setLifecyclePolicy(repoName)
    println(pol)
    waitForInputToContinue(scanner)
```

```
println(DASHES)
println(
    """
    7. Push a docker image to the Amazon ECR Repository.
```

The `pushImageCmd()` method pushes a local Docker image to an Amazon ECR repository.

It sets up the Docker client by connecting to the local Docker host using the default port.

It then retrieves the authorization token for the ECR repository by making a call to the AWS SDK.

The method uses the authorization token to create an `AuthConfig` object, which is used to authenticate the Docker client when pushing the image. Finally, the method tags the Docker image with the specified repository name and image tag, and then pushes the image to the ECR repository using the Docker client.

If the push operation is successful, the method prints a message indicating that the image was pushed to ECR.

```

        """.trimIndent(),
    )

    waitForInputToContinue(scanner)
    ecrActions.pushDockerImage(repoName, localImageName)
    waitForInputToContinue(scanner)

    println(DASHES)
    println("8. Verify if the image is in the ECR Repository.")
    waitForInputToContinue(scanner)
    ecrActions.verifyImage(repoName, localImageName)
    waitForInputToContinue(scanner)

    println(DASHES)
    println("9. As an optional step, you can interact with the image in Amazon ECR
by using the CLI.")
    println("Would you like to view instructions on how to use the CLI to run the
image? (y/n)")
    val ans = scanner.nextLine().trim()
    if (ans.equals("y", true)) {
        val instructions = """
            1. Authenticate with ECR - Before you can pull the image from Amazon ECR,
you need to authenticate with the registry. You can do this using the AWS CLI:

                aws ecr get-login-password --region us-east-1 | docker login --username
AWS --password-stdin $accountId.dkr.ecr.us-east-1.amazonaws.com

            2. Describe the image using this command:

                aws ecr describe-images --repository-name $repoName --image-ids imageTag=
$localImageName

            3. Run the Docker container and view the output using this command:

```

```

        docker run --rm $accountId.dkr.ecr.us-east-1.amazonaws.com/$repoName:
$localImageName
        ""
        println(instructions)
    }
    waitForInputToContinue(scanner)

    println(DASHES)
    println("10. Delete the ECR Repository.")
    println(
        ""
        If the repository isn't empty, you must either delete the contents of the
repository
        or use the force option (used in this scenario) to delete the repository and
have Amazon ECR delete all of its contents
        on your behalf.

        """).trimIndent(),
    )
    println("Would you like to delete the Amazon ECR Repository? (y/n)")
    val delAns = scanner.nextLine().trim { it <= ' ' }
    if (delAns.equals("y", ignoreCase = true)) {
        println("You selected to delete the AWS ECR resources.")
        waitForInputToContinue(scanner)
        ecrActions.deleteECRRepository(repoName)
    }

    println(DASHES)
    println("This concludes the Amazon ECR SDK scenario")
    println(DASHES)
}

private fun waitForInputToContinue(scanner: Scanner) {
    while (true) {
        println("")
        println("Enter 'c' followed by <ENTER> to continue:")
        val input = scanner.nextLine()
        if (input.trim { it <= ' ' }.equals("c", ignoreCase = true)) {
            println("Continuing with the program...")
            println("")
            break
        } else {
            // Handle invalid input.
            println("Invalid input. Please try again.")
        }
    }
}

```

```

    }
}
}

```

## A wrapper class for Amazon ECR SDK methods.

```

import aws.sdk.kotlin.services.ecr.EcrClient
import aws.sdk.kotlin.services.ecr.model.CreateRepositoryRequest
import aws.sdk.kotlin.services.ecr.model.DeleteRepositoryRequest
import aws.sdk.kotlin.services.ecr.model.DescribeImagesRequest
import aws.sdk.kotlin.services.ecr.model.DescribeRepositoriesRequest
import aws.sdk.kotlin.services.ecr.model.EcrException
import aws.sdk.kotlin.services.ecr.model.GetRepositoryPolicyRequest
import aws.sdk.kotlin.services.ecr.model.ImageIdentifier
import aws.sdk.kotlin.services.ecr.model.RepositoryAlreadyExistsException
import aws.sdk.kotlin.services.ecr.model.SetRepositoryPolicyRequest
import aws.sdk.kotlin.services.ecr.model.StartLifecyclePolicyPreviewRequest
import com.github.dockerjava.api.DockerClient
import com.github.dockerjava.api.command.DockerCmdExecFactory
import com.github.dockerjava.api.model.AuthConfig
import com.github.dockerjava.core.DockerClientBuilder
import com.github.dockerjava.netty.NettyDockerCmdExecFactory
import java.io.IOException
import java.util.Base64

class ECRActions {
    private var dockerClient: DockerClient? = null

    private fun getDockerClient(): DockerClient? {
        val osName = System.getProperty("os.name")
        if (osName.startsWith("Windows")) {
            // Make sure Docker Desktop is running.
            val dockerHost = "tcp://localhost:2375" // Use the Docker Desktop
default port.
            val dockerCmdExecFactory: DockerCmdExecFactory =
NettyDockerCmdExecFactory().withReadTimeout(20000).withConnectTimeout(20000)
                dockerClient =
DockerClientBuilder.getInstance(dockerHost).withDockerCmdExecFactory(dockerCmdExecFactory).
        } else {
            dockerClient = DockerClientBuilder.getInstance().build()
        }
    }
}

```

```
        return dockerClient
    }

    /**
     * Sets the lifecycle policy for the specified repository.
     *
     * @param repoName the name of the repository for which to set the lifecycle
    policy.
     */
    suspend fun setLifecyclePolicy(repoName: String): String? {
        val polText =
            """
            {
                "rules": [
                    {
                        "rulePriority": 1,
                        "description": "Expire images older than 14 days",
                        "selection": {
                            "tagStatus": "any",
                            "countType": "sinceImagePushed",
                            "countUnit": "days",
                            "countNumber": 14
                        },
                        "action": {
                            "type": "expire"
                        }
                    }
                ]
            }

            """.trimIndent()
        val lifecyclePolicyPreviewRequest =
            StartLifecyclePolicyPreviewRequest {
                lifecyclePolicyText = polText
                repositoryName = repoName
            }

        // Execute the request asynchronously.
        EcrClient { region = "us-east-1" }.use { ecrClient ->
            val response =
                ecrClient.startLifecyclePolicyPreview(lifecyclePolicyPreviewRequest)
            return response.lifecyclePolicyText
        }
    }
}
```



```

}

/**
 * Retrieves the repository URI for the specified repository name.
 *
 * @param repoName the name of the repository to retrieve the URI for.
 * @return the repository URI for the specified repository name.
 */
suspend fun getRepositoryURI(repoName: String?): String? {
    require(!(repoName == null || repoName.isEmpty())) { "Repository name cannot
be null or empty" }
    val request =
        DescribeRepositoriesRequest {
            repositoryNames = listOf(repoName)
        }

    EcrClient { region = "us-east-1" }.use { ecrClient ->
        val describeRepositoriesResponse =
ecrClient.describeRepositories(request)
        if (!describeRepositoriesResponse.repositories?.isEmpty()!!) {
            return
describeRepositoriesResponse?.repositories?.get(0)?.repositoryUri
        } else {
            println("No repositories found for the given name.")
            return ""
        }
    }
}

/**
 * Retrieves the authorization token for Amazon Elastic Container Registry
(ECR).
 *
 */
suspend fun getAuthToken() {
    EcrClient { region = "us-east-1" }.use { ecrClient ->
        // Retrieve the authorization token for ECR.
        val response = ecrClient.getAuthorizationToken()
        val authorizationData = response.authorizationData?.get(0)
        val token = authorizationData?.authorizationToken
        if (token != null) {
            println("The token was successfully retrieved.")
        }
    }
}

```

```
    }
  }
}

/**
 * Gets the repository policy for the specified repository.
 *
 * @param repoName the name of the repository.
 */
suspend fun getRepoPolicy(repoName: String?): String? {
    require(!(repoName == null || repoName.isEmpty())) { "Repository name cannot
be null or empty" }

    // Create the request
    val getRepositoryPolicyRequest =
        GetRepositoryPolicyRequest {
            repositoryName = repoName
        }
    EcrClient { region = "us-east-1" }.use { ecrClient ->
        val response = ecrClient.getRepositoryPolicy(getRepositoryPolicyRequest)
        val responseText = response.policyText
        return responseText
    }
}

/**
 * Sets the repository policy for the specified ECR repository.
 *
 * @param repoName the name of the ECR repository.
 * @param iamRole the IAM role to be granted access to the repository.
 */
suspend fun setRepoPolicy(
    repoName: String?,
    iamRole: String?,
) {
    val policyDocumentTemplate =
        """
        {
            "Version" : "2012-10-17",
            "Statement" : [ {
                "Sid" : "new statement",
                "Effect" : "Allow",

```

```

        "Principal" : {
            "AWS" : "$iamRole"
        },
        "Action" : "ecr:BatchGetImage"
    } ]
}

"".trimIndent()
val setRepositoryPolicyRequest =
    SetRepositoryPolicyRequest {
        repositoryName = repoName
        policyText = policyDocumentTemplate
    }

EcrClient { region = "us-east-1" }.use { ecrClient ->
    val response = ecrClient.setRepositoryPolicy(setRepositoryPolicyRequest)
    if (response != null) {
        println("Repository policy set successfully.")
    }
}
}

/**
 * Creates an Amazon Elastic Container Registry (Amazon ECR) repository.
 *
 * @param repoName the name of the repository to create.
 * @return the Amazon Resource Name (ARN) of the created repository, or an empty
string if the operation failed.
 * @throws RepositoryAlreadyExistsException if the repository exists.
 * @throws EcrException if an error occurs while creating the
repository.
 */
suspend fun createECRRepository(repoName: String?): String? {
    val request =
        CreateRepositoryRequest {
            repositoryName = repoName
        }

    return try {
        EcrClient { region = "us-east-1" }.use { ecrClient ->
            val response = ecrClient.createRepository(request)
            response.repository?.repositoryArn
        }
    }
}

```

```

    } catch (e: RepositoryAlreadyExistsException) {
        println("Repository already exists: $repoName")
        repoName?.let { getRepoARN(it) }
    } catch (e: EcrException) {
        println("An error occurred: ${e.message}")
        null
    }
}

suspend fun getRepoARN(repoName: String): String? {
    // Fetch the existing repository's ARN.
    val describeRequest =
        DescribeRepositoriesRequest {
            repositoryNames = listOf(repoName)
        }
    EcrClient { region = "us-east-1" }.use { ecrClient ->
        val describeResponse = ecrClient.describeRepositories(describeRequest)
        return describeResponse.repositories?.get(0)?.repositoryArn
    }
}

fun listLocalImages(): Boolean = try {
    val images = getDockerClient()?.listImagesCmd()?.exec()
    images?.any { image ->
        image.repoTags?.any { tag -> tag.startsWith("echo-text") } ?: false
    } ?: false
} catch (ex: Exception) {
    println("ERROR: ${ex.message}")
    false
}

/**
 * Pushes a Docker image to an Amazon Elastic Container Registry (ECR)
repository.
 *
 * @param repoName the name of the ECR repository to push the image to.
 * @param imageName the name of the Docker image.
 */
suspend fun pushDockerImage(
    repoName: String,
    imageName: String,
) {
    println("Pushing $imageName to $repoName will take a few seconds")
}

```

```

    val authConfig = getAuthConfig(repoName)

    EcrClient { region = "us-east-1" }.use { ecrClient ->
        val desRequest =
            DescribeRepositoriesRequest {
                repositoryNames = listOf(repoName)
            }

        val describeRepoResponse = ecrClient.describeRepositories(desRequest)
        val repoData =
            describeRepoResponse.repositories?.firstOrNull { it.repositoryName
== repoName }
                ?: throw RuntimeException("Repository not found: $repoName")

        val tagImageCmd = getDockerClient()?.tagImageCmd("$imageName",
"${repoData.repositoryUri}", imageName)
        if (tagImageCmd != null) {
            tagImageCmd.exec()
        }
        val pushImageCmd =
            repoData.repositoryUri?.let {
                dockerClient?.pushImageCmd(it)
                    // ?.withTag("latest")
                    ?.withAuthConfig(authConfig)
            }

        try {
            if (pushImageCmd != null) {
                pushImageCmd.start().awaitCompletion()
            }
            println("The $imageName was pushed to Amazon ECR")
        } catch (e: IOException) {
            throw RuntimeException(e)
        }
    }
}

/**
 * Verifies the existence of an image in an Amazon Elastic Container Registry
(Amazon ECR) repository asynchronously.
 *
 * @param repositoryName The name of the Amazon ECR repository.
 * @param imageTag       The tag of the image to verify.

```

```
    */
suspend fun verifyImage(
    repoName: String?,
    imageTagVal: String?,
) {
    require(!(repoName == null || repoName.isEmpty())) { "Repository name cannot
be null or empty" }
    require(!(imageTagVal == null || imageTagVal.isEmpty())) { "Image tag cannot
be null or empty" }

    val imageId =
        ImageIdentifier {
            imageTag = imageTagVal
        }
    val request =
        DescribeImagesRequest {
            repositoryName = repoName
            imageIds = listOf(imageId)
        }

    EcrClient { region = "us-east-1" }.use { ecrClient ->
        val describeImagesResponse = ecrClient.describeImages(request)
        if (describeImagesResponse != null && !
describeImagesResponse.imageDetails?.isEmpty()!!) {
            println("Image is present in the repository.")
        } else {
            println("Image is not present in the repository.")
        }
    }
}

/**
 * Deletes an ECR (Elastic Container Registry) repository.
 *
 * @param repoName the name of the repository to delete.
 */
suspend fun deleteECRRepository(repoName: String) {
    if (repoName.isNullOrEmpty()) {
        throw IllegalArgumentException("Repository name cannot be null or
empty")
    }

    val repositoryRequest =
```

```

        DeleteRepositoryRequest {
            force = true
            repositoryName = repoName
        }

        EcrClient { region = "us-east-1" }.use { ecrClient ->
            ecrClient.deleteRepository(repositoryRequest)
            println("You have successfully deleted the $repoName repository")
        }
    }

// Return an AuthConfig.
private suspend fun getAuthConfig(repoName: String): AuthConfig {
    EcrClient { region = "us-east-1" }.use { ecrClient ->
        // Retrieve the authorization token for ECR.
        val response = ecrClient.getAuthorizationToken()
        val authorizationData = response.authorizationData?.get(0)
        val token = authorizationData?.authorizationToken
        val decodedToken = String(Base64.getDecoder().decode(token))
        val password = decodedToken.substring(4)

        val request =
            DescribeRepositoriesRequest {
                repositoryNames = listOf(repoName)
            }

        val descrRepoResponse = ecrClient.describeRepositories(request)
        val repoData = descrRepoResponse.repositories?.firstOrNull
        { it.repositoryName == repoName }
        val registryURL: String = repoData?.repositoryUri?.split("/")?.get(0) ?:
        ""

        return AuthConfig()
            .withUsername("AWS")
            .withPassword(password)
            .withRegistryAddress(registryURL)
    }
}

```

- For API details, see the following topics in *AWS SDK for Kotlin API reference*.
  - [CreateRepository](#)

- [DeleteRepository](#)
- [DescribeImages](#)
- [DescribeRepositories](#)
- [GetAuthorizationToken](#)
- [GetRepositoryPolicy](#)
- [SetRepositoryPolicy](#)
- [StartLifecyclePolicyPreview](#)

## Actions

### CreateRepository

The following code example shows how to use CreateRepository.

#### SDK for Kotlin

##### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
/**
 * Creates an Amazon Elastic Container Registry (Amazon ECR) repository.
 *
 * @param repoName the name of the repository to create.
 * @return the Amazon Resource Name (ARN) of the created repository, or an empty
string if the operation failed.
 * @throws RepositoryAlreadyExistsException if the repository exists.
 * @throws EcrException if an error occurs while creating the
repository.
 */
suspend fun createECRRepository(repoName: String?): String? {
    val request =
        CreateRepositoryRequest {
            repositoryName = repoName
        }
}
```



```
return try {
    EcrClient { region = "us-east-1" }.use { ecrClient ->
        val response = ecrClient.createRepository(request)
        response.repository?.repositoryArn
    }
} catch (e: RepositoryAlreadyExistsException) {
    println("Repository already exists: $repoName")
    repoName?.let { getRepoARN(it) }
} catch (e: EcrException) {
    println("An error occurred: ${e.message}")
    null
}
}
```

- For API details, see [CreateRepository](#) in *AWS SDK for Kotlin API reference*.

## DeleteRepository

The following code example shows how to use DeleteRepository.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
/**
 * Deletes an ECR (Elastic Container Registry) repository.
 *
 * @param repoName the name of the repository to delete.
 */
suspend fun deleteECRRepository(repoName: String) {
    if (repoName.isNullOrEmpty()) {
        throw IllegalArgumentException("Repository name cannot be null or
empty")
    }
}
```

```

    val repositoryRequest =
        DeleteRepositoryRequest {
            force = true
            repositoryName = repoName
        }

    EcrClient { region = "us-east-1" }.use { ecrClient ->
        ecrClient.deleteRepository(repositoryRequest)
        println("You have successfully deleted the $repoName repository")
    }
}

```

- For API details, see [DeleteRepository](#) in *AWS SDK for Kotlin API reference*.

## DescribeImages

The following code example shows how to use DescribeImages.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```

/**
 * Verifies the existence of an image in an Amazon Elastic Container Registry
 (Amazon ECR) repository asynchronously.
 *
 * @param repositoryName The name of the Amazon ECR repository.
 * @param imageTag       The tag of the image to verify.
 */
suspend fun verifyImage(
    repoName: String?,
    imageTagVal: String?,
) {
    require(!(repoName == null || repoName.isEmpty())) { "Repository name cannot
be null or empty" }
}

```

```

        require(!(imageTagVal == null || imageTagVal.isEmpty())) { "Image tag cannot
        be null or empty" }

        val imageId =
            ImageIdentifier {
                imageTag = imageTagVal
            }
        val request =
            DescribeImagesRequest {
                repositoryName = repoName
                imageIds = listOf(imageId)
            }

        EcrClient { region = "us-east-1" }.use { ecrClient ->
            val describeImagesResponse = ecrClient.describeImages(request)
            if (describeImagesResponse != null && !
describeImagesResponse.imageDetails?.isEmpty()!!) {
                println("Image is present in the repository.")
            } else {
                println("Image is not present in the repository.")
            }
        }
    }
}

```

- For API details, see [DescribeImages](#) in *AWS SDK for Kotlin API reference*.

## DescribeRepositories

The following code example shows how to use DescribeRepositories.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```

/**
 * Retrieves the repository URI for the specified repository name.

```

```

*
* @param repoName the name of the repository to retrieve the URI for.
* @return the repository URI for the specified repository name.
*/
suspend fun getRepositoryURI(repoName: String?): String? {
    require(!(repoName == null || repoName.isEmpty())) { "Repository name cannot
be null or empty" }
    val request =
        DescribeRepositoriesRequest {
            repositoryNames = listOf(repoName)
        }

    EcrClient { region = "us-east-1" }.use { ecrClient ->
        val describeRepositoriesResponse =
ecrClient.describeRepositories(request)
        if (!describeRepositoriesResponse.repositories?.isEmpty()!!) {
            return
describeRepositoriesResponse?.repositories?.get(0)?.repositoryUri
        } else {
            println("No repositories found for the given name.")
            return ""
        }
    }
}

```

- For API details, see [DescribeRepositories](#) in *AWS SDK for Kotlin API reference*.

## GetAuthorizationToken

The following code example shows how to use `GetAuthorizationToken`.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
/**
 * Retrieves the authorization token for Amazon Elastic Container Registry
 (ECR).
 *
 */
suspend fun getAuthToken() {
    EcrClient { region = "us-east-1" }.use { ecrClient ->
        // Retrieve the authorization token for ECR.
        val response = ecrClient.getAuthorizationToken()
        val authorizationData = response.authorizationData?.get(0)
        val token = authorizationData?.authorizationToken
        if (token != null) {
            println("The token was successfully retrieved.")
        }
    }
}
```

- For API details, see [GetAuthorizationToken](#) in *AWS SDK for Kotlin API reference*.

## GetRepositoryPolicy

The following code example shows how to use `GetRepositoryPolicy`.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
/**
 * Gets the repository policy for the specified repository.
 *
 * @param repoName the name of the repository.
 */
suspend fun getRepoPolicy(repoName: String?): String? {
    require(!(repoName == null || repoName.isEmpty())) { "Repository name cannot
be null or empty" }
}
```

```
// Create the request
val getRepositoryPolicyRequest =
    GetRepositoryPolicyRequest {
        repositoryName = repoName
    }
EcrClient { region = "us-east-1" }.use { ecrClient ->
    val response = ecrClient.getRepositoryPolicy(getRepositoryPolicyRequest)
    val responseText = response.policyText
    return responseText
}
}
```

- For API details, see [GetRepositoryPolicy](#) in *AWS SDK for Kotlin API reference*.

## PushImageCmd

The following code example shows how to use PushImageCmd.

## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
/**
 * Pushes a Docker image to an Amazon Elastic Container Registry (ECR)
 repository.
 *
 * @param repoName the name of the ECR repository to push the image to.
 * @param imageName the name of the Docker image.
 */
suspend fun pushDockerImage(
    repoName: String,
    imageName: String,
) {
    println("Pushing $imageName to $repoName will take a few seconds")
}
```

```

val authConfig = getAuthConfig(repoName)

EcrClient { region = "us-east-1" }.use { ecrClient ->
    val desRequest =
        DescribeRepositoriesRequest {
            repositoryNames = listOf(repoName)
        }

    val describeRepoResponse = ecrClient.describeRepositories(desRequest)
    val repoData =
        describeRepoResponse.repositories?.firstOrNull { it.repositoryName
== repoName }
            ?: throw RuntimeException("Repository not found: $repoName")

    val tagImageCmd = getDockerClient()?.tagImageCmd("$imageName",
"${repoData.repositoryUri}", imageName)
    if (tagImageCmd != null) {
        tagImageCmd.exec()
    }
    val pushImageCmd =
        repoData.repositoryUri?.let {
            dockerClient?.pushImageCmd(it)
                // ?.withTag("latest")
                ?.withAuthConfig(authConfig)
        }

    try {
        if (pushImageCmd != null) {
            pushImageCmd.start().awaitCompletion()
        }
        println("The $imageName was pushed to Amazon ECR")
    } catch (e: IOException) {
        throw RuntimeException(e)
    }
}
}

```

- For API details, see [PushImageCmd](#) in *AWS SDK for Kotlin API reference*.

## SetRepositoryPolicy

The following code example shows how to use SetRepositoryPolicy.

## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
/**
 * Sets the repository policy for the specified ECR repository.
 *
 * @param repoName the name of the ECR repository.
 * @param iamRole the IAM role to be granted access to the repository.
 */
suspend fun setRepoPolicy(
    repoName: String?,
    iamRole: String?,
) {
    val policyDocumentTemplate =
        """
        {
            "Version" : "2012-10-17",
            "Statement" : [ {
                "Sid" : "new statement",
                "Effect" : "Allow",
                "Principal" : {
                    "AWS" : "$iamRole"
                },
                "Action" : "ecr:BatchGetImage"
            } ]
        }
        """.trimIndent()
    val setRepositoryPolicyRequest =
        SetRepositoryPolicyRequest {
            repositoryName = repoName
            policyText = policyDocumentTemplate
        }

    EcrClient { region = "us-east-1" }.use { ecrClient ->
        val response = ecrClient.setRepositoryPolicy(setRepositoryPolicyRequest)
    }
}
```



```
        if (response != null) {
            println("Repository policy set successfully.")
        }
    }
}
```

- For API details, see [SetRepositoryPolicy](#) in *AWS SDK for Kotlin API reference*.

## StartLifecyclePolicyPreview

The following code example shows how to use `StartLifecyclePolicyPreview`.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
/**
 * Verifies the existence of an image in an Amazon Elastic Container Registry
 (Amazon ECR) repository asynchronously.
 *
 * @param repositoryName The name of the Amazon ECR repository.
 * @param imageTag       The tag of the image to verify.
 */
suspend fun verifyImage(
    repoName: String?,
    imageTagVal: String?,
) {
    require(!(repoName == null || repoName.isEmpty())) { "Repository name cannot
be null or empty" }
    require(!(imageTagVal == null || imageTagVal.isEmpty())) { "Image tag cannot
be null or empty" }

    val imageId =
        ImageIdentifier {
            imageTag = imageTagVal
        }
}
```

```
    }
    val request =
        DescribeImagesRequest {
            repositoryName = repoName
            imageIds = listOf(imageId)
        }

    EcrClient { region = "us-east-1" }.use { ecrClient ->
        val describeImagesResponse = ecrClient.describeImages(request)
        if (describeImagesResponse != null && !
describeImagesResponse.imageDetails?.isEmpty()!!) {
            println("Image is present in the repository.")
        } else {
            println("Image is not present in the repository.")
        }
    }
}
```

- For API details, see [StartLifecyclePolicyPreview](#) in *AWS SDK for Kotlin API reference*.

## OpenSearch Service examples using SDK for Kotlin

The following code examples show you how to perform actions and implement common scenarios by using the AWS SDK for Kotlin with OpenSearch Service.

*Actions* are code excerpts from larger programs and must be run in context. While actions show you how to call individual service functions, you can see actions in context in their related scenarios.

Each example includes a link to the complete source code, where you can find instructions on how to set up and run the code in context.

### Topics

- [Actions](#)

## Actions

### CreateDomain

The following code example shows how to use CreateDomain.

## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun createNewDomain(domainNameVal: String?) {
    val clusterConfigOb =
        ClusterConfig {
            dedicatedMasterEnabled = true
            dedicatedMasterCount = 3
            dedicatedMasterType =
                OpenSearchPartitionInstanceType.fromValue("t2.small.search")
            instanceType =
                OpenSearchPartitionInstanceType.fromValue("t2.small.search")
            instanceCount = 5
        }

    val ebsOptionsOb =
        EbsOptions {
            ebsEnabled = true
            volumeSize = 10
            volumeType = VolumeType.Gp2
        }

    val encryptionOptionsOb =
        NodeToNodeEncryptionOptions {
            enabled = true
        }

    val request =
        CreateDomainRequest {
            domainName = domainNameVal
            engineVersion = "OpenSearch_1.0"
            clusterConfig = clusterConfigOb
            ebsOptions = ebsOptionsOb
            nodeToNodeEncryptionOptions = encryptionOptionsOb
        }

    println("Sending domain creation request...")
}
```

```
OpenSearchClient { region = "us-east-1" }.use { searchClient ->
    val createResponse = searchClient.createDomain(request)
    println("Domain status is ${createResponse.domainStatus}")
    println("Domain Id is ${createResponse.domainStatus?.domainId}")
}
}
```

- For API details, see [CreateDomain](#) in *AWS SDK for Kotlin API reference*.

## DeleteDomain

The following code example shows how to use DeleteDomain.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun deleteSpecificDomain(domainNameVal: String) {
    val request =
        DeleteDomainRequest {
            domainName = domainNameVal
        }
    OpenSearchClient { region = "us-east-1" }.use { searchClient ->
        searchClient.deleteDomain(request)
        println("$domainNameVal was successfully deleted.")
    }
}
```

- For API details, see [DeleteDomain](#) in *AWS SDK for Kotlin API reference*.

## ListDomainNames

The following code example shows how to use ListDomainNames.

## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun listAllDomains() {
    OpenSearchClient { region = "us-east-1" }.use { searchClient ->
        val response: ListDomainNamesResponse =
            searchClient.listDomainNames(ListDomainNamesRequest {})
        response.domainNames?.forEach { domain ->
            println("Domain name is " + domain.domainName)
        }
    }
}
```

- For API details, see [ListDomainNames](#) in *AWS SDK for Kotlin API reference*.

## UpdateDomainConfig

The following code example shows how to use `UpdateDomainConfig`.

## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun updateSpecificDomain(domainNameVal: String?) {
    val clusterConfig0b =
        ClusterConfig {
            instanceCount = 3
        }

    val request =
```

```
UpdateDomainConfigRequest {
    domainName = domainNameVal
    clusterConfig = clusterConfigObj
}

println("Sending domain update request...")
OpenSearchClient { region = "us-east-1" }.use { searchClient ->
    val updateResponse = searchClient.updateDomainConfig(request)
    println("Domain update response from Amazon OpenSearch Service:")
    println(updateResponse.toString())
}
}
```

- For API details, see [UpdateDomainConfig](#) in *AWS SDK for Kotlin API reference*.

## EventBridge examples using SDK for Kotlin

The following code examples show you how to perform actions and implement common scenarios by using the AWS SDK for Kotlin with EventBridge.

*Basics* are code examples that show you how to perform the essential operations within a service.

*Actions* are code excerpts from larger programs and must be run in context. While actions show you how to call individual service functions, you can see actions in context in their related scenarios.

Each example includes a link to the complete source code, where you can find instructions on how to set up and run the code in context.

### Get started

#### Hello EventBridge

The following code examples show how to get started using EventBridge.

#### SDK for Kotlin

##### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
import aws.sdk.kotlin.services.eventbridge.EventBridgeClient
import aws.sdk.kotlin.services.eventbridge.model.ListEventBusesRequest
import aws.sdk.kotlin.services.eventbridge.model.ListEventBusesResponse

suspend fun main() {
    listBusesHello()
}

suspend fun listBusesHello() {
    val request =
        ListEventBusesRequest {
            limit = 10
        }

    EventBridgeClient { region = "us-west-2" }.use { eventBrClient ->
        val response: ListEventBusesResponse = eventBrClient.listEventBuses(request)
        response.eventBuses?.forEach { bus ->
            println("The name of the event bus is ${bus.name}")
            println("The ARN of the event bus is ${bus.arn}")
        }
    }
}
```

- For API details, see [ListEventBuses](#) in *AWS SDK for Kotlin API reference*.

## Topics

- [Basics](#)
- [Actions](#)

## Basics

### Learn the basics

The following code example shows how to:

- Create a rule and add a target to it.
- Enable and disable rules.
- List and update rules and targets.

- Send events, then clean up resources.

## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
/*  
Before running this Kotlin code example, set up your development environment,  
including your credentials.  
  
For more information, see the following documentation topic:  
https://docs.aws.amazon.com/sdk-for-kotlin/latest/developer-guide/setup.html  
  
This Kotlin example performs the following tasks with Amazon EventBridge:  
  
1. Creates an AWS Identity and Access Management (IAM) role to use with Amazon  
EventBridge.  
2. Creates an Amazon Simple Storage Service (Amazon S3) bucket with EventBridge  
events enabled.  
3. Creates a rule that triggers when an object is uploaded to Amazon S3.  
4. Lists rules on the event bus.  
5. Creates a new Amazon Simple Notification Service (Amazon SNS) topic and lets the  
user subscribe to it.  
6. Adds a target to the rule that sends an email to the specified topic.  
7. Creates an EventBridge event that sends an email when an Amazon S3 object is  
created.  
8. Lists targets.  
9. Lists the rules for the same target.  
10. Triggers the rule by uploading a file to the S3 bucket.  
11. Disables a specific rule.  
12. Checks and prints the state of the rule.  
13. Adds a transform to the rule to change the text of the email.  
14. Enables a specific rule.  
15. Triggers the updated rule by uploading a file to the S3 bucket.  
16. Updates the rule to a custom rule pattern.  
17. Sends an event to trigger the rule.  
18. Cleans up resources.  
*/
```



```

val DASHES: String = String(CharArray(80)).replace("\u0000", "-")

suspend fun main(args: Array<String>) {
    val usage = """
Usage:
    <roleName> <bucketName> <topicName> <eventRuleName>

Where:
    roleName - The name of the role to create.
    bucketName - The Amazon Simple Storage Service (Amazon S3) bucket name to
create.
    topicName - The name of the Amazon Simple Notification Service (Amazon SNS)
topic to create.
    eventRuleName - The Amazon EventBridge rule name to create.
    """
    val polJSON =
        "{" +
            "\"Version\": \"2012-10-17\"," +
            "\"Statement\": [{" +
            "\"Effect\": \"Allow\"," +
            "\"Principal\": {" +
            "\"Service\": \"events.amazonaws.com\"" +
            "}," +
            "\"Action\": \"sts:AssumeRole\"" +
            "}]}" +
            "}"

    if (args.size != 4) {
        println(usage)
        exitProcess(1)
    }

    val sc = Scanner(System.`in`)
    val roleName = args[0]
    val bucketName = args[1]
    val topicName = args[2]
    val eventRuleName = args[3]

    println(DASHES)
    println("Welcome to the Amazon EventBridge example scenario.")
    println(DASHES)

    println(DASHES)

```

```
println("1. Create an AWS Identity and Access Management (IAM) role to use with
Amazon EventBridge.")
val roleArn = createIAMRole(roleName, polJSON)
println(DASHES)

println(DASHES)
println("2. Create an S3 bucket with EventBridge events enabled.")
if (checkBucket(bucketName)) {
    println("$bucketName already exists. Ending this scenario.")
    exitProcess(1)
}

createBucket(bucketName)
delay(3000)
setBucketNotification(bucketName)
println(DASHES)

println(DASHES)
println("3. Create a rule that triggers when an object is uploaded to Amazon
S3.")
delay(10000)
addEventRule(roleArn, bucketName, eventRuleName)
println(DASHES)

println(DASHES)
println("4. List rules on the event bus.")
listRules()
println(DASHES)

println(DASHES)
println("5. Create a new SNS topic for testing and let the user subscribe to the
topic.")
val topicArn = createSnsTopic(topicName)
println(DASHES)

println(DASHES)
println("6. Add a target to the rule that sends an email to the specified
topic.")
println("Enter your email to subscribe to the Amazon SNS topic:")
val email = sc.nextLine()
subEmail(topicArn, email)
println("Use the link in the email you received to confirm your subscription.
Then press Enter to continue.")
sc.nextLine()
```

```
println(DASHES)

println(DASHES)
println("7. Create an EventBridge event that sends an email when an Amazon S3
object is created.")
addSnsEventRule(eventRuleName, topicArn, topicName, eventRuleName, bucketName)
println(DASHES)

println(DASHES)
println("8. List targets.")
listTargets(eventRuleName)
println(DASHES)

println(DASHES)
println(" 9. List the rules for the same target.")
listTargetRules(topicArn)
println(DASHES)

println(DASHES)
println("10. Trigger the rule by uploading a file to the S3 bucket.")
println("Press Enter to continue.")
sc.nextLine()
uploadTextFiletoS3(bucketName)
println(DASHES)

println(DASHES)
println("11. Disable a specific rule.")
changeRuleState(eventRuleName, false)
println(DASHES)

println(DASHES)
println("12. Check and print the state of the rule.")
checkRule(eventRuleName)
println(DASHES)

println(DASHES)
println("13. Add a transform to the rule to change the text of the email.")
updateSnsEventRule(topicArn, eventRuleName)
println(DASHES)

println(DASHES)
println("14. Enable a specific rule.")
changeRuleState(eventRuleName, true)
println(DASHES)
```

```
println(DASHES)
println("15. Trigger the updated rule by uploading a file to the S3 bucket.")
println("Press Enter to continue.")
sc.nextLine()
uploadTextFiletoS3(bucketName)
println(DASHES)

println(DASHES)
println("16. Update the rule to a custom rule pattern.")
updateToCustomRule(eventRuleName)
println("Updated event rule $eventRuleName to use a custom pattern.")
updateCustomRuleTargetWithTransform(topicArn, eventRuleName)
println("Updated event target $topicArn.")
println(DASHES)

println(DASHES)
println("17. Send an event to trigger the rule. This will trigger a subscription
email.")
triggerCustomRule(email)
println("Events have been sent. Press Enter to continue.")
sc.nextLine()
println(DASHES)

println(DASHES)
println("18. Clean up resources.")
println("Do you want to clean up resources (y/n)")
val ans = sc.nextLine()
if (ans.compareTo("y") == 0) {
    cleanupResources(topicArn, eventRuleName, bucketName, roleName)
} else {
    println("The resources will not be cleaned up. ")
}
println(DASHES)

println(DASHES)
println("The Amazon EventBridge example scenario has successfully completed.")
println(DASHES)
}

suspend fun cleanupResources(
    topicArn: String?,
    eventRuleName: String?,
    bucketName: String?,
```

```

        roleName: String?,
    ) {
        println("Removing all targets from the event rule.")
        deleteTargetsFromRule(eventRuleName)
        deleteRuleByName(eventRuleName)
        deleteSNSTopic(topicArn)
        deleteS3Bucket(bucketName)
        deleteRole(roleName)
    }

suspend fun deleteRole(roleNameVal: String?) {
    val policyArnVal = "arn:aws:iam::aws:policy/AmazonEventBridgeFullAccess"
    val policyRequest =
        DetachRolePolicyRequest {
            policyArn = policyArnVal
            roleName = roleNameVal
        }
    IamClient { region = "us-east-1" }.use { iam ->
        iam.detachRolePolicy(policyRequest)
        println("Successfully detached policy $policyArnVal from role $roleNameVal")

        // Delete the role.
        val roleRequest =
            DeleteRoleRequest {
                roleName = roleNameVal
            }

        iam.deleteRole(roleRequest)
        println("*** Successfully deleted $roleNameVal")
    }
}

suspend fun deleteS3Bucket(bucketName: String?) {
    // Remove all the objects from the S3 bucket.
    val listObjects =
        ListObjectsRequest {
            bucket = bucketName
        }
    S3Client { region = "us-east-1" }.use { s3Client ->
        val res = s3Client.listObjects(listObjects)
        val myObjects = res.contents
        val toDelete = mutableListof<ObjectIdentifier>()

        if (myObjects != null) {

```

```
        for (myValue in myObjects) {
            toDelete.add(
                ObjectIdentifier {
                    key = myValue.key
                },
            )
        }
    }

    val delOb =
        Delete {
            objects = toDelete
        }

    val dor =
        DeleteObjectsRequest {
            bucket = bucketName
            delete = delOb
        }
    s3Client.deleteObjects(dor)

    // Delete the S3 bucket.
    val deleteBucketRequest =
        DeleteBucketRequest {
            bucket = bucketName
        }
    s3Client.deleteBucket(deleteBucketRequest)
    println("You have deleted the bucket and the objects")
}

// Delete the SNS topic.
suspend fun deleteSNSTopic(topicArnVal: String?) {
    val request =
        DeleteTopicRequest {
            topicArn = topicArnVal
        }

    SnsClient { region = "us-east-1" }.use { snsClient ->
        snsClient.deleteTopic(request)
        println(" $topicArnVal was deleted.")
    }
}
```

```
suspend fun deleteRuleByName(ruleName: String?) {
    val ruleRequest =
        DeleteRuleRequest {
            name = ruleName
        }
    EventBridgeClient { region = "us-east-1" }.use { eventBrClient ->
        eventBrClient.deleteRule(ruleRequest)
        println("Successfully deleted the rule")
    }
}

suspend fun deleteTargetsFromRule(eventRuleName: String?) {
    // First, get all targets that will be deleted.
    val request =
        ListTargetsByRuleRequest {
            rule = eventRuleName
        }

    EventBridgeClient { region = "us-east-1" }.use { eventBrClient ->
        val response = eventBrClient.listTargetsByRule(request)
        val allTargets = response.targets

        // Get all targets and delete them.
        if (allTargets != null) {
            for (myTarget in allTargets) {
                val removeTargetsRequest =
                    RemoveTargetsRequest {
                        rule = eventRuleName
                        ids = listOf(myTarget.id.toString())
                    }
                eventBrClient.removeTargets(removeTargetsRequest)
                println("Successfully removed the target")
            }
        }
    }
}

suspend fun triggerCustomRule(email: String) {
    val json =
        "{" +
            "\"UserEmail\": \"" + email + "\", " +
            "\"Message\": \"This event was generated by example code.\" " +
            "\"UtcTime\": \"Now.\" " +
            "}"
}
```

```
val entry =
    PutEventsRequestEntry {
        source = "ExampleSource"
        detail = json
        detailType = "ExampleType"
    }

val eventsRequest =
    PutEventsRequest {
        this.entries = listOf(entry)
    }

EventBridgeClient { region = "us-east-1" }.use { eventBrClient ->
    eventBrClient.putEvents(eventsRequest)
}

suspend fun updateCustomRuleTargetWithTransform(
    topicArn: String?,
    ruleName: String?,
) {
    val targetId = UUID.randomUUID().toString()

    val inputTransformerOb =
        InputTransformer {
            inputTemplate = "\"Notification: sample event was received.\""
        }

    val target =
        Target {
            id = targetId
            arn = topicArn
            inputTransformer = inputTransformerOb
        }

    val targetsRequest =
        PutTargetsRequest {
            rule = ruleName
            targets = listOf(target)
            eventBusName = null
        }

    EventBridgeClient { region = "us-east-1" }.use { eventBrClient ->
```



```

        eventBrClient.putTargets(targetsRequest)
    }
}

suspend fun updateToCustomRule(ruleName: String?) {
    val customEventsPattern =
        "{" +
            "\"source\": [\"ExampleSource\"]," +
            "\"detail-type\": [\"ExampleType\"]" +
            "}"
    val request =
        PutRuleRequest {
            name = ruleName
            description = "Custom test rule"
            eventPattern = customEventsPattern
        }

    EventBridgeClient { region = "us-east-1" }.use { eventBrClient ->
        eventBrClient.putRule(request)
    }
}

// Update an Amazon S3 object created rule with a transform on the target.
suspend fun updateSnsEventRule(
    topicArn: String?,
    ruleName: String?,
) {
    val targetId = UUID.randomUUID().toString()
    val myMap = mutableMapOf<String, String>()
    myMap["bucket"] = ".$.detail.bucket.name"
    myMap["time"] = ".$.time"

    val inputTransOb =
        InputTransformer {
            inputTemplate = "\"Notification: an object was uploaded to bucket
<bucket> at <time>.\""
            inputPathsMap = myMap
        }
    val targetOb =
        Target {
            id = targetId
            arn = topicArn
            inputTransformer = inputTransOb
        }
}

```

```
val targetsRequest =
    PutTargetsRequest {
        rule = ruleName
        targets = listOf(targetObj)
        eventBusName = null
    }

EventBridgeClient { region = "us-east-1" }.use { eventBrClient ->
    eventBrClient.putTargets(targetsRequest)
}

suspend fun checkRule(eventRuleName: String?) {
    val ruleRequest =
        DescribeRuleRequest {
            name = eventRuleName
        }

    EventBridgeClient { region = "us-east-1" }.use { eventBrClient ->
        val response = eventBrClient.describeRule(ruleRequest)
        println("The state of the rule is $response")
    }
}

suspend fun changeRuleState(
    eventRuleName: String,
    isEnabled?: Boolean?,
) {
    if (!isEnabled!!) {
        println("Disabling the rule: $eventRuleName")
        val ruleRequest =
            DisableRuleRequest {
                name = eventRuleName
            }
        EventBridgeClient { region = "us-east-1" }.use { eventBrClient ->
            eventBrClient.disableRule(ruleRequest)
        }
    } else {
        println("Enabling the rule: $eventRuleName")
        val ruleRequest =
            EnableRuleRequest {
                name = eventRuleName
            }
    }
}
```

```
        EventBridgeClient { region = "us-east-1" }.use { eventBrClient ->
            eventBrClient.enableRule(ruleRequest)
        }
    }
}

// Create and upload a file to an S3 bucket to trigger an event.
@Throws(IOException::class)
suspend fun uploadTextFiletoS3(bucketName: String?) {
    val fileSuffix = SimpleDateFormat("yyyyMMddHHmmss").format(Date())
    val fileName = "TextFile$fileSuffix.txt"
    val myFile = File(fileName)
    val fw = FileWriter(myFile.absoluteFile)
    val bw = BufferedWriter(fw)
    bw.write("This is a sample file for testing uploads.")
    bw.close()

    val putObj =
        PutObjectRequest {
            bucket = bucketName
            key = fileName
            body = myFile.asByteStream()
        }

    S3Client { region = "us-east-1" }.use { s3Client ->
        s3Client.putObject(putObj)
    }
}

suspend fun listTargetRules(topicArnVal: String?) {
    val ruleNamesByTargetRequest =
        ListRuleNamesByTargetRequest {
            targetArn = topicArnVal
        }

    EventBridgeClient { region = "us-east-1" }.use { eventBrClient ->
        val response = eventBrClient.listRuleNamesByTarget(ruleNamesByTargetRequest)
        response.ruleNames?.forEach { rule ->
            println("The rule name is $rule")
        }
    }
}

suspend fun listTargets(ruleName: String?) {
```

```

    val ruleRequest =
        ListTargetsByRuleRequest {
            rule = ruleName
        }

    EventBridgeClient { region = "us-east-1" }.use { eventBrClient ->
        val response = eventBrClient.listTargetsByRule(ruleRequest)
        response.targets?.forEach { target ->
            println("Target ARN: ${target.arn}")
        }
    }
}

// Add a rule that triggers an SNS target when a file is uploaded to an S3 bucket.
suspend fun addSnsEventRule(
    ruleName: String?,
    topicArn: String?,
    topicName: String,
    eventRuleName: String,
    bucketName: String,
) {
    val targetID = UUID.randomUUID().toString()
    val myTarget =
        Target {
            id = targetID
            arn = topicArn
        }

    val targetsOb = mutableListOf<Target>()
    targetsOb.add(myTarget)

    val request =
        PutTargetsRequest {
            eventBusName = null
            targets = targetsOb
            rule = ruleName
        }

    EventBridgeClient { region = "us-east-1" }.use { eventBrClient ->
        eventBrClient.putTargets(request)
        println("Added event rule $eventRuleName with Amazon SNS target $topicName
for bucket $bucketName.")
    }
}

```

```
suspend fun subEmail(
    topicArnVal: String?,
    email: String?,
) {
    val request =
        SubscribeRequest {
            protocol = "email"
            endpoint = email
            returnSubscriptionArn = true
            topicArn = topicArnVal
        }

    SnsClient { region = "us-east-1" }.use { snsClient ->
        val result = snsClient.subscribe(request)
        println(" Subscription ARN: ${result.subscriptionArn}")
    }
}

suspend fun createSnsTopic(topicName: String): String? {
    val topicPolicy =
        "{" +
            "\"Version\": \"2012-10-17\", " +
            "\"Statement\": [{" +
            "\"Sid\": \"EventBridgePublishTopic\", " +
            "\"Effect\": \"Allow\", " +
            "\"Principal\": { " +
            "\"Service\": \"events.amazonaws.com\" " +
            "}, " +
            "\"Resource\": \"*\", " +
            "\"Action\": \"sns:Publish\" " +
            "}] " +
            "}"

    val topicAttributes = mutableMapOf<String, String>()
    topicAttributes["Policy"] = topicPolicy

    val topicRequest =
        CreateTopicRequest {
            name = topicName
            attributes = topicAttributes
        }

    SnsClient { region = "us-east-1" }.use { snsClient ->
```

```

        val response = snsClient.createTopic(topicRequest)
        println("Added topic $topicName for email subscriptions.")
        return response.topicArn
    }
}

suspend fun listRules() {
    val rulesRequest =
        ListRulesRequest {
            eventBusName = "default"
            limit = 10
        }

    EventBridgeClient { region = "us-east-1" }.use { eventBrClient ->
        val response = eventBrClient.listRules(rulesRequest)
        response.rules?.forEach { rule ->
            println("The rule name is ${rule.name}")
            println("The rule ARN is ${rule.arn}")
        }
    }
}

// Create a new event rule that triggers when an Amazon S3 object is created in a
// bucket.
suspend fun addEventRule(
    roleArnVal: String?,
    bucketName: String,
    eventRuleName: String?,
) {
    val pattern = """{
        "source": ["aws.s3"],
        "detail-type": ["Object Created"],
        "detail": {
            "bucket": {
                "name": ["$bucketName"]
            }
        }
    }"""

    val ruleRequest =
        PutRuleRequest {
            description = "Created by using the AWS SDK for Kotlin"
            name = eventRuleName
            eventPattern = pattern
        }
}

```

```
        roleArn = roleArnVal
    }

    EventBridgeClient { region = "us-east-1" }.use { eventBrClient ->
        val ruleResponse = eventBrClient.putRule(ruleRequest)
        println("The ARN of the new rule is ${ruleResponse.ruleArn}")
    }
}

// Set the Amazon S3 bucket notification configuration.
suspend fun setBucketNotification(bucketName: String) {
    val eventBridgeConfig =
        EventBridgeConfiguration {
        }

    val configuration =
        NotificationConfiguration {
            eventBridgeConfiguration = eventBridgeConfig
        }

    val configurationRequest =
        PutBucketNotificationConfigurationRequest {
            bucket = bucketName
            notificationConfiguration = configuration
            skipDestinationValidation = true
        }

    S3Client { region = "us-east-1" }.use { s3Client ->
        s3Client.putBucketNotificationConfiguration(configurationRequest)
        println("Added bucket $bucketName with EventBridge events enabled.")
    }
}

// Create an S3 bucket using a waiter.
suspend fun createBucket(bucketName: String) {
    val request =
        CreateBucketRequest {
            bucket = bucketName
        }

    S3Client { region = "us-east-1" }.use { s3 ->
        s3.createBucket(request)
        s3.waitUntilBucketExists {
            bucket = bucketName
        }
    }
}
```

```
        }
        println("$bucketName is ready")
    }
}

suspend fun checkBucket(bucketName: String?): Boolean {
    try {
        // Determine if the S3 bucket exists.
        val headBucketRequest =
            HeadBucketRequest {
                bucket = bucketName
            }

        S3Client { region = "us-east-1" }.use { s3Client ->
            s3Client.headBucket(headBucketRequest)
            return true
        }
    } catch (e: S3Exception) {
        System.err.println(e.message)
    }
    return false
}

suspend fun createIAMRole(
    rolenameVal: String?,
    polJSON: String?,
): String? {
    val request =
        CreateRoleRequest {
            roleName = rolenameVal
            assumeRolePolicyDocument = polJSON
            description = "Created using the AWS SDK for Kotlin"
        }

    val rolePolicyRequest =
        AttachRolePolicyRequest {
            roleName = rolenameVal
            policyArn = "arn:aws:iam::aws:policy/AmazonEventBridgeFullAccess"
        }

    IAMClient { region = "us-east-1" }.use { iam ->
        val response = iam.createRole(request)
        iam.attachRolePolicy(rolePolicyRequest)
        return response.role?.arn
    }
}
```



```
}  
}
```

- For API details, see the following topics in *AWS SDK for Kotlin API reference*.
  - [DeleteRule](#)
  - [DescribeRule](#)
  - [DisableRule](#)
  - [EnableRule](#)
  - [ListRuleNamesByTarget](#)
  - [ListRules](#)
  - [ListTargetsByRule](#)
  - [PutEvents](#)
  - [PutRule](#)
  - [PutTargets](#)

## Actions

### DeleteRule

The following code example shows how to use DeleteRule.

#### SDK for Kotlin

##### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun deleteRuleByName(ruleName: String?) {  
    val ruleRequest =  
        DeleteRuleRequest {  
            name = ruleName  
        }  
    EventBridgeClient { region = "us-east-1" }.use { eventBrClient ->
```

```
        eventBrClient.deleteRule(ruleRequest)
        println("Successfully deleted the rule")
    }
}
```

- For API details, see [DeleteRule](#) in *AWS SDK for Kotlin API reference*.

## DescribeRule

The following code example shows how to use DescribeRule.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun checkRule(eventRuleName: String?) {
    val ruleRequest =
        DescribeRuleRequest {
            name = eventRuleName
        }

    EventBridgeClient { region = "us-east-1" }.use { eventBrClient ->
        val response = eventBrClient.describeRule(ruleRequest)
        println("The state of the rule is $response")
    }
}
```

- For API details, see [DescribeRule](#) in *AWS SDK for Kotlin API reference*.

## DisableRule

The following code example shows how to use DisableRule.

## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun changeRuleState(
    eventRuleName: String,
    isEnabled: Boolean?,
) {
    if (!isEnabled!!) {
        println("Disabling the rule: $eventRuleName")
        val ruleRequest =
            DisableRuleRequest {
                name = eventRuleName
            }
        EventBridgeClient { region = "us-east-1" }.use { eventBrClient ->
            eventBrClient.disableRule(ruleRequest)
        }
    } else {
        println("Enabling the rule: $eventRuleName")
        val ruleRequest =
            EnableRuleRequest {
                name = eventRuleName
            }
        EventBridgeClient { region = "us-east-1" }.use { eventBrClient ->
            eventBrClient.enableRule(ruleRequest)
        }
    }
}
```

- For API details, see [DisableRule](#) in *AWS SDK for Kotlin API reference*.

## EnableRule

The following code example shows how to use EnableRule.

## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun changeRuleState(
    eventRuleName: String,
    isEnabled: Boolean?,
) {
    if (!isEnabled!!) {
        println("Disabling the rule: $eventRuleName")
        val ruleRequest =
            DisableRuleRequest {
                name = eventRuleName
            }
        EventBridgeClient { region = "us-east-1" }.use { eventBrClient ->
            eventBrClient.disableRule(ruleRequest)
        }
    } else {
        println("Enabling the rule: $eventRuleName")
        val ruleRequest =
            EnableRuleRequest {
                name = eventRuleName
            }
        EventBridgeClient { region = "us-east-1" }.use { eventBrClient ->
            eventBrClient.enableRule(ruleRequest)
        }
    }
}
```

- For API details, see [EnableRule](#) in *AWS SDK for Kotlin API reference*.

## ListRuleNamesByTarget

The following code example shows how to use ListRuleNamesByTarget.

## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun listTargetRules(topicArnVal: String?) {
    val ruleNamesByTargetRequest =
        ListRuleNamesByTargetRequest {
            targetArn = topicArnVal
        }

    EventBridgeClient { region = "us-east-1" }.use { eventBrClient ->
        val response = eventBrClient.listRuleNamesByTarget(ruleNamesByTargetRequest)
        response.ruleNames?.forEach { rule ->
            println("The rule name is $rule")
        }
    }
}
```

- For API details, see [ListRuleNamesByTarget](#) in *AWS SDK for Kotlin API reference*.

## ListRules

The following code example shows how to use `ListRules`.

## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun listRules() {
    val rulesRequest =
```

```

    ListRulesRequest {
        eventBusName = "default"
        limit = 10
    }

    EventBridgeClient { region = "us-east-1" }.use { eventBrClient ->
        val response = eventBrClient.listRules(rulesRequest)
        response.rules?.forEach { rule ->
            println("The rule name is ${rule.name}")
            println("The rule ARN is ${rule.arn}")
        }
    }
}

```

- For API details, see [ListRules](#) in *AWS SDK for Kotlin API reference*.

## ListTargetsByRule

The following code example shows how to use `ListTargetsByRule`.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```

suspend fun listTargets(ruleName: String?) {
    val ruleRequest =
        ListTargetsByRuleRequest {
            rule = ruleName
        }

    EventBridgeClient { region = "us-east-1" }.use { eventBrClient ->
        val response = eventBrClient.listTargetsByRule(ruleRequest)
        response.targets?.forEach { target ->
            println("Target ARN: ${target.arn}")
        }
    }
}

```

- For API details, see [ListTargetsByRule](#) in *AWS SDK for Kotlin API reference*.

## PutEvents

The following code example shows how to use PutEvents.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun triggerCustomRule(email: String) {
    val json =
        "{" +
            "\"UserEmail\": \"" + email + "\", " +
            "\"Message\": \"This event was generated by example code.\" " +
            "\"UtcTime\": \"Now.\" " +
        "}"

    val entry =
        PutEventsRequestEntry {
            source = "ExampleSource"
            detail = json
            detailType = "ExampleType"
        }

    val eventsRequest =
        PutEventsRequest {
            this.entries = listOf(entry)
        }

    EventBridgeClient { region = "us-east-1" }.use { eventBrClient ->
        eventBrClient.putEvents(eventsRequest)
    }
}
```

- For API details, see [PutEvents](#) in *AWS SDK for Kotlin API reference*.

## PutRule

The following code example shows how to use PutRule.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

Create a scheduled rule.

```
suspend fun createScRule(
    ruleName: String?,
    cronExpression: String?,
) {
    val ruleRequest =
        PutRuleRequest {
            name = ruleName
            eventBusName = "default"
            scheduleExpression = cronExpression
            state = RuleState.Enabled
            description = "A test rule that runs on a schedule created by the Kotlin
API"
        }

    EventBridgeClient { region = "us-west-2" }.use { eventBrClient ->
        val ruleResponse = eventBrClient.putRule(ruleRequest)
        println("The ARN of the new rule is ${ruleResponse.ruleArn}")
    }
}
```

Create a rule that triggers when an object is added to an Amazon Simple Storage Service bucket.



```
// Create a new event rule that triggers when an Amazon S3 object is created in a
// bucket.
suspend fun addEventRule(
    roleArnVal: String?,
    bucketName: String,
    eventRuleName: String?,
) {
    val pattern = """{
        "source": ["aws.s3"],
        "detail-type": ["Object Created"],
        "detail": {
            "bucket": {
                "name": ["$bucketName"]
            }
        }
    }"""

    val ruleRequest =
        PutRuleRequest {
            description = "Created by using the AWS SDK for Kotlin"
            name = eventRuleName
            eventPattern = pattern
            roleArn = roleArnVal
        }

    EventBridgeClient { region = "us-east-1" }.use { eventBrClient ->
        val ruleResponse = eventBrClient.putRule(ruleRequest)
        println("The ARN of the new rule is ${ruleResponse.ruleArn}")
    }
}
```

- For API details, see [PutRule](#) in *AWS SDK for Kotlin API reference*.

## PutTargets

The following code example shows how to use PutTargets.

## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
// Add a rule that triggers an SNS target when a file is uploaded to an S3 bucket.
suspend fun addSnsEventRule(
    ruleName: String?,
    topicArn: String?,
    topicName: String,
    eventRuleName: String,
    bucketName: String,
) {
    val targetID = UUID.randomUUID().toString()
    val myTarget =
        Target {
            id = targetID
            arn = topicArn
        }

    val targets0b = mutableListOf<Target>()
    targets0b.add(myTarget)

    val request =
        PutTargetsRequest {
            eventBusName = null
            targets = targets0b
            rule = ruleName
        }

    EventBridgeClient { region = "us-east-1" }.use { eventBrClient ->
        eventBrClient.putTargets(request)
        println("Added event rule $eventRuleName with Amazon SNS target $topicName
for bucket $bucketName.")
    }
}
```

Add an input transformer to a target for a rule.

```
suspend fun updateCustomRuleTargetWithTransform(
    topicArn: String?,
    ruleName: String?,
) {
    val targetId = UUID.randomUUID().toString()

    val inputTransformerOb =
        InputTransformer {
            inputTemplate = "\"Notification: sample event was received.\""
        }

    val target =
        Target {
            id = targetId
            arn = topicArn
            inputTransformer = inputTransformerOb
        }

    val targetsRequest =
        PutTargetsRequest {
            rule = ruleName
            targets = listOf(target)
            eventBusName = null
        }

    EventBridgeClient { region = "us-east-1" }.use { eventBrClient ->
        eventBrClient.putTargets(targetsRequest)
    }
}
```

- For API details, see [PutTargets](#) in *AWS SDK for Kotlin API reference*.

## RemoveTargets

The following code example shows how to use `RemoveTargets`.

## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun deleteTargetsFromRule(eventRuleName: String?) {
    // First, get all targets that will be deleted.
    val request =
        ListTargetsByRuleRequest {
            rule = eventRuleName
        }

    EventBridgeClient { region = "us-east-1" }.use { eventBrClient ->
        val response = eventBrClient.listTargetsByRule(request)
        val allTargets = response.targets

        // Get all targets and delete them.
        if (allTargets != null) {
            for (myTarget in allTargets) {
                val removeTargetsRequest =
                    RemoveTargetsRequest {
                        rule = eventRuleName
                        ids = listOf(myTarget.id.toString())
                    }
                eventBrClient.removeTargets(removeTargetsRequest)
                println("Successfully removed the target")
            }
        }
    }
}
```

- For API details, see [RemoveTargets](#) in *AWS SDK for Kotlin API reference*.

## AWS Glue examples using SDK for Kotlin

The following code examples show you how to perform actions and implement common scenarios by using the AWS SDK for Kotlin with AWS Glue.

*Basics* are code examples that show you how to perform the essential operations within a service.

*Actions* are code excerpts from larger programs and must be run in context. While actions show you how to call individual service functions, you can see actions in context in their related scenarios.

Each example includes a link to the complete source code, where you can find instructions on how to set up and run the code in context.

## Topics

- [Basics](#)
- [Actions](#)

## Basics

### Learn the basics

The following code example shows how to:

- Create a crawler that crawls a public Amazon S3 bucket and generates a database of CSV-formatted metadata.
- List information about databases and tables in your AWS Glue Data Catalog.
- Create a job to extract CSV data from the S3 bucket, transform the data, and load JSON-formatted output into another S3 bucket.
- List information about job runs, view transformed data, and clean up resources.

For more information, see [Tutorial: Getting started with AWS Glue Studio](#).

## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun main(args: Array<String>) {  
    val usage = ""  
    Usage:
```

```
<iam> <s3Path> <cron> <dbName> <crawlerName> <jobName> <scriptLocation>
<locationUri>
```

Where:

iam - The Amazon Resource Name (ARN) of the AWS Identity and Access Management (IAM) role that has AWS Glue and Amazon Simple Storage Service (Amazon S3) permissions.

s3Path - The Amazon Simple Storage Service (Amazon S3) target that contains data (for example, CSV data).

cron - A cron expression used to specify the schedule (for example, cron(15 12 \* \* ? \*)).

dbName - The database name.

crawlerName - The name of the crawler.

jobName - The name you assign to this job definition.

scriptLocation - Specifies the Amazon S3 path to a script that runs a job.

locationUri - Specifies the location of the database  
 """"

```
if (args.size != 8) {
    println(usage)
    exitProcess(1)
}
```

```
val iam = args[0]
val s3Path = args[1]
val cron = args[2]
val dbName = args[3]
val crawlerName = args[4]
val jobName = args[5]
val scriptLocation = args[6]
val locationUri = args[7]
```

```
println("About to start the AWS Glue Scenario")
createDatabase(dbName, locationUri)
createCrawler(iam, s3Path, cron, dbName, crawlerName)
getCrawler(crawlerName)
startCrawler(crawlerName)
getDatabase(dbName)
getGlueTables(dbName)
createJob(jobName, iam, scriptLocation)
startJob(jobName)
getJobs()
getJobRuns(jobName)
```

```
deleteJob(jobName)
println("*** Wait for 5 MIN so the $crawlerName is ready to be deleted")
TimeUnit.MINUTES.sleep(5)
deleteMyDatabase(dbName)
deleteCrawler(crawlerName)
}

suspend fun createDatabase(
    dbName: String?,
    locationUriVal: String?,
) {
    val input =
        DatabaseInput {
            description = "Built with the AWS SDK for Kotlin"
            name = dbName
            locationUri = locationUriVal
        }

    val request =
        CreateDatabaseRequest {
            databaseInput = input
        }

    GlueClient { region = "us-east-1" }.use { glueClient ->
        glueClient.createDatabase(request)
        println("The database was successfully created")
    }
}

suspend fun createCrawler(
    iam: String?,
    s3Path: String?,
    cron: String?,
    dbName: String?,
    crawlerName: String,
) {
    val s3Target =
        S3Target {
            path = s3Path
        }

    val targetList = ArrayList<S3Target>()
    targetList.add(s3Target)
```

```
val targetOb =
    CrawlerTargets {
        s3Targets = targetList
    }

val crawlerRequest =
    CreateCrawlerRequest {
        databaseName = dbName
        name = crawlerName
        description = "Created by the AWS Glue Java API"
        targets = targetOb
        role = iam
        schedule = cron
    }

GlueClient { region = "us-east-1" }.use { glueClient ->
    glueClient.createCrawler(crawlerRequest)
    println("$crawlerName was successfully created")
}

suspend fun getCrawler(crawlerName: String?) {
    val request =
        GetCrawlerRequest {
            name = crawlerName
        }

    GlueClient { region = "us-east-1" }.use { glueClient ->
        val response = glueClient.getCrawler(request)
        val role = response.crawler?.role
        println("The role associated with this crawler is $role")
    }
}

suspend fun startCrawler(crawlerName: String) {
    val crawlerRequest =
        StartCrawlerRequest {
            name = crawlerName
        }

    GlueClient { region = "us-east-1" }.use { glueClient ->
        glueClient.startCrawler(crawlerRequest)
        println("$crawlerName was successfully started.")
    }
}
```



```
}

suspend fun getDatabase(databaseName: String?) {
    val request =
        GetDatabaseRequest {
            name = databaseName
        }

    GlueClient { region = "us-east-1" }.use { glueClient ->
        val response = glueClient.getDatabase(request)
        val dbDesc = response.database?.description
        println("The database description is $dbDesc")
    }
}

suspend fun getGlueTables(dbName: String?) {
    val tableRequest =
        GetTablesRequest {
            databaseName = dbName
        }

    GlueClient { region = "us-east-1" }.use { glueClient ->
        val response = glueClient.getTables(tableRequest)
        response.tableList?.forEach { tableName ->
            println("Table name is ${tableName.name}")
        }
    }
}

suspend fun startJob(jobNameVal: String?) {
    val runRequest =
        StartJobRunRequest {
            workerType = WorkerType.G1X
            numberOfWorkers = 10
            jobName = jobNameVal
        }

    GlueClient { region = "us-east-1" }.use { glueClient ->
        val response = glueClient.startJobRun(runRequest)
        println("The job run Id is ${response.jobRunId}")
    }
}

suspend fun createJob(
```

```
    jobName: String,
    iam: String?,
    scriptLocationVal: String?,
) {
    val commandOb =
        JobCommand {
            pythonVersion = "3"
            name = "MyJob1"
            scriptLocation = scriptLocationVal
        }

    val jobRequest =
        CreateJobRequest {
            description = "A Job created by using the AWS SDK for Java V2"
            glueVersion = "2.0"
            workerType = WorkerType.G1X
            numberOfWorkers = 10
            name = jobName
            role = iam
            command = commandOb
        }

    GlueClient { region = "us-east-1" }.use { glueClient ->
        glueClient.createJob(jobRequest)
        println("$jobName was successfully created.")
    }
}

suspend fun getJobs() {
    val request =
        GetJobsRequest {
            maxResults = 10
        }

    GlueClient { region = "us-east-1" }.use { glueClient ->
        val response = glueClient.getJobs(request)
        response.jobs?.forEach { job ->
            println("Job name is ${job.name}")
        }
    }
}

suspend fun getJobRuns(jobNameVal: String?) {
    val request =
```

```
        GetJobRunsRequest {
            jobName = jobNameVal
        }

        GlueClient { region = "us-east-1" }.use { glueClient ->
            val response = glueClient.getJobRuns(request)
            response.jobRuns?.forEach { job ->
                println("Job name is ${job.jobName}")
            }
        }
    }

suspend fun deleteJob(jobNameVal: String) {
    val jobRequest =
        DeleteJobRequest {
            jobName = jobNameVal
        }

    GlueClient { region = "us-east-1" }.use { glueClient ->
        glueClient.deleteJob(jobRequest)
        println("$jobNameVal was successfully deleted")
    }
}

suspend fun deleteMyDatabase(databaseName: String) {
    val request =
        DeleteDatabaseRequest {
            name = databaseName
        }

    GlueClient { region = "us-east-1" }.use { glueClient ->
        glueClient.deleteDatabase(request)
        println("$databaseName was successfully deleted")
    }
}

suspend fun deleteCrawler(crawlerName: String) {
    val request =
        DeleteCrawlerRequest {
            name = crawlerName
        }

    GlueClient { region = "us-east-1" }.use { glueClient ->
        glueClient.deleteCrawler(request)
        println("$crawlerName was deleted")
    }
}
```

```
}  
}
```

- For API details, see the following topics in *AWS SDK for Kotlin API reference*.
  - [CreateCrawler](#)
  - [CreateJob](#)
  - [DeleteCrawler](#)
  - [DeleteDatabase](#)
  - [DeleteJob](#)
  - [DeleteTable](#)
  - [GetCrawler](#)
  - [GetDatabase](#)
  - [GetDatabases](#)
  - [GetJob](#)
  - [GetJobRun](#)
  - [GetJobRuns](#)
  - [GetTables](#)
  - [ListJobs](#)
  - [StartCrawler](#)
  - [StartJobRun](#)

## Actions

### CreateCrawler

The following code example shows how to use `CreateCrawler`.

#### SDK for Kotlin

##### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun createGlueCrawler(
    iam: String?,
    s3Path: String?,
    cron: String?,
    dbName: String?,
    crawlerName: String,
) {
    val s3Target =
        S3Target {
            path = s3Path
        }

    // Add the S3Target to a list.
    val targetList = mutableListOf<S3Target>()
    targetList.add(s3Target)

    val targetOb =
        CrawlerTargets {
            s3Targets = targetList
        }

    val request =
        CreateCrawlerRequest {
            databaseName = dbName
            name = crawlerName
            description = "Created by the AWS Glue Kotlin API"
            targets = targetOb
            role = iam
            schedule = cron
        }

    GlueClient { region = "us-west-2" }.use { glueClient ->
        glueClient.createCrawler(request)
        println("$crawlerName was successfully created")
    }
}
```

- For API details, see [CreateCrawler](#) in *AWS SDK for Kotlin API reference*.

## GetCrawler

The following code example shows how to use `GetCrawler`.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun getSpecificCrawler(crawlerName: String?) {
    val request =
        GetCrawlerRequest {
            name = crawlerName
        }
    GlueClient { region = "us-east-1" }.use { glueClient ->
        val response = glueClient.getCrawler(request)
        val role = response.crawler?.role
        println("The role associated with this crawler is $role")
    }
}
```

- For API details, see [GetCrawler](#) in *AWS SDK for Kotlin API reference*.

## GetDatabase

The following code example shows how to use `GetDatabase`.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun getSpecificDatabase(databaseName: String?) {
```

```
val request =
    GetDatabaseRequest {
        name = databaseName
    }

GlueClient { region = "us-east-1" }.use { glueClient ->
    val response = glueClient.getDatabase(request)
    val dbDesc = response.database?.description
    println("The database description is $dbDesc")
}
}
```

- For API details, see [GetDatabase](#) in *AWS SDK for Kotlin API reference*.

## StartCrawler

The following code example shows how to use StartCrawler.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun startSpecificCrawler(crawlerName: String?) {
    val request =
        StartCrawlerRequest {
            name = crawlerName
        }

    GlueClient { region = "us-west-2" }.use { glueClient ->
        glueClient.startCrawler(request)
        println("$crawlerName was successfully started.")
    }
}
```

- For API details, see [StartCrawler](#) in *AWS SDK for Kotlin API reference*.

# IAM examples using SDK for Kotlin

The following code examples show you how to perform actions and implement common scenarios by using the AWS SDK for Kotlin with IAM.

*Actions* are code excerpts from larger programs and must be run in context. While actions show you how to call individual service functions, you can see actions in context in their related scenarios.

*Scenarios* are code examples that show you how to accomplish specific tasks by calling multiple functions within a service or combined with other AWS services.

Each example includes a link to the complete source code, where you can find instructions on how to set up and run the code in context.

## Topics

- [Actions](#)
- [Scenarios](#)

## Actions

### AttachRolePolicy

The following code example shows how to use `AttachRolePolicy`.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun attachIAMRolePolicy(
    roleNameVal: String,
    policyArnVal: String,
) {
    val request =
        ListAttachedRolePoliciesRequest {
```



```
        roleName = roleNameVal
    }

    iamClient { region = "AWS_GLOBAL" }.use { iamClient ->
        val response = iamClient.listAttachedRolePolicies(request)
        val attachedPolicies = response.attachedPolicies

        // Ensure that the policy is not attached to this role.
        val checkStatus: Int
        if (attachedPolicies != null) {
            checkStatus = checkList(attachedPolicies, policyArnVal)
            if (checkStatus == -1) {
                return
            }
        }

        val policyRequest =
            AttachRolePolicyRequest {
                roleName = roleNameVal
                policyArn = policyArnVal
            }
        iamClient.attachRolePolicy(policyRequest)
        println("Successfully attached policy $policyArnVal to role $roleNameVal")
    }
}

fun checkList(
    attachedPolicies: List<AttachedPolicy>,
    policyArnVal: String,
): Int {
    for (policy in attachedPolicies) {
        val polArn = policy.policyArn.toString()

        if (polArn.compareTo(policyArnVal) == 0) {
            println("The policy is already attached to this role.")
            return -1
        }
    }
    return 0
}
```

- For API details, see [AttachRolePolicy](#) in *AWS SDK for Kotlin API reference*.

## CreateAccessKey

The following code example shows how to use CreateAccessKey.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun createIAMAccessKey(user: String?): String {
    val request =
        CreateAccessKeyRequest {
            userName = user
        }

    IAMClient { region = "AWS_GLOBAL" }.use { iamClient ->
        val response = iamClient.createAccessKey(request)
        return response.accessKey?.accessKeyId.toString()
    }
}
```

- For API details, see [CreateAccessKey](#) in *AWS SDK for Kotlin API reference*.

## CreateAccountAlias

The following code example shows how to use CreateAccountAlias.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun createIAMAccountAlias(alias: String) {
```

```

val request =
    CreateAccountAliasRequest {
        accountAlias = alias
    }

IamClient { region = "AWS_GLOBAL" }.use { iamClient ->
    iamClient.createAccountAlias(request)
    println("Successfully created account alias named $alias")
}
}

```

- For API details, see [CreateAccountAlias](#) in *AWS SDK for Kotlin API reference*.

## CreatePolicy

The following code example shows how to use CreatePolicy.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```

suspend fun createIAMPolicy(policyNameVal: String?): String {
    val policyDocumentVal =
        "{" +
            "  \"Version\": \"2012-10-17\", " +
            "  \"Statement\": [" +
            "    {" +
            "      \"Effect\": \"Allow\", " +
            "      \"Action\": [" +
            "        \"dynamodb:DeleteItem\", " +
            "        \"dynamodb:GetItem\", " +
            "        \"dynamodb:PutItem\", " +
            "        \"dynamodb:Scan\", " +
            "        \"dynamodb:UpdateItem\" " +
            "      ], " +
            "      \"Resource\": \"*\

```

```
        "    }" +
        "  ]" +
        "}"

val request =
    CreatePolicyRequest {
        policyName = policyNameVal
        policyDocument = policyDocumentVal
    }

IamClient { region = "AWS_GLOBAL" }.use { iamClient ->
    val response = iamClient.createPolicy(request)
    return response.policy?.arn.toString()
}
}
```

- For API details, see [CreatePolicy](#) in *AWS SDK for Kotlin API reference*.

## CreateUser

The following code example shows how to use CreateUser.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun createIAMUser(usernameVal: String?): String? {
    val request =
        CreateUserRequest {
            userName = usernameVal
        }

    IamClient { region = "AWS_GLOBAL" }.use { iamClient ->
        val response = iamClient.createUser(request)
        return response.user?.userName
    }
}
```

```
}
```

- For API details, see [CreateUser](#) in *AWS SDK for Kotlin API reference*.

## DeleteAccessKey

The following code example shows how to use `DeleteAccessKey`.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun deleteKey(
    userNameVal: String,
    accessKey: String,
) {
    val request =
        DeleteAccessKeyRequest {
            accessKeyId = accessKey
            userName = userNameVal
        }

    iamClient { region = "AWS_GLOBAL" }.use { iamClient ->
        iamClient.deleteAccessKey(request)
        println("Successfully deleted access key $accessKey from $userNameVal")
    }
}
```

- For API details, see [DeleteAccessKey](#) in *AWS SDK for Kotlin API reference*.

## DeleteAccountAlias

The following code example shows how to use `DeleteAccountAlias`.

## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun deleteIAMAccountAlias(alias: String) {
    val request =
        DeleteAccountAliasRequest {
            accountAlias = alias
        }

    IAMClient { region = "AWS_GLOBAL" }.use { iamClient ->
        iamClient.deleteAccountAlias(request)
        println("Successfully deleted account alias $alias")
    }
}
```

- For API details, see [DeleteAccountAlias](#) in *AWS SDK for Kotlin API reference*.

## DeletePolicy

The following code example shows how to use DeletePolicy.

## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun deleteIAMPolicy(policyARNVal: String?) {
    val request =
        DeletePolicyRequest {
            policyArn = policyARNVal
        }
}
```

```
IamClient { region = "AWS_GLOBAL" }.use { iamClient ->
    iamClient.deletePolicy(request)
    println("Successfully deleted $policyARNVal")
}
}
```

- For API details, see [DeletePolicy](#) in *AWS SDK for Kotlin API reference*.

## DeleteUser

The following code example shows how to use DeleteUser.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun deleteIAMUser(userNameVal: String) {
    val request =
        DeleteUserRequest {
            userName = userNameVal
        }

    // To delete a user, ensure that the user's access keys are deleted first.
    IamClient { region = "AWS_GLOBAL" }.use { iamClient ->
        iamClient.deleteUser(request)
        println("Successfully deleted user $userNameVal")
    }
}
```

- For API details, see [DeleteUser](#) in *AWS SDK for Kotlin API reference*.

## DetachRolePolicy

The following code example shows how to use DetachRolePolicy.

## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun detachPolicy(
    roleNameVal: String,
    policyArnVal: String,
) {
    val request =
        DetachRolePolicyRequest {
            roleName = roleNameVal
            policyArn = policyArnVal
        }

    IAMClient { region = "AWS_GLOBAL" }.use { iamClient ->
        iamClient.detachRolePolicy(request)
        println("Successfully detached policy $policyArnVal from role $roleNameVal")
    }
}
```

- For API details, see [DetachRolePolicy](#) in *AWS SDK for Kotlin API reference*.

## GetPolicy

The following code example shows how to use GetPolicy.

## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun getIAMPolicy(policyArnVal: String?) {
```



```
val request =
    GetPolicyRequest {
        policyArn = policyArnVal
    }

IamClient { region = "AWS_GLOBAL" }.use { iamClient ->
    val response = iamClient.getPolicy(request)
    println("Successfully retrieved policy ${response.policy?.policyName}")
}
}
```

- For API details, see [GetPolicy](#) in *AWS SDK for Kotlin API reference*.

## ListAccessKeys

The following code example shows how to use `ListAccessKeys`.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun listKeys(userNameVal: String?) {
    val request =
        ListAccessKeysRequest {
            userName = userNameVal
        }
    IamClient { region = "AWS_GLOBAL" }.use { iamClient ->
        val response = iamClient.listAccessKeys(request)
        response.accessKeyMetadata?.forEach { md ->
            println("Retrieved access key ${md.accessKeyId}")
        }
    }
}
```

- For API details, see [ListAccessKeys](#) in *AWS SDK for Kotlin API reference*.

## ListAccountAliases

The following code example shows how to use `ListAccountAliases`.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun listAliases() {
    IAMClient { region = "AWS_GLOBAL" }.use { iamClient ->
        val response = iamClient.listAccountAliases(ListAccountAliasesRequest {})
        response.accountAliases?.forEach { alias ->
            println("Retrieved account alias $alias")
        }
    }
}
```

- For API details, see [ListAccountAliases](#) in *AWS SDK for Kotlin API reference*.

## ListUsers

The following code example shows how to use `ListUsers`.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun listAllUsers() {
    IAMClient { region = "AWS_GLOBAL" }.use { iamClient ->
        val response = iamClient.listUsers(ListUsersRequest { })
        response.users?.forEach { user ->
```

```
println("Retrieved user ${user.userName}")
val permissionsBoundary = user.permissionsBoundary
if (permissionsBoundary != null) {
    println("Permissions boundary details
${permissionsBoundary.permissionsBoundaryType}")
}
}
}
```

- For API details, see [ListUsers](#) in *AWS SDK for Kotlin API reference*.

## UpdateUser

The following code example shows how to use UpdateUser.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun updateIAMUser(
    curName: String?,
    newName: String?,
) {
    val request =
        UpdateUserRequest {
            userName = curName
            newUserName = newName
        }

    IamClient { region = "AWS_GLOBAL" }.use { iamClient ->
        iamClient.updateUser(request)
        println("Successfully updated user to $newName")
    }
}
```

- For API details, see [UpdateUser](#) in *AWS SDK for Kotlin API reference*.

## Scenarios

### Create a user and assume a role

The following code example shows how to create a user and assume a role.

#### Warning

To avoid security risks, don't use IAM users for authentication when developing purpose-built software or working with real data. Instead, use federation with an identity provider such as [AWS IAM Identity Center](#).

- Create a user with no permissions.
- Create a role that grants permission to list Amazon S3 buckets for the account.
- Add a policy to let the user assume the role.
- Assume the role and list S3 buckets using temporary credentials, then clean up resources.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

Create functions that wrap IAM user actions.

```
suspend fun main(args: Array<String>) {
    val usage = ""
    Usage:
        <username> <policyName> <roleName> <roleSessionName> <fileLocation>
<bucketName>

    Where:
        username - The name of the IAM user to create.
        policyName - The name of the policy to create.
```

```
        roleName - The name of the role to create.
        roleSessionName - The name of the session required for the assumeRole
operation.
        fileLocation - The file location to the JSON required to create the role
(see README).
        bucketName - The name of the Amazon S3 bucket from which objects are read.
        """"

    if (args.size != 6) {
        println(usage)
        exitProcess(1)
    }

    val userName = args[0]
    val policyName = args[1]
    val roleName = args[2]
    val roleSessionName = args[3]
    val fileLocation = args[4]
    val bucketName = args[5]

    createUser(userName)
    println("$userName was successfully created.")

    val polArn = createPolicy(policyName)
    println("The policy $polArn was successfully created.")

    val roleArn = createRole(roleName, fileLocation)
    println("$roleArn was successfully created.")
    attachRolePolicy(roleName, polArn)

    println("**** Wait for 1 MIN so the resource is available.")
    delay(60000)
    assumeGivenRole(roleArn, roleSessionName, bucketName)

    println("**** Getting ready to delete the AWS resources.")
    deleteRole(roleName, polArn)
    deleteUser(userName)
    println("This IAM Scenario has successfully completed.")
}

suspend fun createUser(usernameVal: String?): String? {
    val request =
        CreateUserRequest {
            userName = usernameVal
        }
}
```

```

    }

    IamClient { region = "AWS_GLOBAL" }.use { iamClient ->
        val response = iamClient.createUser(request)
        return response.user?.userName
    }
}

suspend fun createPolicy(policyNameVal: String?): String {
    val policyDocumentValue: String =
        "{" +
            "  \"Version\": \"2012-10-17\"," +
            "  \"Statement\": [" +
            "    {" +
            "      \"Effect\": \"Allow\"," +
            "      \"Action\": [" +
            "        \"s3:*\"" +
            "      ]," +
            "      \"Resource\": \"*\"" +
            "    }" +
            "  ]" +
            "}"

    val request =
        CreatePolicyRequest {
            policyName = policyNameVal
            policyDocument = policyDocumentValue
        }

    IamClient { region = "AWS_GLOBAL" }.use { iamClient ->
        val response = iamClient.createPolicy(request)
        return response.policy?.arn.toString()
    }
}

suspend fun createRole(
    rolenameVal: String?,
    fileLocation: String?,
): String? {
    val jsonObject = fileLocation?.let { readJsonSimpleDemo(it) } as JSONObject

    val request =
        CreateRoleRequest {
            roleName = rolenameVal

```

```
        assumeRolePolicyDocument = jsonObject.toJSONString()
        description = "Created using the AWS SDK for Kotlin"
    }

    IAMClient { region = "AWS_GLOBAL" }.use { iamClient ->
        val response = iamClient.createRole(request)
        return response.role?.arn
    }
}

suspend fun attachRolePolicy(
    roleNameVal: String,
    policyArnVal: String,
) {
    val request =
        ListAttachedRolePoliciesRequest {
            roleName = roleNameVal
        }

    IAMClient { region = "AWS_GLOBAL" }.use { iamClient ->
        val response = iamClient.listAttachedRolePolicies(request)
        val attachedPolicies = response.attachedPolicies

        // Ensure that the policy is not attached to this role.
        val checkStatus: Int
        if (attachedPolicies != null) {
            checkStatus = checkMyList(attachedPolicies, policyArnVal)
            if (checkStatus == -1) {
                return
            }
        }

        val policyRequest =
            AttachRolePolicyRequest {
                roleName = roleNameVal
                policyArn = policyArnVal
            }
        iamClient.attachRolePolicy(policyRequest)
        println("Successfully attached policy $policyArnVal to role $roleNameVal")
    }
}

fun checkMyList(
    attachedPolicies: List<AttachedPolicy>,
```

```
    policyArnVal: String,
): Int {
    for (policy in attachedPolicies) {
        val polArn = policy.policyArn.toString()

        if (polArn.compareTo(policyArnVal) == 0) {
            println("The policy is already attached to this role.")
            return -1
        }
    }
    return 0
}

suspend fun assumeGivenRole(
    roleArnVal: String?,
    roleSessionNameVal: String?,
    bucketName: String,
) {
    val stsClient =
        StsClient {
            region = "us-east-1"
        }

    val roleRequest =
        AssumeRoleRequest {
            roleArn = roleArnVal
            roleSessionName = roleSessionNameVal
        }

    val roleResponse = stsClient.assumeRole(roleRequest)
    val myCreds = roleResponse.credentials
    val key = myCreds?.accessKeyId
    val secKey = myCreds?.secretAccessKey
    val secToken = myCreds?.sessionToken

    val staticCredentials =
        StaticCredentialsProvider {
            accessKeyId = key
            secretAccessKey = secKey
            sessionToken = secToken
        }

    // List all objects in an Amazon S3 bucket using the temp creds.
    val s3 =
```



```
    S3Client {
        credentialsProvider = staticCredentials
        region = "us-east-1"
    }

    println("Created a S3Client using temp credentials.")
    println("Listing objects in $bucketName")

    val listObjects =
        ListObjectsRequest {
            bucket = bucketName
        }

    val response = s3.listObjects(listObjects)
    response.contents?.forEach { myObject ->
        println("The name of the key is ${myObject.key}")
        println("The owner is ${myObject.owner}")
    }
}

suspend fun deleteRole(
    roleNameVal: String,
    polArn: String,
) {
    val iam = IamClient { region = "AWS_GLOBAL" }

    // First the policy needs to be detached.
    val rolePolicyRequest =
        DetachRolePolicyRequest {
            policyArn = polArn
            roleName = roleNameVal
        }

    iam.detachRolePolicy(rolePolicyRequest)

    // Delete the policy.
    val request =
        DeletePolicyRequest {
            policyArn = polArn
        }

    iam.deletePolicy(request)
    println("*** Successfully deleted $polArn")
}
```

```
// Delete the role.
val roleRequest =
    DeleteRoleRequest {
        roleName = roleNameVal
    }

iam.deleteRole(roleRequest)
println("*** Successfully deleted $roleNameVal")
}

suspend fun deleteUser(userNameVal: String) {
    val iam = IamClient { region = "AWS_GLOBAL" }
    val request =
        DeleteUserRequest {
            userName = userNameVal
        }

    iam.deleteUser(request)
    println("*** Successfully deleted $userNameVal")
}

@Throws(java.lang.Exception::class)
fun readJsonSimpleDemo(filename: String): Any? {
    val reader = FileReader(filename)
    val jsonParser = JSONParser()
    return jsonParser.parse(reader)
}
```

- For API details, see the following topics in *AWS SDK for Kotlin API reference*.
  - [AttachRolePolicy](#)
  - [CreateAccessKey](#)
  - [CreatePolicy](#)
  - [CreateRole](#)
  - [CreateUser](#)
  - [DeleteAccessKey](#)
  - [DeletePolicy](#)
  - [DeleteRole](#)
  - [DeleteUser](#)

- [DeleteUserPolicy](#)
- [DetachRolePolicy](#)
- [PutUserPolicy](#)

## AWS IoT examples using SDK for Kotlin

The following code examples show you how to perform actions and implement common scenarios by using the AWS SDK for Kotlin with AWS IoT.

*Basics* are code examples that show you how to perform the essential operations within a service.

*Actions* are code excerpts from larger programs and must be run in context. While actions show you how to call individual service functions, you can see actions in context in their related scenarios.

Each example includes a link to the complete source code, where you can find instructions on how to set up and run the code in context.

### Get started

#### Hello AWS IoT

The following code examples show how to get started using AWS IoT.

#### SDK for Kotlin

##### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
import aws.sdk.kotlin.services.iot.IotClient
import aws.sdk.kotlin.services.iot.model.ListThingsRequest

suspend fun main() {
    println("A listing of your AWS IoT Things:")
    listAllThings()
}

suspend fun listAllThings() {
```

```
val thingsRequest =
    ListThingsRequest {
        maxResults = 10
    }

IotClient { region = "us-east-1" }.use { iotClient ->
    val response = iotClient.listThings(thingsRequest)
    val thingList = response.things
    if (thingList != null) {
        for (attribute in thingList) {
            println("Thing name ${attribute.thingName}")
            println("Thing ARN: ${attribute.thingArn}")
        }
    }
}
```

- For API details, see [listThings](#) in *AWS SDK for Kotlin API reference*.

## Topics

- [Basics](#)
- [Actions](#)

## Basics

### Learn the basics

The following code example shows how to work with AWS IoT device management.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
import aws.sdk.kotlin.services.iot.IotClient
import aws.sdk.kotlin.services.iot.model.Action
```

```
import aws.sdk.kotlin.services.iot.model.AttachThingPrincipalRequest
import aws.sdk.kotlin.services.iot.model.AttributePayload
import aws.sdk.kotlin.services.iot.model.CreateThingRequest
import aws.sdk.kotlin.services.iot.model.CreateTopicRuleRequest
import aws.sdk.kotlin.services.iot.model.DeleteCertificateRequest
import aws.sdk.kotlin.services.iot.model.DeleteThingRequest
import aws.sdk.kotlin.services.iot.model.DescribeEndpointRequest
import aws.sdk.kotlin.services.iot.model.DescribeThingRequest
import aws.sdk.kotlin.services.iot.model.DetachThingPrincipalRequest
import aws.sdk.kotlin.services.iot.model.ListTopicRulesRequest
import aws.sdk.kotlin.services.iot.model.SearchIndexRequest
import aws.sdk.kotlin.services.iot.model.SnsAction
import aws.sdk.kotlin.services.iot.model.TopicRulePayload
import aws.sdk.kotlin.services.iot.model.UpdateThingRequest
import aws.sdk.kotlin.services.iotdataplane.IotDataPlaneClient
import aws.sdk.kotlin.services.iotdataplane.model.GetThingShadowRequest
import aws.sdk.kotlin.services.iotdataplane.model.UpdateThingShadowRequest
import aws.smithy.kotlin.runtime.content.ByteString
import aws.smithy.kotlin.runtime.content.toByteArray
import java.util.Scanner
import java.util.regex.Pattern
import kotlin.system.exitProcess

/**
 * Before running this Kotlin code example, ensure that your development environment
 * is set up, including configuring your credentials.
 *
 * For detailed instructions, refer to the following documentation topic:
 * [Setting Up Your Development Environment](https://docs.aws.amazon.com/sdk-for-
kotlin/latest/developer-guide/setup.html)
 *
 * This code example requires an SNS topic and an IAM Role.
 * Follow the steps in the documentation to set up these resources:
 *
 * - [Creating an SNS Topic](https://docs.aws.amazon.com/sns/latest/dg/sns-getting-
started.html#step-create-topic)
 * - [Creating an IAM Role](https://docs.aws.amazon.com/IAM/latest/UserGuide/
id_roles_create.html)
 */

val DASHES = String(CharArray(80)).replace("\u0000", "-")
val TOPIC = "your-iot-topic"

suspend fun main(args: Array<String>) {
```

```
val usage =
    """
    Usage:
        <roleARN> <snsAction>

    Where:
        roleARN - The ARN of an IAM role that has permission to work with AWS
IoT.
        snsAction - An ARN of an SNS topic.

    """.trimIndent()

if (args.size != 2) {
    println(usage)
    exitProcess(1)
}

var thingName: String
val roleARN = args[0]
val snsAction = args[1]
val scanner = Scanner(System.`in`)

println(DASHES)
println("Welcome to the AWS IoT example scenario.")
println(
    """
        This example program demonstrates various interactions with the AWS Internet
of Things (IoT) Core service.
        The program guides you through a series of steps, including creating an IoT
thing, generating a device certificate,
        updating the thing with attributes, and so on.

        It utilizes the AWS SDK for Kotlin and incorporates functionality for
creating and managing IoT things, certificates, rules,
        shadows, and performing searches. The program aims to showcase AWS IoT
capabilities and provides a comprehensive example for
        developers working with AWS IoT in a Kotlin environment.
    """.trimIndent(),
)

print("Press Enter to continue...")
scanner.nextLine()
println(DASHES)
```

```

println(DASHES)
println("1. Create an AWS IoT thing.")
println(
    """
        An AWS IoT thing represents a virtual entity in the AWS IoT service that can
        be associated with a physical device.
        """.trimIndent(),
    )
// Prompt the user for input.
print("Enter thing name: ")
thingName = scanner.nextLine()
createIoTThing(thingName)
describeThing(thingName)
println(DASHES)

println(DASHES)
println("2. Generate a device certificate.")
println(
    """
        A device certificate performs a role in securing the communication between
        devices (things) and the AWS IoT platform.
        """.trimIndent(),
    )

print("Do you want to create a certificate for $thingName? (y/n)")
val certAns = scanner.nextLine()
var certificateArn: String? = ""
if (certAns != null && certAns.trim { it <= ' ' }.equals("y", ignoreCase =
true)) {
    certificateArn = createCertificate()
    println("Attach the certificate to the AWS IoT thing.")
    attachCertificateToThing(thingName, certificateArn)
} else {
    println("A device certificate was not created.")
}
println(DASHES)

println(DASHES)
println("3. Update an AWS IoT thing with Attributes.")
println(
    """
        IoT thing attributes, represented as key-value pairs, offer a pivotal
        advantage in facilitating efficient data
        management and retrieval within the AWS IoT ecosystem.
    """
)

```

```

        """.trimIndent(),
    )
    print("Press Enter to continue...")
    scanner.nextLine()
    updateThing(thingName)
    println(DASHES)

    println(DASHES)
    println("4. Return a unique endpoint specific to the Amazon Web Services
account.")
    println(
        """
            An IoT Endpoint refers to a specific URL or Uniform Resource Locator that
serves as the entry point for communication between IoT devices and the AWS IoT
service.
        """.trimIndent(),
    )
    print("Press Enter to continue...")
    scanner.nextLine()
    val endpointUrl = describeEndpoint()
    println(DASHES)

    println(DASHES)
    println("5. List your AWS IoT certificates")
    print("Press Enter to continue...")
    scanner.nextLine()
    if (certificateArn!!.isNotEmpty()) {
        listCertificates()
    } else {
        println("You did not create a certificates. Skipping this step.")
    }
    println(DASHES)

    println(DASHES)
    println("6. Create an IoT shadow that refers to a digital representation or
virtual twin of a physical IoT device")
    println(
        """
            A thing shadow refers to a feature that enables you to create a virtual
representation, or "shadow,"
            of a physical device or thing. The thing shadow allows you to synchronize
and control the state of a device between
            the cloud and the device itself. and the AWS IoT service. For example, you
can write and retrieve JSON data from a thing shadow.
        """
    )

```



```
        """.trimIndent(),
    )
    print("Press Enter to continue...")
    scanner.nextLine()
    updateShadowThing(thingName)
    println(DASHES)

    println(DASHES)
    println("7. Write out the state information, in JSON format.")
    print("Press Enter to continue...")
    scanner.nextLine()
    getPayload(thingName)
    println(DASHES)

    println(DASHES)
    println("8. Creates a rule")
    println(
        """
        Creates a rule that is an administrator-level action.
        Any user who has permission to create rules will be able to access data
processed by the rule.
        """.trimIndent(),
    )
    print("Enter Rule name: ")
    val ruleName = scanner.nextLine()
    createIoTRule(roleARN, ruleName, snsAction)
    println(DASHES)

    println(DASHES)
    println("9. List your rules.")
    print("Press Enter to continue...")
    scanner.nextLine()
    listIoTRules()
    println(DASHES)

    println(DASHES)
    println("10. Search things using the name.")
    print("Press Enter to continue...")
    scanner.nextLine()
    val queryString = "thingName:$thingName"
    searchThings(queryString)
    println(DASHES)
```

```
println(DASHES)
if (certificateArn.length > 0) {
    print("Do you want to detach and delete the certificate for $thingName? (y/
n)")
    val delAns = scanner.nextLine()
    if (delAns != null && delAns.trim { it <= ' ' }.equals("y", ignoreCase =
true)) {
        println("11. You selected to detach and delete the certificate.")
        print("Press Enter to continue...")
        scanner.nextLine()
        detachThingPrincipal(thingName, certificateArn)
        deleteCertificate(certificateArn)
    } else {
        println("11. You selected not to delete the certificate.")
    }
} else {
    println("11. You did not create a certificate so there is nothing to
delete.")
}
println(DASHES)

println(DASHES)
println("12. Delete the AWS IoT thing.")
print("Do you want to delete the IoT thing? (y/n)")
val delAns = scanner.nextLine()
if (delAns != null && delAns.trim { it <= ' ' }.equals("y", ignoreCase = true))
{
    deleteIoTThing(thingName)
} else {
    println("The IoT thing was not deleted.")
}
println(DASHES)

println(DASHES)
println("The AWS IoT workflow has successfully completed.")
println(DASHES)
}

suspend fun deleteIoTThing(thingNameVal: String) {
    val deleteThingRequest =
        DeleteThingRequest {
            thingName = thingNameVal
        }
}
```

```
IotClient { region = "us-east-1" }.use { iotClient ->
    iotClient.deleteThing(deleteThingRequest)
    println("Deleted $thingNameVal")
}
}

suspend fun deleteCertificate(certificateArn: String) {
    val certificateProviderRequest =
        DeleteCertificateRequest {
            certificateId = extractCertificateId(certificateArn)
        }
    IotClient { region = "us-east-1" }.use { iotClient ->
        iotClient.deleteCertificate(certificateProviderRequest)
        println("$certificateArn was successfully deleted.")
    }
}

private fun extractCertificateId(certificateArn: String): String? {
    // Example ARN: arn:aws:iot:region:account-id:cert/certificate-id.
    val arnParts = certificateArn.split(":").toRegex().dropLastWhile
    { it.isEmpty() }.toTypedArray()
    val certificateIdPart = arnParts[arnParts.size - 1]
    return certificateIdPart.substring(certificateIdPart.lastIndexOf("/") + 1)
}

suspend fun detachThingPrincipal(
    thingNameVal: String,
    certificateArn: String,
) {
    val thingPrincipalRequest =
        DetachThingPrincipalRequest {
            principal = certificateArn
            thingName = thingNameVal
        }

    IotClient { region = "us-east-1" }.use { iotClient ->
        iotClient.detachThingPrincipal(thingPrincipalRequest)
        println("$certificateArn was successfully removed from $thingNameVal")
    }
}

suspend fun searchThings(queryStringVal: String?) {
    val searchIndexRequest =
        SearchIndexRequest {
```

```

        queryString = queryStringVal
    }

    IoTClient { region = "us-east-1" }.use { iotClient ->
        val searchIndexResponse = iotClient.searchIndex(searchIndexRequest)
        if (searchIndexResponse.things?.isEmpty() == true) {
            println("No things found.")
        } else {
            searchIndexResponse.things
                ?.forEach { thing -> println("Thing id found using search is
                ${thing.thingId}") }
        }
    }
}

suspend fun listIoTRules() {
    val listTopicRulesRequest = ListTopicRulesRequest {}

    IoTClient { region = "us-east-1" }.use { iotClient ->
        val listTopicRulesResponse = iotClient.listTopicRules(listTopicRulesRequest)
        println("List of IoT rules:")
        val ruleList = listTopicRulesResponse.rules
        ruleList?.forEach { rule ->
            println("Rule name: ${rule.ruleName}")
            println("Rule ARN: ${rule.ruleArn}")
            println("-----")
        }
    }
}

suspend fun createIoTRule(
    roleARNVal: String?,
    ruleNameVal: String?,
    action: String?,
) {
    val sqlVal = "SELECT * FROM '$TOPIC '"
    val action1 =
        SnsAction {
            targetArn = action
            roleArn = roleARNVal
        }

    val myAction =
        Action {

```

```
        sns = action1
    }

    val topicRulePayloadVal =
        TopicRulePayload {
            sql = sqlVal
            actions = listOf(myAction)
        }

    val topicRuleRequest =
        CreateTopicRuleRequest {
            ruleName = ruleNameVal
            topicRulePayload = topicRulePayloadVal
        }

    IotClient { region = "us-east-1" }.use { iotClient ->
        iotClient.createTopicRule(topicRuleRequest)
        println("IoT rule created successfully.")
    }
}

suspend fun getPayload(thingNameVal: String?) {
    val getThingShadowRequest =
        GetThingShadowRequest {
            thingName = thingNameVal
        }

    IotDataPlaneClient { region = "us-east-1" }.use { iotPlaneClient ->
        val getThingShadowResponse =
            iotPlaneClient.getThingShadow(getThingShadowRequest)
        val payload = getThingShadowResponse.payload
        val payloadString = payload?.let { java.lang.String(it, Charsets.UTF_8) }
        println("Received shadow data: $payloadString")
    }
}

suspend fun listCertificates() {
    IotClient { region = "us-east-1" }.use { iotClient ->
        val response = iotClient.listCertificates()
        val certList = response.certificates
        certList?.forEach { cert ->
            println("Cert id: ${cert.certificateId}")
            println("Cert Arn: ${cert.certificateArn}")
        }
    }
}
```

```
    }  
  }  
  
suspend fun describeEndpoint(): String? {  
    val request = DescribeEndpointRequest {}  
    IotClient { region = "us-east-1" }.use { iotClient ->  
        val endpointResponse = iotClient.describeEndpoint(request)  
        val endpointUrl: String? = endpointResponse.endpointAddress  
        val exString: String = getValue(endpointUrl)  
        val fullEndpoint = "https://$exString-ats.iot.us-east-1.amazonaws.com"  
        println("Full endpoint URL: $fullEndpoint")  
        return fullEndpoint  
    }  
}  
  
private fun getValue(input: String?): String {  
    // Define a regular expression pattern for extracting the subdomain.  
    val pattern = Pattern.compile("^(.*)\\.\\.iot\\.\\.us-east-1\\.\\.amazonaws\\.\\.com")  
  
    // Match the pattern against the input string.  
    val matcher = pattern.matcher(input)  
  
    // Check if a match is found.  
    if (matcher.find()) {  
        val subdomain = matcher.group(1)  
        println("Extracted subdomain: $subdomain")  
        return subdomain  
    } else {  
        println("No match found")  
    }  
    return ""  
}  
  
suspend fun updateThing(thingNameVal: String?) {  
    val newLocation = "Office"  
    val newFirmwareVersion = "v2.0"  
    val attMap: MutableMap<String, String> = HashMap()  
    attMap["location"] = newLocation  
    attMap["firmwareVersion"] = newFirmwareVersion  
  
    val attributePayloadVal =  
        AttributePayload {  
            attributes = attMap  
        }  
}
```

```
val updateThingRequest =
    UpdateThingRequest {
        thingName = thingNameVal
        attributePayload = attributePayloadVal
    }

IotClient { region = "us-east-1" }.use { iotClient ->
    // Update the IoT thing attributes.
    iotClient.updateThing(updateThingRequest)
    println("$thingNameVal attributes updated successfully.")
}

suspend fun updateShadowThing(thingNameVal: String?) {
    // Create the thing shadow state document.
    val stateDocument = "{\"state\":{\"reported\":{\"temperature\":25, \"humidity\":50}}}"
    val byteStream: ByteStream = ByteStream.fromString(stateDocument)
    val byteArray: ByteArray = byteStream.toByteArray()

    val updateThingShadowRequest =
        UpdateThingShadowRequest {
            thingName = thingNameVal
            payload = byteArray
        }

    IotDataPlaneClient { region = "us-east-1" }.use { iotPlaneClient ->
        iotPlaneClient.updateThingShadow(updateThingShadowRequest)
        println("The thing shadow was updated successfully.")
    }
}

suspend fun attachCertificateToThing(
    thingNameVal: String?,
    certificateArn: String?,
) {
    val principalRequest =
        AttachThingPrincipalRequest {
            thingName = thingNameVal
            principal = certificateArn
        }

    IotClient { region = "us-east-1" }.use { iotClient ->
```

```
        iotClient.attachThingPrincipal(principalRequest)
        println("Certificate attached to $thingNameVal successfully.")
    }
}

suspend fun describeThing(thingNameVal: String) {
    val thingRequest =
        DescribeThingRequest {
            thingName = thingNameVal
        }

    // Print Thing details.
    IotClient { region = "us-east-1" }.use { iotClient ->
        val describeResponse = iotClient.describeThing(thingRequest)
        println("Thing details:")
        println("Thing name: ${describeResponse.thingName}")
        println("Thing ARN:  ${describeResponse.thingArn}")
    }
}

suspend fun createCertificate(): String? {
    IotClient { region = "us-east-1" }.use { iotClient ->
        val response = iotClient.createKeysAndCertificate()
        val certificatePem = response.certificatePem
        val certificateArn = response.certificateArn

        // Print the details.
        println("\nCertificate:")
        println(certificatePem)
        println("\nCertificate ARN:")
        println(certificateArn)
        return certificateArn
    }
}

suspend fun createIoTThing(thingNameVal: String) {
    val createThingRequest =
        CreateThingRequest {
            thingName = thingNameVal
        }

    IotClient { region = "us-east-1" }.use { iotClient ->
        iotClient.createThing(createThingRequest)
        println("Created $thingNameVal")
    }
}
```



```
}  
}
```

## Actions

### AttachThingPrincipal

The following code example shows how to use `AttachThingPrincipal`.

#### SDK for Kotlin

##### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun attachCertificateToThing(  
    thingNameVal: String?,  
    certificateArn: String?,  
) {  
    val principalRequest =  
        AttachThingPrincipalRequest {  
            thingName = thingNameVal  
            principal = certificateArn  
        }  
  
    IotClient { region = "us-east-1" }.use { iotClient ->  
        iotClient.attachThingPrincipal(principalRequest)  
        println("Certificate attached to $thingNameVal successfully.")  
    }  
}
```

- For API details, see [AttachThingPrincipal](#) in *AWS SDK for Kotlin API reference*.

### CreateKeysAndCertificate

The following code example shows how to use `CreateKeysAndCertificate`.

## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun createCertificate(): String? {
    IoTClient { region = "us-east-1" }.use { iotClient ->
        val response = iotClient.createKeysAndCertificate()
        val certificatePem = response.certificatePem
        val certificateArn = response.certificateArn

        // Print the details.
        println("\nCertificate:")
        println(certificatePem)
        println("\nCertificate ARN:")
        println(certificateArn)
        return certificateArn
    }
}
```

- For API details, see [CreateKeysAndCertificate](#) in *AWS SDK for Kotlin API reference*.

## CreateThing

The following code example shows how to use CreateThing.

## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun createIoTThing(thingNameVal: String) {
```

```
val createThingRequest =
    CreateThingRequest {
        thingName = thingNameVal
    }

IotClient { region = "us-east-1" }.use { iotClient ->
    iotClient.createThing(createThingRequest)
    println("Created $thingNameVal")
}
}
```

- For API details, see [CreateThing](#) in *AWS SDK for Kotlin API reference*.

## CreateTopicRule

The following code example shows how to use `CreateTopicRule`.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun createIoTRule(
    roleARNVal: String?,
    ruleNameVal: String?,
    action: String?,
) {
    val sqlVal = "SELECT * FROM '$TOPIC '"
    val action1 =
        SnsAction {
            targetArn = action
            roleArn = roleARNVal
        }

    val myAction =
        Action {
            sns = action1
        }
}
```

```
    }

    val topicRulePayloadVal =
        TopicRulePayload {
            sql = sqlVal
            actions = listOf(myAction)
        }

    val topicRuleRequest =
        CreateTopicRuleRequest {
            ruleName = ruleNameVal
            topicRulePayload = topicRulePayloadVal
        }

    IotClient { region = "us-east-1" }.use { iotClient ->
        iotClient.createTopicRule(topicRuleRequest)
        println("IoT rule created successfully.")
    }
}
```

- For API details, see [CreateTopicRule](#) in *AWS SDK for Kotlin API reference*.

## DeleteCertificate

The following code example shows how to use DeleteCertificate.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun deleteCertificate(certificateArn: String) {
    val certificateProviderRequest =
        DeleteCertificateRequest {
            certificateId = extractCertificateId(certificateArn)
        }
    IotClient { region = "us-east-1" }.use { iotClient ->
```

```
        iotClient.deleteCertificate(certificateProviderRequest)
        println("$certificateArn was successfully deleted.")
    }
}
```

- For API details, see [DeleteCertificate](#) in *AWS SDK for Kotlin API reference*.

## DeleteThing

The following code example shows how to use DeleteThing.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun deleteIoTThing(thingNameVal: String) {
    val deleteThingRequest =
        DeleteThingRequest {
            thingName = thingNameVal
        }

    IotClient { region = "us-east-1" }.use { iotClient ->
        iotClient.deleteThing(deleteThingRequest)
        println("Deleted $thingNameVal")
    }
}
```

- For API details, see [DeleteThing](#) in *AWS SDK for Kotlin API reference*.

## DescribeEndpoint

The following code example shows how to use DescribeEndpoint.

## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun describeEndpoint(): String? {
    val request = DescribeEndpointRequest {}
    IoTClient { region = "us-east-1" }.use { iotClient ->
        val endpointResponse = iotClient.describeEndpoint(request)
        val endpointUrl: String? = endpointResponse.endpointAddress
        val exString: String = getValue(endpointUrl)
        val fullEndpoint = "https://$exString-ats.iot.us-east-1.amazonaws.com"
        println("Full endpoint URL: $fullEndpoint")
        return fullEndpoint
    }
}
```

- For API details, see [DescribeEndpoint](#) in *AWS SDK for Kotlin API reference*.

## DescribeThing

The following code example shows how to use DescribeThing.

## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun describeThing(thingNameVal: String) {
    val thingRequest =
        DescribeThingRequest {
            thingName = thingNameVal
        }
}
```

```
// Print Thing details.
IotClient { region = "us-east-1" }.use { iotClient ->
    val describeResponse = iotClient.describeThing(thingRequest)
    println("Thing details:")
    println("Thing name: ${describeResponse.thingName}")
    println("Thing ARN:  ${describeResponse.thingArn}")
}
}
```

- For API details, see [DescribeThing](#) in *AWS SDK for Kotlin API reference*.

## DetachThingPrincipal

The following code example shows how to use `DetachThingPrincipal`.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun detachThingPrincipal(
    thingNameVal: String,
    certificateArn: String,
) {
    val thingPrincipalRequest =
        DetachThingPrincipalRequest {
            principal = certificateArn
            thingName = thingNameVal
        }

    IotClient { region = "us-east-1" }.use { iotClient ->
        iotClient.detachThingPrincipal(thingPrincipalRequest)
        println("$certificateArn was successfully removed from $thingNameVal")
    }
}
```

- For API details, see [DetachThingPrincipal](#) in *AWS SDK for Kotlin API reference*.

## ListCertificates

The following code example shows how to use ListCertificates.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun listCertificates() {
    IoTClient { region = "us-east-1" }.use { iotClient ->
        val response = iotClient.listCertificates()
        val certList = response.certificates
        certList?.forEach { cert ->
            println("Cert id: ${cert.certificateId}")
            println("Cert Arn: ${cert.certificateArn}")
        }
    }
}
```

- For API details, see [ListCertificates](#) in *AWS SDK for Kotlin API reference*.

## SearchIndex

The following code example shows how to use SearchIndex.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).



```
suspend fun searchThings(queryStringVal: String?) {
    val searchIndexRequest =
        SearchIndexRequest {
            queryString = queryStringVal
        }

    IotClient { region = "us-east-1" }.use { iotClient ->
        val searchIndexResponse = iotClient.searchIndex(searchIndexRequest)
        if (searchIndexResponse.things?.isEmpty() == true) {
            println("No things found.")
        } else {
            searchIndexResponse.things
                ?.forEach { thing -> println("Thing id found using search is
                ${thing.thingId}") }
        }
    }
}
```

- For API details, see [SearchIndex](#) in *AWS SDK for Kotlin API reference*.

## UpdateThing

The following code example shows how to use UpdateThing.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun updateThing(thingNameVal: String?) {
    val newLocation = "Office"
    val newFirmwareVersion = "v2.0"
    val attMap: MutableMap<String, String> = HashMap()
    attMap["location"] = newLocation
    attMap["firmwareVersion"] = newFirmwareVersion

    val attributePayloadVal =
```

```
        AttributePayload {
            attributes = attMap
        }

    val updateThingRequest =
        UpdateThingRequest {
            thingName = thingNameVal
            attributePayload = attributePayloadVal
        }

    IotClient { region = "us-east-1" }.use { iotClient ->
        // Update the IoT thing attributes.
        iotClient.updateThing(updateThingRequest)
        println("$thingNameVal attributes updated successfully.")
    }
}
```

- For API details, see [UpdateThing](#) in *AWS SDK for Kotlin API reference*.

## AWS IoT data examples using SDK for Kotlin

The following code examples show you how to perform actions and implement common scenarios by using the AWS SDK for Kotlin with AWS IoT data.

*Actions* are code excerpts from larger programs and must be run in context. While actions show you how to call individual service functions, you can see actions in context in their related scenarios.

Each example includes a link to the complete source code, where you can find instructions on how to set up and run the code in context.

### Topics

- [Actions](#)

## Actions

### GetThingShadow

The following code example shows how to use `GetThingShadow`.

## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun getPayload(thingNameVal: String?) {
    val getThingShadowRequest =
        GetThingShadowRequest {
            thingName = thingNameVal
        }

    IotDataPlaneClient { region = "us-east-1" }.use { iotPlaneClient ->
        val getThingShadowResponse =
            iotPlaneClient.getThingShadow(getThingShadowRequest)
        val payload = getThingShadowResponse.payload
        val payloadString = payload?.let { java.lang.String(it, Charsets.UTF_8) }
        println("Received shadow data: $payloadString")
    }
}
```

- For API details, see [GetThingShadow](#) in *AWS SDK for Kotlin API reference*.

## UpdateThingShadow

The following code example shows how to use UpdateThingShadow.

## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun updateShawdowThing(thingNameVal: String?) {
```

```
// Create the thing shadow state document.
val stateDocument = "{\"state\":{\"reported\":{\"temperature\":25, \"humidity\":50}}}"
val byteStream: ByteStream = ByteStream.fromString(stateDocument)
val byteArray: ByteArray = byteStream.toByteArray()

val updateThingShadowRequest =
    UpdateThingShadowRequest {
        thingName = thingNameVal
        payload = byteArray
    }

IoTDataPlaneClient { region = "us-east-1" }.use { iotPlaneClient ->
    iotPlaneClient.updateThingShadow(updateThingShadowRequest)
    println("The thing shadow was updated successfully.")
}
}
```

- For API details, see [UpdateThingShadow](#) in *AWS SDK for Kotlin API reference*.

## Amazon Keyspaces examples using SDK for Kotlin

The following code examples show you how to perform actions and implement common scenarios by using the AWS SDK for Kotlin with Amazon Keyspaces.

*Basics* are code examples that show you how to perform the essential operations within a service.

*Actions* are code excerpts from larger programs and must be run in context. While actions show you how to call individual service functions, you can see actions in context in their related scenarios.

Each example includes a link to the complete source code, where you can find instructions on how to set up and run the code in context.

### Get started

#### Hello Amazon Keyspaces

The following code examples show how to get started using Amazon Keyspaces.

## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
/**
Before running this Kotlin code example, set up your development environment,
including your credentials.

For more information, see the following documentation topic:

https://docs.aws.amazon.com/sdk-for-kotlin/latest/developer-guide/setup.html
*/

suspend fun main() {
    listKeyspaces()
}

suspend fun listKeyspaces() {
    val keyspacesRequest =
        ListKeyspacesRequest {
            maxResults = 10
        }

    KeyspacesClient { region = "us-east-1" }.use { keyClient ->
        val response = keyClient.listKeyspaces(keyspacesRequest)
        response.keyspaces?.forEach { keyspace ->
            println("The name of the keyspace is ${keyspace.keyspaceName}")
        }
    }
}
```

- For API details, see [ListKeyspaces](#) in *AWS SDK for Kotlin API reference*.

## Topics

- [Basics](#)

- [Actions](#)

## Basics

### Learn the basics

The following code example shows how to:

- Create a keyspace and table. The table schema holds movie data and has point-in-time recovery enabled.
- Connect to the keyspace using a secure TLS connection with SigV4 authentication.
- Query the table. Add, retrieve, and update movie data.
- Update the table. Add a column to track watched movies.
- Restore the table to its previous state and clean up resources.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
/**
```

```
Before running this Kotlin code example, set up your development environment, including your credentials.
```

```
For more information, see the following documentation topic:
```

```
https://docs.aws.amazon.com/sdk-for-kotlin/latest/developer-guide/setup.html
```

```
This example uses a secure file format to hold certificate information for Kotlin applications. This is required to make a connection to Amazon Keyspaces. For more information, see the following documentation topic:
```

```
https://docs.aws.amazon.com/keyspaces/latest/devguide/using\_java\_driver.html
```

```
This Kotlin example performs the following tasks:
```

1. Create a keyspace.
2. Check for keyspace existence.
3. List keyspaces using a paginator.
4. Create a table with a simple movie data schema and enable point-in-time recovery.
5. Check for the table to be in an Active state.
6. List all tables in the keyspace.
7. Use a Cassandra driver to insert some records into the Movie table.
8. Get all records from the Movie table.
9. Get a specific Movie.
10. Get a UTC timestamp for the current time.
11. Update the table schema to add a 'watched' Boolean column.
12. Update an item as watched.
13. Query for items with watched = True.
14. Restore the table back to the previous state using the timestamp.
15. Check for completion of the restore action.
16. Delete the table.
17. Confirm that both tables are deleted.
18. Delete the keyspace.

```
*/
```

```
/*
```

```
Usage:
```

```
    fileName - The name of the JSON file that contains movie data. (Get this file  
from the GitHub repo at resources/sample_file.)
```

```
    keyspaceName - The name of the keyspace to create.
```

```
*/
```

```
val DASHES: String = String(CharArray(80)).replace("\u0000", "-")
```

```
suspend fun main() {  
    val fileName = "<Replace with the JSON file that contains movie data>"  
    val keyspaceName = "<Replace with the name of the keyspace to create>"  
    val titleUpdate = "The Family"  
    val yearUpdate = 2013  
    val tableName = "MovieKotlin"  
    val tableNameRestore = "MovieRestore"  
  
    val loader = DriverConfigLoader.fromClasspath("application.conf")  
    val session =  
        CqlSession  
            .builder()  
            .withConfigLoader(loader)  
            .build()
```

```
println(DASHES)
println("Welcome to the Amazon Keyspaces example scenario.")
println(DASHES)

println(DASHES)
println("1. Create a keyspace.")
createKeySpace(keyspaceName)
println(DASHES)

println(DASHES)
delay(5000)
println("2. Check for keyspace existence.")
checkKeyspaceExistence(keyspaceName)
println(DASHES)

println(DASHES)
println("3. List keyspaces using a paginator.")
listKeyspacesPaginator()
println(DASHES)

println(DASHES)
println("4. Create a table with a simple movie data schema and enable point-in-
time recovery.")
createTable(keyspaceName, tableName)
println(DASHES)

println(DASHES)
println("5. Check for the table to be in an Active state.")
delay(6000)
checkTable(keyspaceName, tableName)
println(DASHES)

println(DASHES)
println("6. List all tables in the keyspace.")
listTables(keyspaceName)
println(DASHES)

println(DASHES)
println("7. Use a Cassandra driver to insert some records into the Movie
table.")
delay(6000)
loadData(session, fileName, keyspaceName)
println(DASHES)
```



```
println(DASHES)
println("8. Get all records from the Movie table.")
getMovieData(session, keyspaceName)
println(DASHES)

println(DASHES)
println("9. Get a specific Movie.")
getSpecificMovie(session, keyspaceName)
println(DASHES)

println(DASHES)
println("10. Get a UTC timestamp for the current time.")
val utc = ZonedDateTime.now(ZoneOffset.UTC)
println("DATETIME = ${Date.from(utc.toInstant())}")
println(DASHES)

println(DASHES)
println("11. Update the table schema to add a watched Boolean column.")
updateTable(keyspaceName, tableName)
println(DASHES)

println(DASHES)
println("12. Update an item as watched.")
delay(10000) // Wait 10 seconds for the update.
updateRecord(session, keyspaceName, titleUpdate, yearUpdate)
println(DASHES)

println(DASHES)
println("13. Query for items with watched = True.")
getWatchedData(session, keyspaceName)
println(DASHES)

println(DASHES)
println("14. Restore the table back to the previous state using the timestamp.")
println("Note that the restore operation can take up to 20 minutes.")
restoreTable(keyspaceName, utc)
println(DASHES)

println(DASHES)
println("15. Check for completion of the restore action.")
delay(5000)
checkRestoredTable(keyspaceName, "MovieRestore")
println(DASHES)
```

```
println(DASHES)
println("16. Delete both tables.")
deleteTable(keyspaceName, tableName)
deleteTable(keyspaceName, tableNameRestore)
println(DASHES)

println(DASHES)
println("17. Confirm that both tables are deleted.")
checkTableDelete(keyspaceName, tableName)
checkTableDelete(keyspaceName, tableNameRestore)
println(DASHES)

println(DASHES)
println("18. Delete the keyspace.")
deleteKeyspace(keyspaceName)
println(DASHES)

println(DASHES)
println("The scenario has completed successfully.")
println(DASHES)
}

suspend fun deleteKeyspace(keyspaceNameVal: String?) {
    val deleteKeyspaceRequest =
        DeleteKeyspaceRequest {
            keyspaceName = keyspaceNameVal
        }

    KeyspacesClient { region = "us-east-1" }.use { keyClient ->
        keyClient.deleteKeyspace(deleteKeyspaceRequest)
    }
}

suspend fun checkTableDelete(
    keyspaceNameVal: String?,
    tableNameVal: String?,
) {
    var status: String
    var response: GetTableResponse
    val tableRequest =
        GetTableRequest {
            keyspaceName = keyspaceNameVal
            tableName = tableNameVal
        }
}
```

```
    }

    try {
        KeyspacesClient { region = "us-east-1" }.use { keyClient ->
            // Keep looping until the table cannot be found and a
            ResourceNotFoundException is thrown.
            while (true) {
                response = keyClient.getTable(tableRequest)
                status = response.status.toString()
                println(". The table status is $status")
                delay(500)
            }
        }
    } catch (e: ResourceNotFoundException) {
        println(e.message)
    }
    println("The table is deleted")
}

suspend fun deleteTable(
    keyspaceNameVal: String?,
    tableNameVal: String?,
) {
    val tableRequest =
        DeleteTableRequest {
            keyspaceName = keyspaceNameVal
            tableName = tableNameVal
        }

    KeyspacesClient { region = "us-east-1" }.use { keyClient ->
        keyClient.deleteTable(tableRequest)
    }
}

suspend fun checkRestoredTable(
    keyspaceNameVal: String?,
    tableNameVal: String?,
) {
    var tableStatus = false
    var status: String
    var response: GetTableResponse? = null

    val tableRequest =
        GetTableRequest {
```

```
        keyspaceName = keyspaceNameVal
        tableName = tableNameVal
    }

    KeyspacesClient { region = "us-east-1" }.use { keyClient ->
        while (!tableStatus) {
            response = keyClient.getTable(tableRequest)
            status = response!!.status.toString()
            println("The table status is $status")

            if (status.compareTo("ACTIVE") == 0) {
                tableStatus = true
            }
            delay(500)
        }

        val cols = response!!.schemaDefinition?.allColumns
        if (cols != null) {
            for (def in cols) {
                println("The column name is ${def.name}")
                println("The column type is ${def.type}")
            }
        }
    }
}

suspend fun restoreTable(
    keyspaceName: String?,
    utc: ZonedDateTime,
) {
    // Create an aws.smithy.kotlin.runtime.time.Instant value.
    val timeStamp =
        aws.smithy.kotlin.runtime.time
            .Instant(utc.toInstant())
    val restoreTableRequest =
        RestoreTableRequest {
            restoreTimestamp = timeStamp
            sourceTableName = "MovieKotlin"
            targetKeyspaceName = keyspaceName
            targetTableName = "MovieRestore"
            sourceKeyspaceName = keyspaceName
        }

    KeyspacesClient { region = "us-east-1" }.use { keyClient ->
```

```
        val response = keyClient.restoreTable(restoreTableRequest)
        println("The ARN of the restored table is ${response.restoredTableArn}")
    }
}

fun getWatchedData(
    session: CqlSession,
    keyspaceName: String,
) {
    val resultSet = session.execute("SELECT * FROM \"${keyspaceName}\".\"MovieKotlin\"
WHERE watched = true ALLOW FILTERING;")
    resultSet.forEach { item: Row ->
        println("The Movie title is ${item.getString("title")}")
        println("The Movie year is ${item.getInt("year")}")
        println("The plot is ${item.getString("plot")}")
    }
}

fun updateRecord(
    session: CqlSession,
    keySpace: String,
    titleUpdate: String?,
    yearUpdate: Int,
) {
    val sqlStatement =
        "UPDATE \"${keySpace}\".\"MovieKotlin\" SET watched=true WHERE title = :k0 AND
year = :k1;"
    val builder = BatchStatement.builder(DefaultBatchType.UNLOGGED)
    builder.setConsistencyLevel(ConsistencyLevel.LOCAL_QUORUM)
    val preparedStatement = session.prepare(sqlStatement)
    builder.addStatement(
        preparedStatement
            .boundStatementBuilder()
            .setString("k0", titleUpdate)
            .setInt("k1", yearUpdate)
            .build(),
    )
    val batchStatement = builder.build()
    session.execute(batchStatement)
}

suspend fun updateTable(
    keySpace: String?,
    tableNameVal: String?,
```

```
) {
    val def =
        ColumnDefinition {
            name = "watched"
            type = "boolean"
        }

    val tableRequest =
        UpdateTableRequest {
            keyspaceName = keySpace
            tableName = tableNameVal
            addColumns = listOf(def)
        }

    KeyspacesClient { region = "us-east-1" }.use { keyClient ->
        keyClient.updateTable(tableRequest)
    }
}

fun getSpecificMovie(
    session: CqlSession,
    keyspaceName: String,
) {
    val resultSet =
        session.execute("SELECT * FROM \"\$keyspaceName\".\"MovieKotlin\" WHERE title
= 'The Family' ALLOW FILTERING ;")

    resultSet.forEach { item: Row ->
        println("The Movie title is \${item.getString("title")}")
        println("The Movie year is \${item.getInt("year")}")
        println("The plot is \${item.getString("plot")}")
    }
}

// Get records from the Movie table.
fun getMovieData(
    session: CqlSession,
    keyspaceName: String,
) {
    val resultSet = session.execute("SELECT * FROM \"\$keyspaceName\".\"MovieKotlin
\";")
    resultSet.forEach { item: Row ->
        println("The Movie title is \${item.getString("title")}")
        println("The Movie year is \${item.getInt("year")}")
    }
}
```

```
        println("The plot is ${item.getString("plot")}")
    }
}

// Load data into the table.
fun loadData(
    session: CqlSession,
    fileName: String,
    keySpace: String,
) {
    val sqlStatement =
        "INSERT INTO \"\$keySpace\".\"MovieKotlin\" (title, year, plot) values
(:k0, :k1, :k2)"
    val parser = JsonFactory().createParser(File(fileName))
    val rootNode = ObjectMapper().readTree<JsonNode>(parser)
    val iter: Iterator<JsonNode> = rootNode.iterator()
    var currentNode: ObjectNode

    var t = 0
    while (iter.hasNext()) {
        if (t == 50) {
            break
        }

        currentNode = iter.next() as ObjectNode
        val year = currentNode.path("year").asInt()
        val title = currentNode.path("title").asText()
        val info = currentNode.path("info").toString()

        // Insert the data into the Amazon Keyspaces table.
        val builder = BatchStatement.builder(DefaultBatchType.UNLOGGED)
        builder.setConsistencyLevel(ConsistencyLevel.LOCAL_QUORUM)
        val preparedStatement: PreparedStatement = session.prepare(sqlStatement)
        builder.addStatement(
            preparedStatement
                .boundStatementBuilder()
                .setString("k0", title)
                .setInt("k1", year)
                .setString("k2", info)
                .build(),
        )

        val batchStatement = builder.build()
        session.execute(batchStatement)
    }
}
```

```

        t++
    }
}

suspend fun listTables(keyspaceNameVal: String?) {
    val tablesRequest =
        ListTablesRequest {
            keyspaceName = keyspaceNameVal
        }

    KeyspacesClient { region = "us-east-1" }.use { keyClient ->
        keyClient
            .listTablesPaginated(tablesRequest)
            .transform { it.tables?.forEach { obj -> emit(obj) } }
            .collect { obj ->
                println(" ARN: ${obj.resourceArn} Table name: ${obj.tableName}")
            }
    }
}

suspend fun checkTable(
    keyspaceNameVal: String?,
    tableNameVal: String?,
) {
    var tableStatus = false
    var status: String
    var response: GetTableResponse? = null

    val tableRequest =
        GetTableRequest {
            keyspaceName = keyspaceNameVal
            tableName = tableNameVal
        }

    KeyspacesClient { region = "us-east-1" }.use { keyClient ->
        while (!tableStatus) {
            response = keyClient.getTable(tableRequest)
            status = response!!.status.toString()
            println(". The table status is $status")
            if (status.compareTo("ACTIVE") == 0) {
                tableStatus = true
            }
            delay(500)
        }
        val cols: List<ColumnDefinition>? = response!!.schemaDefinition?.allColumns
    }
}

```



```
        if (cols != null) {
            for (def in cols) {
                println("The column name is ${def.name}")
                println("The column type is ${def.type}")
            }
        }
    }
}

suspend fun createTable(
    keySpaceVal: String?,
    tableNameVal: String?,
) {
    // Set the columns.
    val defTitle =
        ColumnDefinition {
            name = "title"
            type = "text"
        }

    val defYear =
        ColumnDefinition {
            name = "year"
            type = "int"
        }

    val defReleaseDate =
        ColumnDefinition {
            name = "release_date"
            type = "timestamp"
        }

    val defPlot =
        ColumnDefinition {
            name = "plot"
            type = "text"
        }

    val colList = ArrayList<ColumnDefinition>()
    colList.add(defTitle)
    colList.add(defYear)
    colList.add(defReleaseDate)
    colList.add(defPlot)
}
```

```
// Set the keys.
val yearKey =
    PartitionKey {
        name = "year"
    }

val titleKey =
    PartitionKey {
        name = "title"
    }

val keyList = ArrayList<PartitionKey>()
keyList.add(yearKey)
keyList.add(titleKey)

val schemaDefinition0b =
    SchemaDefinition {
        partitionKeys = keyList
        allColumns = collList
    }

val timeRecovery =
    PointInTimeRecovery {
        status = PointInTimeRecoveryStatus.Enabled
    }

val tableRequest =
    CreateTableRequest {
        keyspaceName = keySpaceVal
        tableName = tableNameVal
        schemaDefinition = schemaDefinition0b
        pointInTimeRecovery = timeRecovery
    }

KeyspacesClient { region = "us-east-1" }.use { keyClient ->
    val response = keyClient.createTable(tableRequest)
    println("The table ARN is ${response.resourceArn}")
}

suspend fun listKeyspacesPaginator() {
    KeyspacesClient { region = "us-east-1" }.use { keyClient ->
        keyClient
            .listKeyspacesPaginated(ListKeyspacesRequest {})
    }
}
```

```
        .transform { it.keyspaces?.forEach { obj -> emit(obj) } }
        .collect { obj ->
            println("Name: ${obj.keyspaceName}")
        }
    }
}

suspend fun checkKeyspaceExistence(keyspaceNameVal: String?) {
    val keyspaceRequest =
        GetKeyspaceRequest {
            keyspaceName = keyspaceNameVal
        }
    KeyspacesClient { region = "us-east-1" }.use { keyClient ->
        val response: GetKeyspaceResponse = keyClient.getKeyspace(keyspaceRequest)
        val name = response.keyspaceName
        println("The $name KeySpace is ready")
    }
}

suspend fun createKeySpace(keyspaceNameVal: String) {
    val keyspaceRequest =
        CreateKeyspaceRequest {
            keyspaceName = keyspaceNameVal
        }

    KeyspacesClient { region = "us-east-1" }.use { keyClient ->
        val response = keyClient.createKeyspace(keyspaceRequest)
        println("The ARN of the KeySpace is ${response.resourceArn}")
    }
}
```

- For API details, see the following topics in *AWS SDK for Kotlin API reference*.
  - [CreateKeyspace](#)
  - [CreateTable](#)
  - [DeleteKeyspace](#)
  - [DeleteTable](#)
  - [GetKeyspace](#)
  - [GetTable](#)
  - [ListKeyspaces](#)

- [ListTables](#)
- [RestoreTable](#)
- [UpdateTable](#)

## Actions

### CreateKeyspace

The following code example shows how to use CreateKeyspace.

#### SDK for Kotlin

##### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun createKeySpace(keyspaceNameVal: String) {
    val keySpaceRequest =
        CreateKeyspaceRequest {
            keyspaceName = keyspaceNameVal
        }

    KeySpacesClient { region = "us-east-1" }.use { keyClient ->
        val response = keyClient.createKeyspace(keySpaceRequest)
        println("The ARN of the KeySpace is ${response.resourceArn}")
    }
}
```

- For API details, see [CreateKeyspace](#) in *AWS SDK for Kotlin API reference*.

### CreateTable

The following code example shows how to use CreateTable.

## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun createTable(
    keySpaceVal: String?,
    tableNameVal: String?,
) {
    // Set the columns.
    val defTitle =
        ColumnDefinition {
            name = "title"
            type = "text"
        }

    val defYear =
        ColumnDefinition {
            name = "year"
            type = "int"
        }

    val defReleaseDate =
        ColumnDefinition {
            name = "release_date"
            type = "timestamp"
        }

    val defPlot =
        ColumnDefinition {
            name = "plot"
            type = "text"
        }

    val collList = ArrayList<ColumnDefinition>()
    collList.add(defTitle)
    collList.add(defYear)
    collList.add(defReleaseDate)
    collList.add(defPlot)
}
```

```
// Set the keys.
val yearKey =
    PartitionKey {
        name = "year"
    }

val titleKey =
    PartitionKey {
        name = "title"
    }

val keyList = ArrayList<PartitionKey>()
keyList.add(yearKey)
keyList.add(titleKey)

val schemaDefinition0b =
    SchemaDefinition {
        partitionKeys = keyList
        allColumns = colList
    }

val timeRecovery =
    PointInTimeRecovery {
        status = PointInTimeRecoveryStatus.Enabled
    }

val tableRequest =
    CreateTableRequest {
        keyspaceName = keySpaceVal
        tableName = tableNameVal
        schemaDefinition = schemaDefinition0b
        pointInTimeRecovery = timeRecovery
    }

KeyspacesClient { region = "us-east-1" }.use { keyClient ->
    val response = keyClient.createTable(tableRequest)
    println("The table ARN is ${response.resourceArn}")
}
}
```

- For API details, see [CreateTable](#) in *AWS SDK for Kotlin API reference*.

## DeleteKeyspace

The following code example shows how to use DeleteKeyspace.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun deleteKeyspace(keyspaceNameVal: String?) {
    val deleteKeyspaceRequest =
        DeleteKeyspaceRequest {
            keyspaceName = keyspaceNameVal
        }

    KeyspacesClient { region = "us-east-1" }.use { keyClient ->
        keyClient.deleteKeyspace(deleteKeyspaceRequest)
    }
}
```

- For API details, see [DeleteKeyspace](#) in *AWS SDK for Kotlin API reference*.

## DeleteTable

The following code example shows how to use DeleteTable.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun deleteTable(
```

```

    keyspaceNameVal: String?,
    tableNameVal: String?,
) {
    val tableRequest =
        DeleteTableRequest {
            keyspaceName = keyspaceNameVal
            tableName = tableNameVal
        }

    KeyspacesClient { region = "us-east-1" }.use { keyClient ->
        keyClient.deleteTable(tableRequest)
    }
}

```

- For API details, see [DeleteTable](#) in *AWS SDK for Kotlin API reference*.

## GetKeyspace

The following code example shows how to use GetKeyspace.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```

suspend fun checkKeyspaceExistence(keyspaceNameVal: String?) {
    val keyspaceRequest =
        GetKeyspaceRequest {
            keyspaceName = keyspaceNameVal
        }
    KeyspacesClient { region = "us-east-1" }.use { keyClient ->
        val response: GetKeyspaceResponse = keyClient.getKeyspace(keyspaceRequest)
        val name = response.keyspaceName
        println("The $name KeySpace is ready")
    }
}

```



- For API details, see [GetKeyspace](#) in *AWS SDK for Kotlin API reference*.

## GetTable

The following code example shows how to use `GetTable`.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun checkTable(
    keyspaceNameVal: String?,
    tableNameVal: String?,
) {
    var tableStatus = false
    var status: String
    var response: GetTableResponse? = null

    val tableRequest =
        GetTableRequest {
            keyspaceName = keyspaceNameVal
            tableName = tableNameVal
        }
    KeyspacesClient { region = "us-east-1" }.use { keyClient ->
        while (!tableStatus) {
            response = keyClient.getTable(tableRequest)
            status = response!!.status.toString()
            println(". The table status is $status")
            if (status.compareTo("ACTIVE") == 0) {
                tableStatus = true
            }
            delay(500)
        }
        val cols: List<ColumnDefinition>? = response!!.schemaDefinition?.allColumns
        if (cols != null) {
            for (def in cols) {
                println("The column name is ${def.name}")
                println("The column type is ${def.type}")
            }
        }
    }
}
```

```
    }  
  }  
}
```

- For API details, see [GetTable](#) in *AWS SDK for Kotlin API reference*.

## ListKeyspaces

The following code example shows how to use `ListKeyspaces`.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun listKeyspacesPaginator() {  
    KeyspacesClient { region = "us-east-1" }.use { keyClient ->  
        keyClient  
            .listKeyspacesPaginated(ListKeyspacesRequest {})  
            .transform { it.keyspaces?.forEach { obj -> emit(obj) } }  
            .collect { obj ->  
                println("Name: ${obj.keyspaceName}")  
            }  
    }  
}
```

- For API details, see [ListKeyspaces](#) in *AWS SDK for Kotlin API reference*.

## ListTables

The following code example shows how to use `ListTables`.

## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun listTables(keyspaceNameVal: String?) {
    val tablesRequest =
        ListTablesRequest {
            keyspaceName = keyspaceNameVal
        }

    KeyspacesClient { region = "us-east-1" }.use { keyClient ->
        keyClient
            .listTablesPaginated(tablesRequest)
            .transform { it.tables?.forEach { obj -> emit(obj) } }
            .collect { obj ->
                println(" ARN: ${obj.resourceArn} Table name: ${obj.tableName}")
            }
    }
}
```

- For API details, see [ListTables](#) in *AWS SDK for Kotlin API reference*.

## RestoreTable

The following code example shows how to use RestoreTable.

## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun restoreTable(
```

```

    keyspaceName: String?,
    utc: ZonedDateTime,
) {
    // Create an aws.smithy.kotlin.runtime.time.Instant value.
    val timeStamp =
        aws.smithy.kotlin.runtime.time
            .Instant(utc.toInstant())
    val restoreTableRequest =
        RestoreTableRequest {
            restoreTimestamp = timeStamp
            sourceTableName = "MovieKotlin"
            targetKeyspaceName = keyspaceName
            targetTableName = "MovieRestore"
            sourceKeyspaceName = keyspaceName
        }

    KeyspacesClient { region = "us-east-1" }.use { keyClient ->
        val response = keyClient.restoreTable(restoreTableRequest)
        println("The ARN of the restored table is ${response.restoredTableArn}")
    }
}

```

- For API details, see [RestoreTable](#) in *AWS SDK for Kotlin API reference*.

## UpdateTable

The following code example shows how to use UpdateTable.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```

suspend fun updateTable(
    keySpace: String?,
    tableNameVal: String?,
) {

```

```
val def =
    ColumnDefinition {
        name = "watched"
        type = "boolean"
    }

val tableRequest =
    UpdateTableRequest {
        keyspaceName = keySpace
        tableName = tableNameVal
        addColumns = listOf(def)
    }

KeyspacesClient { region = "us-east-1" }.use { keyClient ->
    keyClient.updateTable(tableRequest)
}
}
```

- For API details, see [UpdateTable](#) in *AWS SDK for Kotlin API reference*.

## AWS KMS examples using SDK for Kotlin

The following code examples show you how to perform actions and implement common scenarios by using the AWS SDK for Kotlin with AWS KMS.

*Actions* are code excerpts from larger programs and must be run in context. While actions show you how to call individual service functions, you can see actions in context in their related scenarios.

Each example includes a link to the complete source code, where you can find instructions on how to set up and run the code in context.

### Topics

- [Actions](#)

## Actions

### CreateAlias

The following code example shows how to use CreateAlias.

## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun createCustomAlias(
    targetKeyIdVal: String?,
    aliasNameVal: String?,
) {
    val request =
        CreateAliasRequest {
            aliasName = aliasNameVal
            targetKeyId = targetKeyIdVal
        }

    KmsClient { region = "us-west-2" }.use { kmsClient ->
        kmsClient.createAlias(request)
        println("$aliasNameVal was successfully created")
    }
}
```

- For API details, see [CreateAlias](#) in *AWS SDK for Kotlin API reference*.

## CreateGrant

The following code example shows how to use CreateGrant.

## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun createNewGrant(
```

```

    keyIdVal: String?,
    granteePrincipalVal: String?,
    operation: String,
): String? {
    val operationObj = GrantOperation.fromValue(operation)
    val grantOperationList = ArrayList<GrantOperation>()
    grantOperationList.add(operationObj)

    val request =
        CreateGrantRequest {
            keyId = keyIdVal
            granteePrincipal = granteePrincipalVal
            operations = grantOperationList
        }

    KmsClient { region = "us-west-2" }.use { kmsClient ->
        val response = kmsClient.createGrant(request)
        return response.grantId
    }
}

```

- For API details, see [CreateGrant](#) in *AWS SDK for Kotlin API reference*.

## CreateKey

The following code example shows how to use CreateKey.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```

suspend fun createKey(keyDesc: String?): String? {
    val request =
        CreateKeyRequest {
            description = keyDesc
            customerMasterKeySpec = CustomerMasterKeySpec.SymmetricDefault

```

```
        keyUsage = KeyUsageType.fromValue("ENCRYPT_DECRYPT")
    }

    KmsClient { region = "us-west-2" }.use { kmsClient ->
        val result = kmsClient.createKey(request)
        println("Created a customer key with id " + result.keyMetadata?.arn)
        return result.keyMetadata?.keyId
    }
}
```

- For API details, see [CreateKey](#) in *AWS SDK for Kotlin API reference*.

## Decrypt

The following code example shows how to use Decrypt.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun encryptData(keyIdValue: String): ByteArray? {
    val text = "This is the text to encrypt by using the AWS KMS Service"
    val myBytes: ByteArray = text.toByteArray()

    val encryptRequest =
        EncryptRequest {
            keyId = keyIdValue
            plaintext = myBytes
        }

    KmsClient { region = "us-west-2" }.use { kmsClient ->
        val response = kmsClient.encrypt(encryptRequest)
        val algorithm: String = response.encryptionAlgorithm.toString()
        println("The encryption algorithm is $algorithm")

        // Return the encrypted data.
    }
}
```



```
        return response.ciphertextBlob
    }
}

suspend fun decryptData(
    encryptedDataVal: ByteArray?,
    keyIdVal: String?,
    path: String,
) {
    val decryptRequest =
        DecryptRequest {
            ciphertextBlob = encryptedDataVal
            keyId = keyIdVal
        }
    KmsClient { region = "us-west-2" }.use { kmsClient ->
        val decryptResponse = kmsClient.decrypt(decryptRequest)
        val myVal = decryptResponse.plaintext

        // Write the decrypted data to a file.
        if (myVal != null) {
            File(path).writeBytes(myVal)
        }
    }
}
```

- For API details, see [Decrypt](#) in *AWS SDK for Kotlin API reference*.

## DescribeKey

The following code example shows how to use DescribeKey.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun describeSpecifcKey(keyIdVal: String?) {
```

```
val request =
    DescribeKeyRequest {
        keyId = keyIdVal
    }

KmsClient { region = "us-west-2" }.use { kmsClient ->
    val response = kmsClient.describeKey(request)
    println("The key description is ${response.keyMetadata?.description}")
    println("The key ARN is ${response.keyMetadata?.arn}")
}
}
```

- For API details, see [DescribeKey](#) in *AWS SDK for Kotlin API reference*.

## DisableKey

The following code example shows how to use `DisableKey`.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun disableKey(keyIdVal: String?) {
    val request =
        DisableKeyRequest {
            keyId = keyIdVal
        }

    KmsClient { region = "us-west-2" }.use { kmsClient ->
        kmsClient.disableKey(request)
        println("$keyIdVal was successfully disabled")
    }
}
```

- For API details, see [DisableKey](#) in *AWS SDK for Kotlin API reference*.

## EnableKey

The following code example shows how to use EnableKey.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun enableKey(keyIdVal: String?) {
    val request =
        EnableKeyRequest {
            keyId = keyIdVal
        }

    KmsClient { region = "us-west-2" }.use { kmsClient ->
        kmsClient.enableKey(request)
        println("$keyIdVal was successfully enabled.")
    }
}
```

- For API details, see [EnableKey](#) in *AWS SDK for Kotlin API reference*.

## Encrypt

The following code example shows how to use Encrypt.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun encryptData(keyIdValue: String): ByteArray? {
```

```
val text = "This is the text to encrypt by using the AWS KMS Service"
val myBytes: ByteArray = text.toByteArray()

val encryptRequest =
    EncryptRequest {
        keyId = keyIdValue
        plaintext = myBytes
    }

KmsClient { region = "us-west-2" }.use { kmsClient ->
    val response = kmsClient.encrypt(encryptRequest)
    val algorithm: String = response.encryptionAlgorithm.toString()
    println("The encryption algorithm is $algorithm")

    // Return the encrypted data.
    return response.ciphertextBlob
}

suspend fun decryptData(
    encryptedDataVal: ByteArray?,
    keyIdVal: String?,
    path: String,
) {
    val decryptRequest =
        DecryptRequest {
            ciphertextBlob = encryptedDataVal
            keyId = keyIdVal
        }
    KmsClient { region = "us-west-2" }.use { kmsClient ->
        val decryptResponse = kmsClient.decrypt(decryptRequest)
        val myVal = decryptResponse.plaintext

        // Write the decrypted data to a file.
        if (myVal != null) {
            File(path).writeBytes(myVal)
        }
    }
}
```

- For API details, see [Encrypt](#) in *AWS SDK for Kotlin API reference*.

## ListAliases

The following code example shows how to use ListAliases.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun listAllAliases() {
    val request =
        ListAliasesRequest {
            limit = 15
        }

    KmsClient { region = "us-west-2" }.use { kmsClient ->
        val response = kmsClient.listAliases(request)
        response.aliases?.forEach { alias ->
            println("The alias name is ${alias.aliasName}")
        }
    }
}
```

- For API details, see [ListAliases](#) in *AWS SDK for Kotlin API reference*.

## ListGrants

The following code example shows how to use ListGrants.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun displayGrantIds(keyIdVal: String?) {
    val request =
        ListGrantsRequest {
            keyId = keyIdVal
            limit = 15
        }

    KmsClient { region = "us-west-2" }.use { kmsClient ->
        val response = kmsClient.listGrants(request)
        response.grants?.forEach { grant ->
            println("The grant Id is ${grant.grantId}")
        }
    }
}
```

- For API details, see [ListGrants](#) in *AWS SDK for Kotlin API reference*.

## ListKeys

The following code example shows how to use ListKeys.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun listAllKeys() {
    val request =
        ListKeysRequest {
            limit = 15
        }

    KmsClient { region = "us-west-2" }.use { kmsClient ->
        val response = kmsClient.listKeys(request)
        response.keys?.forEach { key ->
            println("The key ARN is ${key.keyArn}")
            println("The key Id is ${key.keyId}")
        }
    }
}
```

```
    }  
  }  
}
```

- For API details, see [ListKeys](#) in *AWS SDK for Kotlin API reference*.

## Lambda examples using SDK for Kotlin

The following code examples show you how to perform actions and implement common scenarios by using the AWS SDK for Kotlin with Lambda.

*Actions* are code excerpts from larger programs and must be run in context. While actions show you how to call individual service functions, you can see actions in context in their related scenarios.

*Scenarios* are code examples that show you how to accomplish specific tasks by calling multiple functions within a service or combined with other AWS services.

Each example includes a link to the complete source code, where you can find instructions on how to set up and run the code in context.

### Topics

- [Actions](#)
- [Scenarios](#)

## Actions

### CreateFunction

The following code example shows how to use CreateFunction.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun createNewFunction(
    myFunctionName: String,
    s3BucketName: String,
    myS3Key: String,
    myHandler: String,
    myRole: String,
): String? {
    val functionCode =
        FunctionCode {
            s3Bucket = s3BucketName
            s3Key = myS3Key
        }

    val request =
        CreateFunctionRequest {
            functionName = myFunctionName
            code = functionCode
            description = "Created by the Lambda Kotlin API"
            handler = myHandler
            role = myRole
            runtime = Runtime.Java8
        }

    LambdaClient { region = "us-west-2" }.use { awsLambda ->
        val functionResponse = awsLambda.createFunction(request)
        awsLambda.waitForFunctionActive {
            functionName = myFunctionName
        }
        return functionResponse.functionArn
    }
}
```

- For API details, see [CreateFunction](#) in *AWS SDK for Kotlin API reference*.

## DeleteFunction

The following code example shows how to use DeleteFunction.



## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun delLambdaFunction(myFunctionName: String) {
    val request =
        DeleteFunctionRequest {
            functionName = myFunctionName
        }

    LambdaClient { region = "us-west-2" }.use { awsLambda ->
        awsLambda.deleteFunction(request)
        println("$myFunctionName was deleted")
    }
}
```

- For API details, see [DeleteFunction](#) in *AWS SDK for Kotlin API reference*.

## Invoke

The following code example shows how to use Invoke.

## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun invokeFunction(functionNameVal: String) {
    val json = """"{"inputValue":"1000}""""
    val byteArray = json.trimIndent().encodeToByteArray()
    val request =
        InvokeRequest {
```

```
        functionName = functionNameVal
        logType = LogType.Tail
        payload = byteArray
    }

    LambdaClient { region = "us-west-2" }.use { awsLambda ->
        val res = awsLambda.invoke(request)
        println("${res.payload?.toString(Charsets.UTF_8)}")
        println("The log result is ${res.logResult}")
    }
}
```

- For API details, see [Invoke](#) in *AWS SDK for Kotlin API reference*.

## Scenarios

### Create a serverless application to manage photos

The following code example shows how to create a serverless application that lets users manage photos using labels.

#### SDK for Kotlin

Shows how to develop a photo asset management application that detects labels in images using Amazon Rekognition and stores them for later retrieval.

For complete source code and instructions on how to set up and run, see the full example on [GitHub](#).

For a deep dive into the origin of this example see the post on [AWS Community](#).

#### Services used in this example

- API Gateway
- DynamoDB
- Lambda
- Amazon Rekognition
- Amazon S3
- Amazon SNS

## Get started with functions

The following code example shows how to:

- Create an IAM role and Lambda function, then upload handler code.
- Invoke the function with a single parameter and get results.
- Update the function code and configure with an environment variable.
- Invoke the function with new parameters and get results. Display the returned execution log.
- List the functions for your account, then clean up resources.

For more information, see [Create a Lambda function with the console](#).

## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun main(args: Array<String>) {
    val usage = """
        Usage:
            <functionName> <role> <handler> <bucketName> <updatedBucketName> <key>

        Where:
            functionName - The name of the AWS Lambda function.
            role - The AWS Identity and Access Management (IAM) service role that
            has AWS Lambda permissions.
            handler - The fully qualified method name (for example,
            example.Handler::handleRequest).
            bucketName - The Amazon Simple Storage Service (Amazon S3) bucket name
            that contains the ZIP or JAR used for the Lambda function's code.
            updatedBucketName - The Amazon S3 bucket name that contains the .zip
            or .jar used to update the Lambda function's code.
            key - The Amazon S3 key name that represents the .zip or .jar file (for
            example, LambdaHello-1.0-SNAPSHOT.jar).
        """

    if (args.size != 6) {
```

```
        println(usage)
        exitProcess(1)
    }

    val functionName = args[0]
    val role = args[1]
    val handler = args[2]
    val bucketName = args[3]
    val updatedBucketName = args[4]
    val key = args[5]

    println("Creating a Lambda function named $functionName.")
    val funArn = createScFunction(functionName, bucketName, key, handler, role)
    println("The AWS Lambda ARN is $funArn")

    // Get a specific Lambda function.
    println("Getting the $functionName AWS Lambda function.")
    getFunction(functionName)

    // List the Lambda functions.
    println("Listing all AWS Lambda functions.")
    listFunctionsSc()

    // Invoke the Lambda function.
    println("*** Invoke the Lambda function.")
    invokeFunctionSc(functionName)

    // Update the AWS Lambda function code.
    println("*** Update the Lambda function code.")
    updateFunctionCode(functionName, updatedBucketName, key)

    // println("*** Invoke the function again after updating the code.")
    invokeFunctionSc(functionName)

    // Update the AWS Lambda function configuration.
    println("Update the run time of the function.")
    updateFunctionConfiguration(functionName, handler)

    // Delete the AWS Lambda function.
    println("Delete the AWS Lambda function.")
    delFunction(functionName)
}

suspend fun createScFunction(
```

```
    myFunctionName: String,
    s3BucketName: String,
    myS3Key: String,
    myHandler: String,
    myRole: String,
): String {
    val functionCode =
        FunctionCode {
            s3Bucket = s3BucketName
            s3Key = myS3Key
        }

    val request =
        CreateFunctionRequest {
            functionName = myFunctionName
            code = functionCode
            description = "Created by the Lambda Kotlin API"
            handler = myHandler
            role = myRole
            runtime = Runtime.Java8
        }

    // Create a Lambda function using a waiter
    LambdaClient { region = "us-west-2" }.use { awsLambda ->
        val functionResponse = awsLambda.createFunction(request)
        awsLambda.waitUntilFunctionActive {
            functionName = myFunctionName
        }
        return functionResponse.functionArn.toString()
    }
}

suspend fun getFunction(functionNameVal: String) {
    val functionRequest =
        GetFunctionRequest {
            functionName = functionNameVal
        }

    LambdaClient { region = "us-west-2" }.use { awsLambda ->
        val response = awsLambda.getFunction(functionRequest)
        println("The runtime of this Lambda function is
        ${response.configuration?.runtime}")
    }
}
```

```
suspend fun listFunctionsSc() {
    val request =
        ListFunctionsRequest {
            maxItems = 10
        }

    LambdaClient { region = "us-west-2" }.use { awsLambda ->
        val response = awsLambda.listFunctions(request)
        response.functions?.forEach { function ->
            println("The function name is ${function.functionName}")
        }
    }
}

suspend fun invokeFunctionSc(functionNameVal: String) {
    val json = """"{"inputValue":"1000"}""""
    val byteArray = json.trimIndent().encodeToByteArray()
    val request =
        InvokeRequest {
            functionName = functionNameVal
            payload = byteArray
            logType = LogType.Tail
        }

    LambdaClient { region = "us-west-2" }.use { awsLambda ->
        val res = awsLambda.invoke(request)
        println("The function payload is ${res.payload?.toString(Charsets.UTF_8)}")
    }
}

suspend fun updateFunctionCode(
    functionNameVal: String?,
    bucketName: String?,
    key: String?,
) {
    val functionCodeRequest =
        UpdateFunctionCodeRequest {
            functionName = functionNameVal
            publish = true
            s3Bucket = bucketName
            s3Key = key
        }
}
```

```
LambdaClient { region = "us-west-2" }.use { awsLambda ->
    val response = awsLambda.updateFunctionCode(functionCodeRequest)
    awsLambda.waitUntilFunctionUpdated {
        functionName = functionNameVal
    }
    println("The last modified value is " + response.lastModified)
}

suspend fun updateFunctionConfiguration(
    functionNameVal: String?,
    handlerVal: String?,
) {
    val configurationRequest =
        UpdateFunctionConfigurationRequest {
            functionName = functionNameVal
            handler = handlerVal
            runtime = Runtime.Java11
        }

    LambdaClient { region = "us-west-2" }.use { awsLambda ->
        awsLambda.updateFunctionConfiguration(configurationRequest)
    }
}

suspend fun delFunction(myFunctionName: String) {
    val request =
        DeleteFunctionRequest {
            functionName = myFunctionName
        }

    LambdaClient { region = "us-west-2" }.use { awsLambda ->
        awsLambda.deleteFunction(request)
        println("$myFunctionName was deleted")
    }
}
```

- For API details, see the following topics in *AWS SDK for Kotlin API reference*.
  - [CreateFunction](#)
  - [DeleteFunction](#)
  - [GetFunction](#)

- [Invoke](#)
- [ListFunctions](#)
- [UpdateFunctionCode](#)
- [UpdateFunctionConfiguration](#)

## MediaConvert examples using SDK for Kotlin

The following code examples show you how to perform actions and implement common scenarios by using the AWS SDK for Kotlin with MediaConvert.

*Actions* are code excerpts from larger programs and must be run in context. While actions show you how to call individual service functions, you can see actions in context in their related scenarios.

Each example includes a link to the complete source code, where you can find instructions on how to set up and run the code in context.

### Topics

- [Actions](#)

## Actions

### CreateJob

The following code example shows how to use CreateJob.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun createMediaJob(
    mcClient: MediaConvertClient,
    mcRoleARN: String,
    fileInputVal: String,
): String? {
```



```

    val s3path = fileInputVal.substring(0, fileInputVal.lastIndexOf('/') + 1) +
"javasdk/out/"
    val fileOutput = s3path + "index"
    val thumbsOutput = s3path + "thumbs/"
    val mp4Output = s3path + "mp4/"

    try {
        val describeEndpoints =
            DescribeEndpointsRequest {
                maxResults = 20
            }

        val res = mcClient.describeEndpoints(describeEndpoints)
        if (res.endpoints?.size!! <= 0) {
            println("Cannot find MediaConvert service endpoint URL!")
            exitProcess(0)
        }
        val endpointURL = res.endpoints!!.get(0).url!!
        val mediaConvert =
            MediaConvertClient.fromEnvironment {
                region = "us-west-2"
                endpointProvider =
                    MediaConvertEndpointProvider {
                        Endpoint(endpointURL)
                    }
            }

        // output group Preset HLS low profile
        val hlsLow = createOutput("_low", "_\${dt}", 750000, 7, 1920, 1080, 640)

        // output group Preset HLS medium profile
        val hlsMedium = createOutput("_medium", "_\${dt}", 1200000, 7, 1920, 1080,
1280)

        // output group Preset HLS high profole
        val hlsHigh = createOutput("_high", "_\${dt}", 3500000, 8, 1920, 1080, 1920)

        val outputSettings =
            OutputGroupSettings {
                type = OutputGroupType.HlsGroupSettings
            }

        val outputObsList: MutableList<Output> = mutableListOf()
        if (hlsLow != null) {

```

```

        outputObsList.add(hlsLow)
    }
    if (hlsMedium != null) {
        outputObsList.add(hlsMedium)
    }
    if (hlsHigh != null) {
        outputObsList.add(hlsHigh)
    }

    // Create an OutputGroup object.
    val appleHLS =
        OutputGroup {
            name = "Apple HLS"
            customName = "Example"
            outputGroupSettings =
                OutputGroupSettings {
                    type = OutputGroupType.HlsGroupSettings
                    this.hlsGroupSettings =
                        HlsGroupSettings {
                            directoryStructure =
HlsDirectoryStructure.SingleDirectory
                            manifestDurationFormat =
HlsManifestDurationFormat.Integer
                            streamInfResolution = HlsStreamInfResolution.Include
                            clientCache = HlsClientCache.Enabled
                            captionLanguageSetting =
HlsCaptionLanguageSetting.Omit
                            manifestCompression = HlsManifestCompression.None
                            codecSpecification = HlsCodecSpecification.Rfc4281
                            outputSelection =
HlsOutputSelection.ManifestsAndSegments
                            programDateTime = HlsProgramDateTime.Exclude
                            programDateTimePeriod = 600
                            timedMetadataId3Frame =
HlsTimedMetadataId3Frame.Priv
                            timedMetadataId3Period = 10
                            destination = fileOutput
                            segmentControl = HlsSegmentControl.SegmentedFiles
                            minFinalSegmentLength = 0.toDouble()
                            segmentLength = 4
                            minSegmentLength = 1
                        }
                }
        }
    outputs = outputObsList

```

```

    }

    val theOutput =
        Output {
            extension = "mp4"
            containerSettings =
                ContainerSettings {
                    container = ContainerType.fromValue("MP4")
                }

            videoDescription =
                VideoDescription {
                    width = 1280
                    height = 720
                    scalingBehavior = ScalingBehavior.Default
                    sharpness = 50
                    antiAlias = AntiAlias.Enabled
                    timecodeInsertion = VideoTimecodeInsertion.Disabled
                    colorMetadata = ColorMetadata.Insert
                    respondToAfd = RespondToAfd.None
                    afdSignaling = AfdSignaling.None
                    dropFrameTimecode = DropFrameTimecode.Enabled
                    codecSettings =
                        VideoCodecSettings {
                            codec = VideoCodec.H264
                            h264Settings =
                                H264Settings {
                                    rateControlMode = H264RateControlMode.Qvbr
                                    parControl =
                                        H264ParControl.InitializeFromSource
                                        H264QualityTuningLevel.SinglePass
                                        { qvbrQualityLevel = 8 }
                                    qualityTuningLevel =
                                        H264QualityTuningLevel.SinglePass
                                    qvbrSettings = H264QvbrSettings
                                    codecLevel = H264CodecLevel.Auto
                                    codecProfile = H264CodecProfile.Main
                                    maxBitrate = 2400000
                                    framerateControl =
                                        H264FramerateControl.InitializeFromSource
                                        gopSize = 2.0
                                        gopSizeUnits = H264GopSizeUnits.Seconds
                                        numberBFramesBetweenReferenceFrames = 2
                                        gopClosedCadence = 1
                                        gopBReference = H264GopBReference.Disabled
                                }
                        }
                }
        }

```

```

        slowPal = H264SlowPal.Disabled
        syntax = H264Syntax.Default
        numberReferenceFrames = 3
        dynamicSubGop = H264DynamicSubGop.Static
        fieldEncoding = H264FieldEncoding.Paff
        sceneChangeDetect =
H264SceneChangeDetect.Enabled

        minIInterval = 0
        telecine = H264Telecine.None
        framerateConversionAlgorithm =
H264FramerateConversionAlgorithm.DuplicateDrop
        entropyEncoding = H264EntropyEncoding.Cabac
        slices = 1
        unregisteredSeiTimecode =
H264UnregisteredSeiTimecode.Disabled

        repeatPps = H264RepeatPps.Disabled
        adaptiveQuantization =
H264AdaptiveQuantization.High

        spatialAdaptiveQuantization =
H264SpatialAdaptiveQuantization.Enabled

        temporalAdaptiveQuantization =
H264TemporalAdaptiveQuantization.Enabled

        flickerAdaptiveQuantization =
H264FlickerAdaptiveQuantization.Disabled

        softness = 0
        interlaceMode =
H264InterlaceMode.Progressive
    }
}

audioDescriptions =
    listOf(
        AudioDescription {
            audioTypeControl = AudioTypeControl.FollowInput
            languageCodeControl =
AudioLanguageCodeControl.FollowInput
            codecSettings =
                AudioCodecSettings {
                    codec = AudioCodec.Aac
                    aacSettings =
                        AacSettings {
                            codecProfile = AacCodecProfile.Lc
                            rateControlMode = AacRateControlMode.Cbr

```

```

        codingMode = AacCodingMode.CodingMode2_0
        sampleRate = 44100
        bitrate = 160000
        rawFormat = AacRawFormat.None
        specification = AacSpecification.Mpeg4
        audioDescriptionBroadcasterMix =
AacAudioDescriptionBroadcasterMix.Normal
    }
    },
)
}

// Create an OutputGroup
val fileMp4 =
    OutputGroup {
        name = "File Group"
        customName = "mp4"
        outputGroupSettings =
            OutputGroupSettings {
                type = OutputGroupType.FileGroupSettings
                fileGroupSettings =
                    FileGroupSettings {
                        destination = mp4Output
                    }
            }
        outputs = listOf(theOutput)
    }

val containerSettings1 =
    ContainerSettings {
        container = ContainerType.Raw
    }

val thumbs =
    OutputGroup {
        name = "File Group"
        customName = "thumbs"
        outputGroupSettings =
            OutputGroupSettings {
                type = OutputGroupType.FileGroupSettings
                fileGroupSettings =
                    FileGroupSettings {
                        destination = thumbsOutput

```

```

        }
    }

    outputs =
        listOf(
            Output {
                extension = "jpg"

                this.containerSettings = containerSettings1
                videoDescription =
                    VideoDescription {
                        scalingBehavior = ScalingBehavior.Default
                        sharpness = 50
                        antiAlias = AntiAlias.Enabled
                        timecodeInsertion =
VideoTimecodeInsertion.Disabled

                        colorMetadata = ColorMetadata.Insert
                        dropFrameTimecode = DropFrameTimecode.Enabled
                        codecSettings =
                            VideoCodecSettings {
                                codec = VideoCodec.FrameCapture
                                frameCaptureSettings =
                                    FrameCaptureSettings {
                                        framerateNumerator = 1
                                        framerateDenominator = 1
                                        maxCaptures = 10000000
                                        quality = 80
                                    }
                                }
                            }
                    },
        )
}

val audioSelectors1: MutableMap<String, AudioSelector> = HashMap()
audioSelectors1["Audio Selector 1"] =
    AudioSelector {
        defaultSelection = AudioDefaultSelection.Default
        offset = 0
    }

val jobSettings =
    JobSettings {
        inputs =

```

```

        listOf(
            Input {
                audioSelectors = audioSelectors1
                videoSelector =
                    VideoSelector {
                        colorSpace = ColorSpace.Follow
                        rotate = InputRotate.Degree0
                    }
                filterEnable = InputFilterEnable.Auto
                filterStrength = 0
                deblockFilter = InputDeblockFilter.Disabled
                denoiseFilter = InputDenoiseFilter.Disabled
                psiControl = InputPsiControl.UsePsi
                timecodeSource = InputTimecodeSource.Embedded
                fileInput = fileInputVal

                outputGroups = listOf(appleHLS, thumbs, fileMp4)
            },
        )
    }

    val createJobRequest =
        CreateJobRequest {
            role = mcRoleARN
            settings = jobSettings
        }

    val createJobResponse = mediaConvert.createJob(createJobRequest)
    return createJobResponse.job?.id
} catch (ex: MediaConvertException) {
    println(ex.message)
    mcClient.close()
    exitProcess(0)
}
}

fun createOutput(
    nameModifierVal: String,
    segmentModifierVal: String,
    qvbrMaxBitrate: Int,
    qvbrQualityLevelVal: Int,
    originWidth: Int,
    originHeight: Int,
    targetWidth: Int,

```

```
) : Output? {
    val targetHeight = (
        (originHeight * targetWidth / originWidth).toFloat().roundToInt() -
        (originHeight * targetWidth / originWidth).toFloat().roundToInt() % 4
    )

    var output: Output?
    try {
        val audio1 =
            AudioDescription {
                audioTypeControl = AudioTypeControl.FollowInput
                languageCodeControl = AudioLanguageCodeControl.FollowInput
                codecSettings =
                    AudioCodecSettings {
                        codec = AudioCodec.Aac
                        aacSettings =
                            AacSettings {
                                codecProfile = AacCodecProfile.Lc
                                rateControlMode = AacRateControlMode.Cbr
                                codingMode = AacCodingMode.CodingMode2_0
                                sampleRate = 44100
                                bitrate = 96000
                                rawFormat = AacRawFormat.None
                                specification = AacSpecification.Mpeg4
                                audioDescriptionBroadcasterMix =
AacAudioDescriptionBroadcasterMix.Normal
                            }
                        }
                    }
            }

        output =
            Output {
                nameModifier = nameModifierVal
                outputSettings =
                    OutputSettings {
                        hlsSettings =
                            HlsSettings {
                                segmentModifier = segmentModifierVal
                                audioGroupId = "program_audio"
                                iFrameOnlyManifest = HlsIFrameOnlyManifest.Exclude
                            }
                    }
                containerSettings =
                    ContainerSettings {
```



```

        container = ContainerType.M3U8
        this.m3u8Settings =
            M3u8Settings {
                audioFramesPerPes = 4
                pcrControl = M3u8PcrControl.PcrEveryPesPacket
                pmtPid = 480
                privateMetadataPid = 503
                programNumber = 1
                patInterval = 0
                pmtInterval = 0
                scte35Source = M3u8Scte35Source.None
                scte35Pid = 500
                nielsenId3 = M3u8NielsenId3.None
                timedMetadata = TimedMetadata.None
                timedMetadataPid = 502
                videoPid = 481
                audioPids = listOf(482, 483, 484, 485, 486, 487,
488, 489, 490, 491, 492)
            }

        videoDescription =
            VideoDescription {
                width = targetWidth
                height = targetHeight
                scalingBehavior = ScalingBehavior.Default
                sharpness = 50
                antiAlias = AntiAlias.Enabled
                timecodeInsertion = VideoTimecodeInsertion.Disabled
                colorMetadata = ColorMetadata.Insert
                respondToAfd = RespondToAfd.None
                afdSignaling = AfdSignaling.None
                dropFrameTimecode = DropFrameTimecode.Enabled
                codecSettings =
                    VideoCodecSettings {
                        codec = VideoCodec.H264
                        h264Settings =
                            H264Settings {
                                rateControlMode =
H264RateControlMode.Qvbr
                                parControl =
H264ParControl.InitializeFromSource
                                qualityTuningLevel =
H264QualityTuningLevel.SinglePass
                                qvbrSettings =

```

```

H264QvbrSettings {
    qvbrQualityLevel =
        qvbrQualityLevelVal
    }
    codecLevel = H264CodecLevel.Auto
    codecProfile =
        if (targetHeight > 720 &&
            targetWidth > 1280
        ) {
            H264CodecProfile.High
        } else {
            H264CodecProfile.Main
        }
    maxBitrate = qvbrMaxBitrate
    framerateControl =
        H264FramerateControl.InitializeFromSource
    gopSize = 2.0
    gopSizeUnits =
        H264GopSizeUnits.Seconds
    numberBFramesBetweenReferenceFrames =
        2
    gopClosedCadence = 1
    gopBReference =
        H264GopBReference.Disabled
    slowPal = H264SlowPal.Disabled
    syntax = H264Syntax.Default
    numberReferenceFrames = 3
    dynamicSubGop =
        H264DynamicSubGop.Static
    fieldEncoding =
        H264FieldEncoding.Paff
    sceneChangeDetect =
        H264SceneChangeDetect.Enabled
    minIInterval = 0
    telecine = H264Telecine.None
    framerateConversionAlgorithm =
        H264FramerateConversionAlgorithm.DuplicateDrop
    entropyEncoding =
        H264EntropyEncoding.Cabac
    slices = 1
    unregisteredSeiTimecode =
        H264UnregisteredSeiTimecode.Disabled
    repeatPps = H264RepeatPps.Disabled

```

```

        H264AdaptiveQuantization.High
        H264SpatialAdaptiveQuantization.Enabled
        H264TemporalAdaptiveQuantization.Enabled
        H264FlickerAdaptiveQuantization.Disabled
        H264InterlaceMode.Progressive

        adaptiveQuantization =
        spatialAdaptiveQuantization =
        temporalAdaptiveQuantization =
        flickerAdaptiveQuantization =

        softness = 0
        interlaceMode =

    }
    }
    audioDescriptions = listOf(audio1)
}
}
}
} catch (ex: MediaConvertException) {
    println(ex.toString())
    exitProcess(0)
}
return output
}

```

- For API details, see [CreateJob](#) in *AWS SDK for Kotlin API reference*.

## GetJob

The following code example shows how to use GetJob.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```

suspend fun getSpecificJob(
    mcClient: MediaConvertClient,

```

```
    jobId: String?,
) {
    val describeEndpoints =
        DescribeEndpointsRequest {
            maxResults = 20
        }

    val res = mcClient.describeEndpoints(describeEndpoints)
    if (res.endpoints?.size!! <= 0) {
        println("Cannot find MediaConvert service endpoint URL!")
        exitProcess(0)
    }

    val endpointURL = res.endpoints!!.get(0).url!!
    val mediaConvert =
        MediaConvertClient.fromEnvironment {
            region = "us-west-2"
            endpointProvider =
                MediaConvertEndpointProvider {
                    Endpoint(endpointURL)
                }
        }

    val jobRequest =
        GetJobRequest {
            id = jobId
        }

    val response: GetJobResponse = mediaConvert.getJob(jobRequest)
    println("The ARN of the job is ${response.job?.arn}.")
}
```

- For API details, see [GetJob](#) in *AWS SDK for Kotlin API reference*.

## ListJobs

The following code example shows how to use ListJobs.

## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun listCompleteJobs(mcClient: MediaConvertClient) {
    val describeEndpoints =
        DescribeEndpointsRequest {
            maxResults = 20
        }

    val res = mcClient.describeEndpoints(describeEndpoints)
    if (res.endpoints?.size!! <= 0) {
        println("Cannot find MediaConvert service endpoint URL!")
        exitProcess(0)
    }
    val endpointURL = res.endpoints!![0].url!!
    val mediaConvert =
        MediaConvertClient.fromEnvironment {
            region = "us-west-2"
            endpointProvider =
                MediaConvertEndpointProvider {
                    Endpoint(endpointURL)
                }
        }

    val jobsRequest =
        ListJobsRequest {
            maxResults = 10
            status = JobStatus.fromValue("COMPLETE")
        }

    val jobsResponse = mediaConvert.listJobs(jobsRequest)
    val jobs = jobsResponse.jobs
    if (jobs != null) {
        for (job in jobs) {
            println("The JOB ARN is ${job.arn}")
        }
    }
}
```

```
}
```

- For API details, see [ListJobs](#) in *AWS SDK for Kotlin API reference*.

## Amazon Pinpoint examples using SDK for Kotlin

The following code examples show you how to perform actions and implement common scenarios by using the AWS SDK for Kotlin with Amazon Pinpoint.

*Actions* are code excerpts from larger programs and must be run in context. While actions show you how to call individual service functions, you can see actions in context in their related scenarios.

Each example includes a link to the complete source code, where you can find instructions on how to set up and run the code in context.

### Topics

- [Actions](#)

## Actions

### CreateApp

The following code example shows how to use CreateApp.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun createApplication(applicationName: String?): String? {
    val createApplicationRequest0b =
        CreateApplicationRequest {
            name = applicationName
        }
}
```

```
PinpointClient { region = "us-west-2" }.use { pinpoint ->
    val result =
        pinpoint.createApp(
            CreateAppRequest {
                createApplicationRequest = createApplicationRequestOb
            },
        )
    return result.applicationResponse?.id
}
```

- For API details, see [CreateApp](#) in *AWS SDK for Kotlin API reference*.

## CreateCampaign

The following code example shows how to use CreateCampaign.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun createPinCampaign(
    appId: String,
    segmentIdVal: String,
) {
    val scheduleOb =
        Schedule {
            startTime = "IMMEDIATE"
        }

    val defaultMessageOb =
        Message {
            action = Action.OpenApp
            body = "My message body"
            title = "My message title"
        }
}
```

```

val messageConfiguration0b =
    MessageConfiguration {
        defaultMessage = defaultMessage0b
    }

val writeCampaign =
    WriteCampaignRequest {
        description = "My description"
        schedule = schedule0b
        name = "MyCampaign"
        segmentId = segmentIdVal
        messageConfiguration = messageConfiguration0b
    }

PinpointClient { region = "us-west-2" }.use { pinpoint ->
    val result: CreateCampaignResponse =
        pinpoint.createCampaign(
            CreateCampaignRequest {
                applicationId = appId
                writeCampaignRequest = writeCampaign
            },
        )
    println("Campaign ID is ${result.campaignResponse?.id}")
}
}

```

- For API details, see [CreateCampaign](#) in *AWS SDK for Kotlin API reference*.

## CreateSegment

The following code example shows how to use CreateSegment.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun createPinpointSegment(applicationIdVal: String?): String? {
```



```
val segmentAttributes = mutableMapOf<String, AttributeDimension>()
val myList = mutableListOf<String>()
myList.add("Lakers")

val atts =
    AttributeDimension {
        attributeType = AttributeType.Inclusive
        values = myList
    }

segmentAttributes["Team"] = atts
val recencyDimension =
    RecencyDimension {
        duration = Duration.fromValue("DAY_30")
        recencyType = RecencyType.fromValue("ACTIVE")
    }

val segmentBehaviors =
    SegmentBehaviors {
        recency = recencyDimension
    }

val segmentLocation = SegmentLocation {}
val dimensionsOb =
    SegmentDimensions {
        attributes = segmentAttributes
        behavior = segmentBehaviors
        demographic = SegmentDemographics {}
        location = segmentLocation
    }

val writeSegmentRequestOb =
    WriteSegmentRequest {
        name = "MySegment101"
        dimensions = dimensionsOb
    }

PinpointClient { region = "us-west-2" }.use { pinpoint ->
    val createSegmentResult: CreateSegmentResponse =
        pinpoint.createSegment(
            CreateSegmentRequest {
                applicationId = applicationIdVal
                writeSegmentRequest = writeSegmentRequestOb
            },
```

```
        )
        println("Segment ID is ${createSegmentResult.segmentResponse?.id}")
        return createSegmentResult.segmentResponse?.id
    }
}
```

- For API details, see [CreateSegment](#) in *AWS SDK for Kotlin API reference*.

## DeleteApp

The following code example shows how to use DeleteApp.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun deletePinApp(appId: String?) {
    PinpointClient { region = "us-west-2" }.use { pinpoint ->
        val result =
            pinpoint.deleteApp(
                DeleteAppRequest {
                    applicationId = appId
                },
            )
        val appName = result.applicationResponse?.name
        println("Application $appName has been deleted.")
    }
}
```

- For API details, see [DeleteApp](#) in *AWS SDK for Kotlin API reference*.

## DeleteEndpoint

The following code example shows how to use DeleteEndpoint.

## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun deletePinEndpoint(
    appIdVal: String?,
    endpointIdVal: String?,
) {
    val deleteEndpointRequest =
        DeleteEndpointRequest {
            applicationId = appIdVal
            endpointId = endpointIdVal
        }

    PinpointClient { region = "us-west-2" }.use { pinpoint ->
        val result = pinpoint.deleteEndpoint(deleteEndpointRequest)
        val id = result.endpointResponse?.id
        println("The deleted endpoint is $id")
    }
}
```

- For API details, see [DeleteEndpoint](#) in *AWS SDK for Kotlin API reference*.

## GetEndpoint

The following code example shows how to use GetEndpoint.

## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun lookupPinpointEndpoint(
    appId: String?,
    endpoint: String?,
) {
    PinpointClient { region = "us-west-2" }.use { pinpoint ->
        val result =
            pinpoint.getEndpoint(
                GetEndpointRequest {
                    applicationId = appId
                    endpointId = endpoint
                },
            )
        val endResponse = result.endpointResponse

        // Uses the Google Gson library to pretty print the endpoint JSON.
        val gson: com.google.gson.Gson =
            GsonBuilder()
                .setFieldNamingPolicy(FieldNamingPolicy.UPPER_CAMEL_CASE)
                .setPrettyPrinting()
                .create()

        val endpointJson: String = gson.toJson(endResponse)
        println(endpointJson)
    }
}
```

- For API details, see [GetEndpoint](#) in *AWS SDK for Kotlin API reference*.

## GetSegments

The following code example shows how to use GetSegments.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun listSegs(appId: String?) {
    PinpointClient { region = "us-west-2" }.use { pinpoint ->
        val response =
            pinpoint.getSegments(
                GetSegmentsRequest {
                    applicationId = appId
                },
            )
        response.segmentsResponse?.item?.forEach { segment ->
            println("Segment id is ${segment.id}")
        }
    }
}
```

- For API details, see [GetSegments](#) in *AWS SDK for Kotlin API reference*.

## SendMessage

The following code example shows how to use SendMessage.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
/**
 * Before running this Kotlin code example, set up your development environment,
 * including your credentials.
 *
 * For more information, see the following documentation topic:
 * https://docs.aws.amazon.com/sdk-for-kotlin/latest/developer-guide/setup.html
 */
val body: String =
    """
    Amazon Pinpoint test (AWS SDK for Kotlin)
    """
```

This email was sent through the Amazon Pinpoint Email API using the AWS SDK for Kotlin.

```
"".trimIndent()

suspend fun main(args: Array<String>) {
    val usage = ""
    Usage:
        <subject> <appId> <senderAddress> <toAddress>

    Where:
        subject - The email subject to use.
        senderAddress - The from address. This address has to be verified in Amazon
        Pinpoint in the region you're using to send email
        toAddress - The to address. This address has to be verified in Amazon
        Pinpoint in the region you're using to send email
        ""

    if (args.size != 3) {
        println(usage)
        exitProcess(0)
    }

    val subject = args[0]
    val senderAddress = args[1]
    val toAddress = args[2]
    sendEmail(subject, senderAddress, toAddress)
}

suspend fun sendEmail(
    subjectVal: String?,
    senderAddress: String,
    toAddressVal: String,
) {
    var content =
        Content {
            data = body
        }

    val messageBody =
        Body {
            text = content
        }
}
```

```
val subContent =
    Content {
        data = subjectVal
    }

val message =
    Message {
        body = messageBody
        subject = subContent
    }

val destination0b =
    Destination {
        toAddresses = listOf(toAddressVal)
    }

val emailContent =
    EmailContent {
        simple = message
    }

val sendEmailRequest =
    SendEmailRequest {
        fromEmailAddress = senderAddress
        destination = destination0b
        this.content = emailContent
    }

PinpointEmailClient { region = "us-east-1" }.use { pinpointemail ->
    pinpointemail.sendEmail(sendEmailRequest)
    println("Message Sent")
}
}
```

- For API details, see [SendMessages](#) in *AWS SDK for Kotlin API reference*.

## Amazon RDS examples using SDK for Kotlin

The following code examples show you how to perform actions and implement common scenarios by using the AWS SDK for Kotlin with Amazon RDS.

*Basics* are code examples that show you how to perform the essential operations within a service.

*Actions* are code excerpts from larger programs and must be run in context. While actions show you how to call individual service functions, you can see actions in context in their related scenarios.

*Scenarios* are code examples that show you how to accomplish specific tasks by calling multiple functions within a service or combined with other AWS services.

Each example includes a link to the complete source code, where you can find instructions on how to set up and run the code in context.

## Topics

- [Basics](#)
- [Actions](#)
- [Scenarios](#)

## Basics

### Learn the basics

The following code example shows how to:

- Create a custom DB parameter group and set parameter values.
- Create a DB instance that's configured to use the parameter group. The DB instance also contains a database.
- Take a snapshot of the instance.
- Delete the instance and parameter group.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
/**
```



Before running this code example, set up your development environment, including your credentials.

For more information, see the following documentation topic:

<https://docs.aws.amazon.com/sdk-for-kotlin/latest/developer-guide/setup.html>

This example requires an AWS Secrets Manager secret that contains the database credentials. If you do not create a secret, this example will not work. For more details, see:

[https://docs.aws.amazon.com/secretsmanager/latest/userguide/integrating\\_how-services-use-secrets\\_RS.html](https://docs.aws.amazon.com/secretsmanager/latest/userguide/integrating_how-services-use-secrets_RS.html)

This example performs the following tasks:

1. Returns a list of the available DB engines by invoking the DescribeDbEngineVersions method.
2. Selects an engine family and create a custom DB parameter group by invoking the createDBParameterGroup method.
3. Gets the parameter groups by invoking the DescribeDbParameterGroups method.
4. Gets parameters in the group by invoking the DescribeDbParameters method.
5. Modifies both the auto\_increment\_offset and auto\_increment\_increment parameters by invoking the modifyDbParameterGroup method.
6. Gets and displays the updated parameters.
7. Gets a list of allowed engine versions by invoking the describeDbEngineVersions method.
8. Gets a list of micro instance classes available for the selected engine.
9. Creates an Amazon Relational Database Service (Amazon RDS) database instance that contains a MySQL database and uses the parameter group.
10. Waits for DB instance to be ready and prints out the connection endpoint value.
11. Creates a snapshot of the DB instance.
12. Waits for the DB snapshot to be ready.
13. Deletes the DB instance.
14. Deletes the parameter group.

```
*/
```

```
var sleepTime: Long = 20
```

```
suspend fun main(args: Array<String>) {  
    val usage = ""  
    Usage:  
        <dbGroupName> <dbParameterGroupFamily> <dbInstanceIdentifier> <dbName>  
        <dbSnapshotIdentifier><secretName>
```

```
Where:
    dbGroupName - The database group name.
    dbParameterGroupFamily - The database parameter group name.
    dbInstanceIdentifier - The database instance identifier.
    dbName - The database name.
    dbSnapshotIdentifier - The snapshot identifier.
    secretName - The name of the AWS Secrets Manager secret that contains
the database credentials.
"""

if (args.size != 6) {
    println(usage)
    exitProcess(1)
}

val dbGroupName = args[0]
val dbParameterGroupFamily = args[1]
val dbInstanceIdentifier = args[2]
val dbName = args[3]
val dbSnapshotIdentifier = args[4]
val secretName = args[5]

val gson = Gson()
val user = gson.fromJson(getSecretValues(secretName).toString(),
User::class.java)
val username = user.username
val userPassword = user.password

println("1. Return a list of the available DB engines")
describeDBEngines()

println("2. Create a custom parameter group")
createDBParameterGroup(dbGroupName, dbParameterGroupFamily)

println("3. Get the parameter groups")
describeDbParameterGroups(dbGroupName)

println("4. Get the parameters in the group")
describeDbParameters(dbGroupName, 0)

println("5. Modify the auto_increment_offset parameter")
modifyDBParas(dbGroupName)
```

```
println("6. Display the updated value")
describeDbParameters(dbGroupName, -1)

println("7. Get a list of allowed engine versions")
getAllowedEngines(dbParameterGroupFamily)

println("8. Get a list of micro instance classes available for the selected
engine")
getMicroInstances()

println("9. Create an RDS database instance that contains a MySQL database and
uses the parameter group")
val dbARN = createDatabaseInstance(dbGroupName, dbInstanceIdentifier, dbName,
username, userPassword)
println("The ARN of the new database is $dbARN")

println("10. Wait for DB instance to be ready")
waitForDbInstanceReady(dbInstanceIdentifier)

println("11. Create a snapshot of the DB instance")
createDbSnapshot(dbInstanceIdentifier, dbSnapshotIdentifier)

println("12. Wait for DB snapshot to be ready")
waitForSnapshotReady(dbInstanceIdentifier, dbSnapshotIdentifier)

println("13. Delete the DB instance")
deleteDbInstance(dbInstanceIdentifier)

println("14. Delete the parameter group")
if (dbARN != null) {
    deleteParaGroup(dbGroupName, dbARN)
}

println("The Scenario has successfully completed.")
}

suspend fun deleteParaGroup(
    dbGroupName: String,
    dbARN: String,
) {
    var isDataDel = false
    var didFind: Boolean
    var instanceARN: String
```

```

RdsClient { region = "us-west-2" }.use { rdsClient ->
    // Make sure that the database has been deleted.
    while (!isDataDel) {
        val response = rdsClient.describeDbInstances()
        val instanceList = response.dbInstances
        val listSize = instanceList?.size
        isDataDel = false // Reset this value.
        didFind = false // Reset this value.
        var index = 1
        if (instanceList != null) {
            for (instance in instanceList) {
                instanceARN = instance.dbInstanceArn.toString()
                if (instanceARN.compareTo(dbARN) == 0) {
                    println("$dbARN still exists")
                    didFind = true
                }
                if (index == listSize && !didFind) {
                    // Went through the entire list and did not find the
database name.
                    isDataDel = true
                }
                index++
            }
        }
    }

    // Delete the para group.
    val parameterGroupRequest =
        DeleteDbParameterGroupRequest {
            dbParameterGroupName = dbGroupName
        }
    rdsClient.deleteDbParameterGroup(parameterGroupRequest)
    println("$dbGroupName was deleted.")
}

suspend fun deleteDbInstance(dbInstanceIdentifierVal: String) {
    val deleteDbInstanceRequest =
        DeleteDbInstanceRequest {
            dbInstanceIdentifier = dbInstanceIdentifierVal
            deleteAutomatedBackups = true
            skipFinalSnapshot = true
        }
}

```

```
RdsClient { region = "us-west-2" }.use { rdsClient ->
    val response = rdsClient.deleteDbInstance(deleteDbInstanceRequest)
    print("The status of the database is
    ${response.dbInstance?.dbInstanceStatus}")
}

// Waits until the snapshot instance is available.
suspend fun waitForSnapshotReady(
    dbInstanceIdentifierVal: String?,
    dbSnapshotIdentifierVal: String?,
) {
    var snapshotReady = false
    var snapshotReadyStr: String
    println("Waiting for the snapshot to become available.")

    val snapshotsRequest =
        DescribeDbSnapshotsRequest {
            dbSnapshotIdentifier = dbSnapshotIdentifierVal
            dbInstanceIdentifier = dbInstanceIdentifierVal
        }

    while (!snapshotReady) {
        RdsClient { region = "us-west-2" }.use { rdsClient ->
            val response = rdsClient.describeDbSnapshots(snapshotsRequest)
            val snapshotList: List<DbSnapshot>? = response.dbSnapshots
            if (snapshotList != null) {
                for (snapshot in snapshotList) {
                    snapshotReadyStr = snapshot.status.toString()
                    if (snapshotReadyStr.contains("available")) {
                        snapshotReady = true
                    } else {
                        print(".")
                        delay(sleepTime * 1000)
                    }
                }
            }
        }
    }
    println("The Snapshot is available!")
}

// Create an Amazon RDS snapshot.
suspend fun createDbSnapshot(
```

```
    dbInstanceIdentifierVal: String?,
    dbSnapshotIdentifierVal: String?,
) {
    val snapshotRequest =
        CreateDbSnapshotRequest {
            dbInstanceIdentifier = dbInstanceIdentifierVal
            dbSnapshotIdentifier = dbSnapshotIdentifierVal
        }

    RdsClient { region = "us-west-2" }.use { rdsClient ->
        val response = rdsClient.createDbSnapshot(snapshotRequest)
        print("The Snapshot id is ${response.dbSnapshot?.dbiResourceId}")
    }
}

// Waits until the database instance is available.
suspend fun waitForDbInstanceReady(dbInstanceIdentifierVal: String?) {
    var instanceReady = false
    var instanceReadyStr: String
    println("Waiting for instance to become available.")

    val instanceRequest =
        DescribeDbInstancesRequest {
            dbInstanceIdentifier = dbInstanceIdentifierVal
        }
    var endpoint = ""
    while (!instanceReady) {
        RdsClient { region = "us-west-2" }.use { rdsClient ->
            val response = rdsClient.describeDbInstances(instanceRequest)
            val instanceList = response.dbInstances
            if (instanceList != null) {
                for (instance in instanceList) {
                    instanceReadyStr = instance.dbInstanceStatus.toString()
                    if (instanceReadyStr.contains("available")) {
                        endpoint = instance.endpoint?.address.toString()
                        instanceReady = true
                    } else {
                        print(".")
                        delay(sleepTime * 1000)
                    }
                }
            }
        }
    }
}
```

```
println("Database instance is available! The connection endpoint is $endpoint")
}

// Create a database instance and return the ARN of the database.
suspend fun createDatabaseInstance(
    dbGroupNameVal: String?,
    dbInstanceIdentifierVal: String?,
    dbNameVal: String?,
    masterUsernameVal: String?,
    masterUserPasswordVal: String?,
): String? {
    val instanceRequest =
        CreateDbInstanceRequest {
            dbInstanceIdentifier = dbInstanceIdentifierVal
            allocatedStorage = 100
            dbName = dbNameVal
            dbParameterGroupName = dbGroupNameVal
            engine = "mysql"
            dbInstanceClass = "db.m4.large"
            engineVersion = "8.0"
            storageType = "standard"
            masterUsername = masterUsernameVal
            masterUserPassword = masterUserPasswordVal
        }

    RdsClient { region = "us-west-2" }.use { rdsClient ->
        val response = rdsClient.createDbInstance(instanceRequest)
        print("The status is ${response.dbInstance?.dbInstanceStatus}")
        return response.dbInstance?.dbInstanceArn
    }
}

// Get a list of micro instances.
suspend fun getMicroInstances() {
    val dbInstanceOptionsRequest =
        DescribeOrderableDbInstanceOptionsRequest {
            engine = "mysql"
        }

    RdsClient { region = "us-west-2" }.use { rdsClient ->
        val response =
            rdsClient.describeOrderableDbInstanceOptions(dbInstanceOptionsRequest)
        val orderableDBInstances = response.orderableDbInstanceOptions
        if (orderableDBInstances != null) {
            for (dbInstanceOption in orderableDBInstances) {
```

```

        println("The engine version is ${dbInstanceOption.engineVersion}")
        println("The engine description is ${dbInstanceOption.engine}")
    }
}

// Get a list of allowed engine versions.
suspend fun getAllowedEngines(dbParameterGroupFamilyVal: String?) {
    val versionsRequest =
        DescribeDbEngineVersionsRequest {
            dbParameterGroupFamily = dbParameterGroupFamilyVal
            engine = "mysql"
        }
    RdsClient { region = "us-west-2" }.use { rdsClient ->
        val response = rdsClient.describeDbEngineVersions(versionsRequest)
        val dbEngines: List<DbEngineVersion>? = response.dbEngineVersions
        if (dbEngines != null) {
            for (dbEngine in dbEngines) {
                println("The engine version is ${dbEngine.engineVersion}")
                println("The engine description is ${dbEngine.dbEngineDescription}")
            }
        }
    }
}

// Modify the auto_increment_offset parameter.
suspend fun modifyDBParas(dbGroupName: String) {
    val parameter1 =
        Parameter {
            parameterName = "auto_increment_offset"
            applyMethod = ApplyMethod.Immediate
            parameterValue = "5"
        }

    val paraList: ArrayList<Parameter> = ArrayList()
    paraList.add(parameter1)
    val groupRequest =
        ModifyDbParameterGroupRequest {
            dbParameterGroupName = dbGroupName
            parameters = paraList
        }

    RdsClient { region = "us-west-2" }.use { rdsClient ->

```



```
        val response = rdsClient.modifyDbParameterGroup(groupRequest)
        println("The parameter group ${response.dbParameterGroupName} was
successfully modified")
    }
}

// Retrieve parameters in the group.
suspend fun describeDbParameters(
    dbGroupName: String?,
    flag: Int,
) {
    val dbParameterGroupsRequest: DescribeDbParametersRequest
    dbParameterGroupsRequest =
        if (flag == 0) {
            DescribeDbParametersRequest {
                dbParameterGroupName = dbGroupName
            }
        } else {
            DescribeDbParametersRequest {
                dbParameterGroupName = dbGroupName
                source = "user"
            }
        }
    RdsClient { region = "us-west-2" }.use { rdsClient ->
        val response = rdsClient.describeDbParameters(dbParameterGroupsRequest)
        val dbParameters: List<Parameter>? = response.parameters
        var paraName: String
        if (dbParameters != null) {
            for (para in dbParameters) {
                // Only print out information about either auto_increment_offset or
                auto_increment_increment.
                paraName = para.parameterName.toString()
                if (paraName.compareTo("auto_increment_offset") == 0 ||
                paraName.compareTo("auto_increment_increment ") == 0) {
                    println("**** The parameter name is $paraName")
                    System.out.println("**** The parameter value is
${para.parameterValue}")
                    System.out.println("**** The parameter data type is
${para.dataType}")
                    System.out.println("**** The parameter description is
${para.description}")
                    System.out.println("**** The parameter allowed values is
${para.allowedValues}")
                }
            }
        }
    }
}
```

```

    }
  }
}

suspend fun describeDbParameterGroups(dbGroupName: String?) {
    val groupsRequest =
        DescribeDbParameterGroupsRequest {
            dbParameterGroupName = dbGroupName
            maxRecords = 20
        }
    RdsClient { region = "us-west-2" }.use { rdsClient ->
        val response = rdsClient.describeDbParameterGroups(groupsRequest)
        val groups = response.dbParameterGroups
        if (groups != null) {
            for (group in groups) {
                println("The group name is ${group.dbParameterGroupName}")
                println("The group description is ${group.description}")
            }
        }
    }
}

// Create a parameter group.
suspend fun createDBParameterGroup(
    dbGroupName: String?,
    dbParameterGroupFamilyVal: String?,
) {
    val groupRequest =
        CreateDbParameterGroupRequest {
            dbParameterGroupName = dbGroupName
            dbParameterGroupFamily = dbParameterGroupFamilyVal
            description = "Created by using the AWS SDK for Kotlin"
        }

    RdsClient { region = "us-west-2" }.use { rdsClient ->
        val response = rdsClient.createDbParameterGroup(groupRequest)
        println("The group name is
    ${response.dbParameterGroup?.dbParameterGroupName}")
    }
}

// Returns a list of the available DB engines.
suspend fun describeDBEngines() {

```

```

val engineVersionsRequest =
    DescribeDbEngineVersionsRequest {
        defaultOnly = true
        engine = "mysql"
        maxRecords = 20
    }

RdsClient { region = "us-west-2" }.use { rdsClient ->
    val response = rdsClient.describeDbEngineVersions(engineVersionsRequest)
    val engines: List<DbEngineVersion>? = response.dbEngineVersions

    // Get all DbEngineVersion objects.
    if (engines != null) {
        for (engineOb in engines) {
            println("The name of the DB parameter group family for the database
engine is ${engineOb.dbParameterGroupFamily}.")
            println("The name of the database engine ${engineOb.engine}.")
            println("The version number of the database engine
${engineOb.engineVersion}")
        }
    }
}

suspend fun getSecretValues(secretName: String?): String? {
    val valueRequest =
        GetSecretValueRequest {
            secretId = secretName
        }

    SecretsManagerClient { region = "us-west-2" }.use { secretsClient ->
        val valueResponse = secretsClient.getSecretValue(valueRequest)
        return valueResponse.secretString
    }
}

```

- For API details, see the following topics in *AWS SDK for Kotlin API reference*.
  - [CreateDBInstance](#)
  - [CreateDBParameterGroup](#)
  - [CreateDBSnapshot](#)
  - [DeleteDBInstance](#)

- [DeleteDBParameterGroup](#)
- [DescribeDBEngineVersions](#)
- [DescribeDBInstances](#)
- [DescribeDBParameterGroups](#)
- [DescribeDBParameters](#)
- [DescribeDBSnapshots](#)
- [DescribeOrderableDBInstanceOptions](#)
- [ModifyDBParameterGroup](#)

## Actions

### CreateDBInstance

The following code example shows how to use CreateDBInstance.

#### SDK for Kotlin

##### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun createDatabaseInstance(
    dbInstanceIdentifierVal: String?,
    dbNameVal: String?,
    masterUsernameVal: String?,
    masterUserPasswordVal: String?,
) {
    val instanceRequest =
        CreateDbInstanceRequest {
            dbInstanceIdentifier = dbInstanceIdentifierVal
            allocatedStorage = 100
            dbName = dbNameVal
            engine = "mysql"
            dbInstanceClass = "db.m4.large"
            engineVersion = "8.0"
            storageType = "standard"
        }
}
```

```
        masterUsername = masterUsernameVal
        masterUserPassword = masterUserPasswordVal
    }

    RdsClient { region = "us-west-2" }.use { rdsClient ->
        val response = rdsClient.createDbInstance(instanceRequest)
        print("The status is ${response.dbInstance?.dbInstanceStatus}")
    }
}

// Waits until the database instance is available.
suspend fun waitForInstanceReady(dbInstanceIdentifierVal: String?) {
    val sleepTime: Long = 20
    var instanceReady = false
    var instanceReadyStr: String
    println("Waiting for instance to become available.")

    val instanceRequest =
        DescribeDbInstancesRequest {
            dbInstanceIdentifier = dbInstanceIdentifierVal
        }

    RdsClient { region = "us-west-2" }.use { rdsClient ->
        while (!instanceReady) {
            val response = rdsClient.describeDbInstances(instanceRequest)
            val instanceList = response.dbInstances
            if (instanceList != null) {
                for (instance in instanceList) {
                    instanceReadyStr = instance.dbInstanceStatus.toString()
                    if (instanceReadyStr.contains("available")) {
                        instanceReady = true
                    } else {
                        println("...$instanceReadyStr")
                        delay(sleepTime * 1000)
                    }
                }
            }
        }
    }
    println("Database instance is available!")
}
}
```

- For API details, see [CreateDBInstance](#) in *AWS SDK for Kotlin API reference*.

## DeleteDBInstance

The following code example shows how to use DeleteDBInstance.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun deleteDatabaseInstance(dbInstanceIdentifierVal: String?) {
    val deleteDbInstanceRequest =
        DeleteDbInstanceRequest {
            dbInstanceIdentifier = dbInstanceIdentifierVal
            deleteAutomatedBackups = true
            skipFinalSnapshot = true
        }

    RdsClient { region = "us-west-2" }.use { rdsClient ->
        val response = rdsClient.deleteDbInstance(deleteDbInstanceRequest)
        print("The status of the database is
        ${response.dbInstance?.dbInstanceStatus}")
    }
}
```

- For API details, see [DeleteDBInstance](#) in *AWS SDK for Kotlin API reference*.

## DescribeAccountAttributes

The following code example shows how to use DescribeAccountAttributes.

## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun getAccountAttributes() {
    RdsClient { region = "us-west-2" }.use { rdsClient ->
        val response =
            rdsClient.describeAccountAttributes(DescribeAccountAttributesRequest {})
        response.accountQuotas?.forEach { quotas ->
            val response = response.accountQuotas
            println("Name is: ${quotas.accountQuotaName}")
            println("Max value is ${quotas.max}")
        }
    }
}
```

- For API details, see [DescribeAccountAttributes](#) in *AWS SDK for Kotlin API reference*.

## DescribeDBInstances

The following code example shows how to use DescribeDBInstances.

## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun describeInstances() {
    RdsClient { region = "us-west-2" }.use { rdsClient ->
        val response = rdsClient.describeDbInstances(DescribeDbInstancesRequest {})
        response.dbInstances?.forEach { instance ->
            println("Instance Identifier is ${instance.dbInstanceIdentifier}")
        }
    }
}
```

```
        println("The Engine is ${instance.engine}")
        println("Connection endpoint is ${instance.endpoint?.address}")
    }
}
}
```

- For API details, see [DescribeDBInstances](#) in *AWS SDK for Kotlin API reference*.

## ModifyDBInstance

The following code example shows how to use `ModifyDBInstance`.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun updateIntance(
    dbInstanceIdentifierVal: String?,
    masterUserPasswordVal: String?,
) {
    val request =
        ModifyDbInstanceRequest {
            dbInstanceIdentifier = dbInstanceIdentifierVal
            publiclyAccessible = true
            masterUserPassword = masterUserPasswordVal
        }

    RdsClient { region = "us-west-2" }.use { rdsClient ->
        val instanceResponse = rdsClient.modifyDbInstance(request)
        println("The ARN of the modified database is
        ${instanceResponse.dbInstance?.dbInstanceArn}")
    }
}
```

- For API details, see [ModifyDBInstance](#) in *AWS SDK for Kotlin API reference*.



## Scenarios

### Create an Aurora Serverless work item tracker

The following code example shows how to create a web application that tracks work items in an Amazon Aurora Serverless database and uses Amazon Simple Email Service (Amazon SES) to send reports.

#### SDK for Kotlin

Shows how to create a web application that tracks and reports on work items stored in an Amazon RDS database.

For complete source code and instructions on how to set up a Spring REST API that queries Amazon Aurora Serverless data and for use by a React application, see the full example on [GitHub](#).

#### Services used in this example

- Aurora
- Amazon RDS
- Amazon RDS Data Service
- Amazon SES

## Amazon RDS Data Service examples using SDK for Kotlin

The following code examples show you how to perform actions and implement common scenarios by using the AWS SDK for Kotlin with Amazon RDS Data Service.

*Scenarios* are code examples that show you how to accomplish specific tasks by calling multiple functions within a service or combined with other AWS services.

Each example includes a link to the complete source code, where you can find instructions on how to set up and run the code in context.

#### Topics

- [Scenarios](#)

## Scenarios

### Create an Aurora Serverless work item tracker

The following code example shows how to create a web application that tracks work items in an Amazon Aurora Serverless database and uses Amazon Simple Email Service (Amazon SES) to send reports.

#### SDK for Kotlin

Shows how to create a web application that tracks and reports on work items stored in an Amazon RDS database.

For complete source code and instructions on how to set up a Spring REST API that queries Amazon Aurora Serverless data and for use by a React application, see the full example on [GitHub](#).

#### Services used in this example

- Aurora
- Amazon RDS
- Amazon RDS Data Service
- Amazon SES

## Amazon Redshift examples using SDK for Kotlin

The following code examples show you how to perform actions and implement common scenarios by using the AWS SDK for Kotlin with Amazon Redshift.

*Actions* are code excerpts from larger programs and must be run in context. While actions show you how to call individual service functions, you can see actions in context in their related scenarios.

*Scenarios* are code examples that show you how to accomplish specific tasks by calling multiple functions within a service or combined with other AWS services.

Each example includes a link to the complete source code, where you can find instructions on how to set up and run the code in context.

#### Topics

- [Actions](#)

- [Scenarios](#)

## Actions

### CreateCluster

The following code example shows how to use CreateCluster.

#### SDK for Kotlin

##### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

Create the cluster.

```
suspend fun createCluster(
    clusterId: String?,
    masterUsernameVal: String?,
    masterUserPasswordVal: String?,
) {
    val clusterRequest =
        CreateClusterRequest {
            clusterIdentifier = clusterId
            masterUsername = masterUsernameVal
            masterUserPassword = masterUserPasswordVal
            nodeType = "ra3.4xlarge"
            publiclyAccessible = true
            numberOfNodes = 2
        }

    RedshiftClient { region = "us-east-1" }.use { redshiftClient ->
        val clusterResponse = redshiftClient.createCluster(clusterRequest)
        println("Created cluster ${clusterResponse.cluster?.clusterIdentifier}")
    }
}
```

- For API details, see [CreateCluster](#) in *AWS SDK for Kotlin API reference*.

## DeleteCluster

The following code example shows how to use DeleteCluster.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

Delete the cluster.

```
suspend fun deleteRedshiftCluster(clusterId: String?) {
    val request =
        DeleteClusterRequest {
            clusterIdentifier = clusterId
            skipFinalClusterSnapshot = true
        }

    RedshiftClient { region = "us-west-2" }.use { redshiftClient ->
        val response = redshiftClient.deleteCluster(request)
        println("The status is ${response.cluster?.clusterStatus}")
    }
}
```

- For API details, see [DeleteCluster](#) in *AWS SDK for Kotlin API reference*.

## DescribeClusters

The following code example shows how to use DescribeClusters.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

## Describe the cluster.

```
suspend fun describeRedshiftClusters() {
    RedshiftClient { region = "us-west-2" }.use { redshiftClient ->
        val clusterResponse =
            redshiftClient.describeClusters(DescribeClustersRequest {})
        val clusterList = clusterResponse.clusters

        if (clusterList != null) {
            for (cluster in clusterList) {
                println("Cluster database name is ${cluster.dbName}")
                println("Cluster status is ${cluster.clusterStatus}")
            }
        }
    }
}
```

- For API details, see [DescribeClusters](#) in *AWS SDK for Kotlin API reference*.

## ModifyCluster

The following code example shows how to use `ModifyCluster`.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

## Modify a cluster.

```
suspend fun modifyCluster(clusterId: String?) {
    val modifyClusterRequest =
        ModifyClusterRequest {
            clusterIdentifier = clusterId
            preferredMaintenanceWindow = "wed:07:30-wed:08:00"
        }

    RedshiftClient { region = "us-west-2" }.use { redshiftClient ->
```

```
        val clusterResponse = redshiftClient.modifyCluster(modifyClusterRequest)
        println(
            "The modified cluster was successfully modified and has
            ${clusterResponse.cluster?.preferredMaintenanceWindow} as the maintenance window",
        )
    }
}
```

- For API details, see [ModifyCluster](#) in *AWS SDK for Kotlin API reference*.

## Scenarios

### Create a web application to track Amazon Redshift data

The following code example shows how to create a web application that tracks and reports on work items using an Amazon Redshift database.

#### SDK for Kotlin

Shows how to create a web application that tracks and reports on work items stored in an Amazon Redshift database.

For complete source code and instructions on how to set up a Spring REST API that queries Amazon Redshift data and for use by a React application, see the full example on [GitHub](#).

#### Services used in this example

- Amazon Redshift
- Amazon SES

## Amazon Rekognition examples using SDK for Kotlin

The following code examples show you how to perform actions and implement common scenarios by using the AWS SDK for Kotlin with Amazon Rekognition.

*Actions* are code excerpts from larger programs and must be run in context. While actions show you how to call individual service functions, you can see actions in context in their related scenarios.

*Scenarios* are code examples that show you how to accomplish specific tasks by calling multiple functions within a service or combined with other AWS services.

Each example includes a link to the complete source code, where you can find instructions on how to set up and run the code in context.

## Topics

- [Actions](#)
- [Scenarios](#)

## Actions

### CompareFaces

The following code example shows how to use CompareFaces.

For more information, see [Comparing faces in images](#).

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun compareTwoFaces(
    similarityThresholdVal: Float,
    sourceImageVal: String,
    targetImageVal: String,
) {
    val sourceBytes = (File(sourceImageVal).readBytes())
    val targetBytes = (File(targetImageVal).readBytes())

    // Create an Image object for the source image.
    val souImage =
        Image {
            bytes = sourceBytes
        }

    val tarImage =
        Image {
            bytes = targetBytes
        }
}
```

```

    }

    val facesRequest =
        CompareFacesRequest {
            sourceImage = souImage
            targetImage = tarImage
            similarityThreshold = similarityThresholdVal
        }

    RekognitionClient { region = "us-east-1" }.use { rekClient ->

        val compareFacesResult = rekClient.compareFaces(facesRequest)
        val faceDetails = compareFacesResult.faceMatches

        if (faceDetails != null) {
            for (match: CompareFacesMatch in faceDetails) {
                val face = match.face
                val position = face?.boundingBox
                if (position != null) {
                    println("Face at ${position.left} ${position.top} matches with
                    ${face.confidence} % confidence.")
                }
            }
        }

        val uncompered = compareFacesResult.unmatchedFaces
        if (uncompered != null) {
            println("There was ${uncompered.size} face(s) that did not match")
        }

        println("Source image rotation:
        ${compareFacesResult.sourceImageOrientationCorrection}")
        println("target image rotation:
        ${compareFacesResult.targetImageOrientationCorrection}")
    }
}

```

- For API details, see [CompareFaces](#) in *AWS SDK for Kotlin API reference*.

## CreateCollection

The following code example shows how to use CreateCollection.



For more information, see [Creating a collection](#).

## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun createMyCollection(collectionIdVal: String) {
    val request =
        CreateCollectionRequest {
            collectionId = collectionIdVal
        }

    RekognitionClient { region = "us-east-1" }.use { rekClient ->
        val response = rekClient.createCollection(request)
        println("Collection ARN is ${response.collectionArn}")
        println("Status code is ${response.statusCode}")
    }
}
```

- For API details, see [CreateCollection](#) in *AWS SDK for Kotlin API reference*.

## DeleteCollection

The following code example shows how to use DeleteCollection.

For more information, see [Deleting a collection](#).

## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun deleteMyCollection(collectionIdVal: String) {
    val request =
        DeleteCollectionRequest {
            collectionId = collectionIdVal
        }

    RekognitionClient { region = "us-east-1" }.use { rekClient ->
        val response = rekClient.deleteCollection(request)
        println("The collectionId status is ${response.statusCode}")
    }
}
```

- For API details, see [DeleteCollection](#) in *AWS SDK for Kotlin API reference*.

## DeleteFaces

The following code example shows how to use DeleteFaces.

For more information, see [Deleting faces from a collection](#).

## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun deleteFacesCollection(
    collectionIdVal: String?,
    faceIdVal: String,
) {
    val deleteFacesRequest =
        DeleteFacesRequest {
            collectionId = collectionIdVal
            faceIds = listOf(faceIdVal)
        }

    RekognitionClient { region = "us-east-1" }.use { rekClient ->
        rekClient.deleteFaces(deleteFacesRequest)
    }
}
```

```
        println("$faceIdVal was deleted from the collection")
    }
}
```

- For API details, see [DeleteFaces](#) in *AWS SDK for Kotlin API reference*.

## DescribeCollection

The following code example shows how to use DescribeCollection.

For more information, see [Describing a collection](#).

## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun describeColl(collectionName: String) {
    val request =
        DescribeCollectionRequest {
            collectionId = collectionName
        }

    RekognitionClient { region = "us-east-1" }.use { rekClient ->
        val response = rekClient.describeCollection(request)
        println("The collection Arn is ${response.collectionArn}")
        println("The collection contains this many faces ${response.faceCount}")
    }
}
```

- For API details, see [DescribeCollection](#) in *AWS SDK for Kotlin API reference*.

## DetectFaces

The following code example shows how to use DetectFaces.

For more information, see [Detecting faces in an image](#).

## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun detectFacesinImage(sourceImage: String?) {
    val souImage =
        Image {
            bytes = (File(sourceImage).readBytes())
        }

    val request =
        DetectFacesRequest {
            attributes = listOf(Attribute.All)
            image = souImage
        }

    RekognitionClient { region = "us-east-1" }.use { rekClient ->
        val response = rekClient.detectFaces(request)
        response.faceDetails?.forEach { face ->
            val ageRange = face.ageRange
            println("The detected face is estimated to be between ${ageRange?.low}
and ${ageRange?.high} years old.")
            println("There is a smile ${face.smile?.value}")
        }
    }
}
```

- For API details, see [DetectFaces](#) in *AWS SDK for Kotlin API reference*.

## DetectLabels

The following code example shows how to use DetectLabels.

For more information, see [Detecting labels in an image](#).

## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun detectImageLabels(sourceImage: String) {
    val souImage =
        Image {
            bytes = (File(sourceImage).readBytes())
        }
    val request =
        DetectLabelsRequest {
            image = souImage
            maxLabels = 10
        }

    RekognitionClient { region = "us-east-1" }.use { rekClient ->
        val response = rekClient.detectLabels(request)
        response.labels?.forEach { label ->
            println("${label.name} : ${label.confidence}")
        }
    }
}
```

- For API details, see [DetectLabels](#) in *AWS SDK for Kotlin API reference*.

## DetectModerationLabels

The following code example shows how to use `DetectModerationLabels`.

For more information, see [Detecting inappropriate images](#).

## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun detectModLabels(sourceImage: String) {
    val myImage =
        Image {
            this.bytes = (File(sourceImage).readBytes())
        }

    val request =
        DetectModerationLabelsRequest {
            image = myImage
            minConfidence = 60f
        }

    RekognitionClient { region = "us-east-1" }.use { rekClient ->
        val response = rekClient.detectModerationLabels(request)
        response.moderationLabels?.forEach { label ->
            println("Label: ${label.name} - Confidence: ${label.confidence} %
Parent: ${label.parentName}")
        }
    }
}
```

- For API details, see [DetectModerationLabels](#) in *AWS SDK for Kotlin API reference*.

## DetectText

The following code example shows how to use DetectText.

For more information, see [Detecting text in an image](#).

## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun detectTextLabels(sourceImage: String?) {
    val souImage =
        Image {
            bytes = (File(sourceImage).readBytes())
        }

    val request =
        DetectTextRequest {
            image = souImage
        }

    RekognitionClient { region = "us-east-1" }.use { rekClient ->
        val response = rekClient.detectText(request)
        response.textDetections?.forEach { text ->
            println("Detected: ${text.detectedText}")
            println("Confidence: ${text.confidence}")
            println("Id: ${text.id}")
            println("Parent Id: ${text.parentId}")
            println("Type: ${text.type}")
        }
    }
}
```

- For API details, see [DetectText](#) in *AWS SDK for Kotlin API reference*.

## IndexFaces

The following code example shows how to use IndexFaces.

For more information, see [Adding faces to a collection](#).

## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun addToCollection(
    collectionIdVal: String?,
    sourceImage: String,
) {
    val souImage =
        Image {
            bytes = (File(sourceImage).readBytes())
        }

    val request =
        IndexFacesRequest {
            collectionId = collectionIdVal
            image = souImage
            maxFaces = 1
            qualityFilter = QualityFilter.Auto
            detectionAttributes = listOf(Attribute.Default)
        }

    RekognitionClient { region = "us-east-1" }.use { rekClient ->
        val facesResponse = rekClient.indexFaces(request)

        // Display the results.
        println("Results for the image")
        println("\n Faces indexed:")
        facesResponse.faceRecords?.forEach { faceRecord ->
            println("Face ID: ${faceRecord.face?.faceId}")
            println("Location: ${faceRecord.faceDetail?.boundingBox}")
        }

        println("Faces not indexed:")
        facesResponse.unindexedFaces?.forEach { unindexedFace ->
            println("Location: ${unindexedFace.faceDetail?.boundingBox}")
            println("Reasons:")
        }
    }
}
```



```
        unindexedFace.reasons?.forEach { reason ->
            println("Reason: $reason")
        }
    }
}
```

- For API details, see [IndexFaces](#) in *AWS SDK for Kotlin API reference*.

## ListCollections

The following code example shows how to use `ListCollections`.

For more information, see [Listing collections](#).

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun listAllCollections() {
    val request =
        ListCollectionsRequest {
            maxResults = 10
        }

    RekognitionClient { region = "us-east-1" }.use { rekClient ->
        val response = rekClient.listCollections(request)
        response.collectionIds?.forEach { resultId ->
            println(resultId)
        }
    }
}
```

- For API details, see [ListCollections](#) in *AWS SDK for Kotlin API reference*.

## ListFaces

The following code example shows how to use ListFaces.

For more information, see [Listing faces in a collection](#).

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun listFacesCollection(collectionIdVal: String?) {
    val request =
        ListFacesRequest {
            collectionId = collectionIdVal
            maxResults = 10
        }

    RekognitionClient { region = "us-east-1" }.use { rekClient ->
        val response = rekClient.listFaces(request)
        response.faces?.forEach { face ->
            println("Confidence level there is a face: ${face.confidence}")
            println("The face Id value is ${face.faceId}")
        }
    }
}
```

- For API details, see [ListFaces](#) in *AWS SDK for Kotlin API reference*.

## RecognizeCelebrities

The following code example shows how to use RecognizeCelebrities.

For more information, see [Recognizing celebrities in an image](#).

## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun recognizeAllCelebrities(sourceImage: String?) {
    val souImage =
        Image {
            bytes = (File(sourceImage).readBytes())
        }

    val request =
        RecognizeCelebritiesRequest {
            image = souImage
        }

    RekognitionClient { region = "us-east-1" }.use { rekClient ->
        val response = rekClient.recognizeCelebrities(request)
        response.celebrityFaces?.forEach { celebrity ->
            println("Celebrity recognized: ${celebrity.name}")
            println("Celebrity ID:${celebrity.id}")
            println("Further information (if available):")
            celebrity.urls?.forEach { url ->
                println(url)
            }
        }
        println("${response.unrecognizedFaces?.size} face(s) were unrecognized.")
    }
}
```

- For API details, see [RecognizeCelebrities](#) in *AWS SDK for Kotlin API reference*.

## Scenarios

### Create a serverless application to manage photos

The following code example shows how to create a serverless application that lets users manage photos using labels.

#### SDK for Kotlin

Shows how to develop a photo asset management application that detects labels in images using Amazon Rekognition and stores them for later retrieval.

For complete source code and instructions on how to set up and run, see the full example on [GitHub](#).

For a deep dive into the origin of this example see the post on [AWS Community](#).

#### Services used in this example

- API Gateway
- DynamoDB
- Lambda
- Amazon Rekognition
- Amazon S3
- Amazon SNS

### Detect information in videos

The following code example shows how to:

- Start Amazon Rekognition jobs to detect elements like people, objects, and text in videos.
- Check job status until jobs finish.
- Output the list of elements detected by each job.

## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

Detect faces in a video stored in an Amazon S3 bucket.

```
suspend fun startFaceDetection(
    channelVal: NotificationChannel?,
    bucketVal: String,
    videoVal: String,
) {
    val s3obj =
        S3Object {
            bucket = bucketVal
            name = videoVal
        }
    val vid0b =
        Video {
            s3object = s3obj
        }

    val request =
        StartFaceDetectionRequest {
            jobTag = "Faces"
            faceAttributes = FaceAttributes.All
            notificationChannel = channelVal
            video = vid0b
        }

    RekognitionClient { region = "us-east-1" }.use { rekClient ->
        val startLabelDetectionResult = rekClient.startFaceDetection(request)
        startJobId = startLabelDetectionResult.jobId.toString()
    }
}

suspend fun getFaceResults() {
    var finished = false
    var status: String
    var yy = 0
}
```

```
RecognitionClient { region = "us-east-1" }.use { rekClient ->
    var response: GetFaceDetectionResponse? = null

    val recognitionRequest =
        GetFaceDetectionRequest {
            jobId = startJobId
            maxResults = 10
        }

    // Wait until the job succeeds.
    while (!finished) {
        response = rekClient.getFaceDetection(recognitionRequest)
        status = response.jobStatus.toString()
        if (status.compareTo("SUCCEEDED") == 0) {
            finished = true
        } else {
            println("$yy status is: $status")
            delay(1000)
        }
        yy++
    }

    // Proceed when the job is done - otherwise VideoMetadata is null.
    val videoMetaData = response?.videoMetadata
    println("Format: ${videoMetaData?.format}")
    println("Codec: ${videoMetaData?.codec}")
    println("Duration: ${videoMetaData?.durationMillis}")
    println("FrameRate: ${videoMetaData?.frameRate}")

    // Show face information.
    response?.faces?.forEach { face ->
        println("Age: ${face.face?.ageRange}")
        println("Face: ${face.face?.beard}")
        println("Eye glasses: ${face?.face?.eyeglasses}")
        println("Mustache: ${face.face?.mustache}")
        println("Smile: ${face.face?.smile}")
    }
}
}
```

Detect inappropriate or offensive content in a video stored in an Amazon S3 bucket.

```
suspend fun startModerationDetection(
    channel: NotificationChannel?,
    bucketVal: String?,
    videoVal: String?,
) {
    val s3Obj =
        S3Object {
            bucket = bucketVal
            name = videoVal
        }
    val vidObj =
        Video {
            s3Object = s3Obj
        }
    val request =
        StartContentModerationRequest {
            jobTag = "Moderation"
            notificationChannel = channel
            video = vidObj
        }

    RekognitionClient { region = "us-east-1" }.use { rekClient ->
        val startModDetectionResult = rekClient.startContentModeration(request)
        startJobId = startModDetectionResult.jobId.toString()
    }
}

suspend fun getModResults() {
    var finished = false
    var status: String
    var yy = 0
    RekognitionClient { region = "us-east-1" }.use { rekClient ->
        var modDetectionResponse: GetContentModerationResponse? = null

        val modRequest =
            GetContentModerationRequest {
                jobId = startJobId
                maxResults = 10
            }

        // Wait until the job succeeds.
        while (!finished) {
            modDetectionResponse = rekClient.getContentModeration(modRequest)
```

```
        status = modDetectionResponse.jobStatus.toString()
        if (status.compareTo("SUCCEEDED") == 0) {
            finished = true
        } else {
            println("$yy status is: $status")
            delay(1000)
        }
        yy++
    }

    // Proceed when the job is done - otherwise VideoMetadata is null.
    val videoMetaData = modDetectionResponse?.videoMetadata
    println("Format: ${videoMetaData?.format}")
    println("Codec: ${videoMetaData?.codec}")
    println("Duration: ${videoMetaData?.durationMillis}")
    println("FrameRate: ${videoMetaData?.frameRate}")

    modDetectionResponse?.moderationLabels?.forEach { mod ->
        val seconds: Long = mod.timestamp / 1000
        print("Mod label: $seconds ")
        println(mod.moderationLabel)
    }
}
}
```

- For API details, see the following topics in *AWS SDK for Kotlin API reference*.
  - [GetCelebrityRecognition](#)
  - [GetContentModeration](#)
  - [GetLabelDetection](#)
  - [GetPersonTracking](#)
  - [GetSegmentDetection](#)
  - [GetTextDetection](#)
  - [StartCelebrityRecognition](#)
  - [StartContentModeration](#)
  - [StartLabelDetection](#)
  - [StartPersonTracking](#)
  - [StartSegmentDetection](#)



- [StartTextDetection](#)

## Detect objects in images

The following code example shows how to build an app that uses Amazon Rekognition to detect objects by category in images.

### SDK for Kotlin

Shows how to use Amazon Rekognition Kotlin API to create an app that uses Amazon Rekognition to identify objects by category in images located in an Amazon Simple Storage Service (Amazon S3) bucket. The app sends the admin an email notification with the results using Amazon Simple Email Service (Amazon SES).

For complete source code and instructions on how to set up and run, see the full example on [GitHub](#).

#### Services used in this example

- Amazon Rekognition
- Amazon S3
- Amazon SES

## Route 53 domain registration examples using SDK for Kotlin

The following code examples show you how to perform actions and implement common scenarios by using the AWS SDK for Kotlin with Route 53 domain registration.

*Basics* are code examples that show you how to perform the essential operations within a service.

*Actions* are code excerpts from larger programs and must be run in context. While actions show you how to call individual service functions, you can see actions in context in their related scenarios.

Each example includes a link to the complete source code, where you can find instructions on how to set up and run the code in context.

### Get started

#### Hello Route 53 domain registration

The following code examples show how to get started using Route 53 domain registration.

## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
/**
 Before running this Kotlin code example, set up your development environment,
 including your credentials.

 For more information, see the following documentation topic:
 https://docs.aws.amazon.com/sdk-for-kotlin/latest/developer-guide/setup.html
 */
suspend fun main(args: Array<String>) {
    val usage = """
        Usage:
            <domainType>

        Where:
            domainType - The domain type (for example, com).
    """

    if (args.size != 1) {
        println(usage)
        exitProcess(0)
    }

    val domainType = args[0]
    println("Invokes ListPrices using a Paginated method.")
    listPricesPaginated(domainType)
}

suspend fun listPricesPaginated(domainType: String) {
    val pricesRequest =
        ListPricesRequest {
            maxItems = 10
            tld = domainType
        }
}
```

```
Route53DomainsClient { region = "us-east-1" }.use { route53DomainsClient ->
    route53DomainsClient
        .listPricesPaginated(pricesRequest)
        .transform { it.prices?.forEach { obj -> emit(obj) } }
        .collect { pr ->
            println("Registration: ${pr.registrationPrice}
${pr.registrationPrice?.currency}")
            println("Renewal: ${pr.renewalPrice?.price}
${pr.renewalPrice?.currency}")
            println("Transfer: ${pr.transferPrice?.price}
${pr.transferPrice?.currency}")
            println("Restoration: ${pr.restorationPrice?.price}
${pr.restorationPrice?.currency}")
        }
    }
}
```

- For API details, see [ListPrices](#) in *AWS SDK for Kotlin API reference*.

## Topics

- [Basics](#)
- [Actions](#)

## Basics

### Learn the basics

The following code example shows how to:

- List current domains, and list operations in the past year.
- View billing for the past year, and view prices for domain types.
- Get domain suggestions.
- Check domain availability and transferability.
- Optionally, request a domain registration.
- Get an operation detail.
- Optionally, get a domain detail.

## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
/**
Before running this Kotlin code example, set up your development environment,
including your credentials.

For more information, see the following documentation topic:
https://docs.aws.amazon.com/sdk-for-kotlin/latest/developer-guide/setup.html

This Kotlin code example performs the following operations:

1. List current domains.
2. List operations in the past year.
3. View billing for the account in the past year.
4. View prices for domain types.
5. Get domain suggestions.
6. Check domain availability.
7. Check domain transferability.
8. Request a domain registration.
9. Get operation details.
10. Optionally, get domain details.
*/

val DASHES: String = String(CharArray(80)).replace("\u0000", "-")

suspend fun main(args: Array<String>) {
    val usage = """
        Usage:
            <domainType> <phoneNumber> <email> <domainSuggestion> <firstName>
<lastName> <city>
        Where:
            domainType - The domain type (for example, com).
            phoneNumber - The phone number to use (for example, +1.2065550100)
            email - The email address to use.
            domainSuggestion - The domain suggestion (for example, findmy.example).
```

```
        firstName - The first name to use to register a domain.
        lastName - The last name to use to register a domain.
        city - The city to use to register a domain.
    """

    if (args.size != 7) {
        println(usage)
        exitProcess(1)
    }

    val domainType = args[0]
    val phoneNumber = args[1]
    val email = args[2]
    val domainSuggestion = args[3]
    val firstName = args[4]
    val lastName = args[5]
    val city = args[6]

    println(DASHES)
    println("Welcome to the Amazon Route 53 domains example scenario.")
    println(DASHES)

    println(DASHES)
    println("1. List current domains.")
    listDomains()
    println(DASHES)

    println(DASHES)
    println("2. List operations in the past year.")
    listOperations()
    println(DASHES)

    println(DASHES)
    println("3. View billing for the account in the past year.")
    listBillingRecords()
    println(DASHES)

    println(DASHES)
    println("4. View prices for domain types.")
    listAllPrices(domainType)
    println(DASHES)

    println(DASHES)
    println("5. Get domain suggestions.")
```

```
listDomainSuggestions(domainSuggestion)
println(DASHES)

println(DASHES)
println("6. Check domain availability.")
checkDomainAvailability(domainSuggestion)
println(DASHES)

println(DASHES)
println("7. Check domain transferability.")
checkDomainTransferability(domainSuggestion)
println(DASHES)

println(DASHES)
println("8. Request a domain registration.")
val opId = requestDomainRegistration(domainSuggestion, phoneNumber, email,
firstName, lastName, city)
println(DASHES)

println(DASHES)
println("9. Get operation details.")
getOperationalDetail(opId)
println(DASHES)

println(DASHES)
println("10. Get domain details.")
println("Note: You must have a registered domain to get details.")
println("Otherwise an exception is thrown that states ")
println("Domain xxxxxxxx not found in xxxxxxxx account.")
getDomainDetails(domainSuggestion)
println(DASHES)
}

suspend fun getDomainDetails(domainSuggestion: String?) {
    val detailRequest =
        GetDomainDetailRequest {
            domainName = domainSuggestion
        }
    Route53DomainsClient { region = "us-east-1" }.use { route53DomainsClient ->
        val response = route53DomainsClient.getDomainDetail(detailRequest)
        println("The contact first name is
${response.registrantContact?.firstName}")
        println("The contact last name is ${response.registrantContact?.lastName}")
    }
}
```

```
        println("The contact org name is
        ${response.registrantContact?.organizationName}")
    }
}

suspend fun getOperationalDetail(opId: String?) {
    val detailRequest =
        GetOperationDetailRequest {
            operationId = opId
        }
    Route53DomainsClient { region = "us-east-1" }.use { route53DomainsClient ->
        val response = route53DomainsClient.getOperationDetail(detailRequest)
        println("Operation detail message is ${response.message}")
    }
}

suspend fun requestDomainRegistration(
    domainSuggestion: String?,
    phoneNumberVal: String?,
    emailVal: String?,
    firstNameVal: String?,
    lastNameVal: String?,
    cityVal: String?,
): String? {
    val contactDetail =
        ContactDetail {
            contactType = ContactType.Company
            state = "LA"
            countryCode = CountryCode.In
            email = emailVal
            firstName = firstNameVal
            lastName = lastNameVal
            city = cityVal
            phoneNumber = phoneNumberVal
            organizationName = "My Org"
            addressLine1 = "My Address"
            zipCode = "123 123"
        }

    val domainRequest =
        RegisterDomainRequest {
            adminContact = contactDetail
            registrantContact = contactDetail
            techContact = contactDetail
        }
}
```

```
        domainName = domainSuggestion
        autoRenew = true
        durationInYears = 1
    }

    Route53DomainsClient { region = "us-east-1" }.use { route53DomainsClient ->
        val response = route53DomainsClient.registerDomain(domainRequest)
        println("Registration requested. Operation Id: ${response.operationId}")
        return response.operationId
    }
}

suspend fun checkDomainTransferability(domainSuggestion: String?) {
    val transferabilityRequest =
        CheckDomainTransferabilityRequest {
            domainName = domainSuggestion
        }
    Route53DomainsClient { region = "us-east-1" }.use { route53DomainsClient ->
        val response =
            route53DomainsClient.checkDomainTransferability(transferabilityRequest)
        println("Transferability: ${response.transferability?.transferable}")
    }
}

suspend fun checkDomainAvailability(domainSuggestion: String) {
    val availabilityRequest =
        CheckDomainAvailabilityRequest {
            domainName = domainSuggestion
        }
    Route53DomainsClient { region = "us-east-1" }.use { route53DomainsClient ->
        val response =
            route53DomainsClient.checkDomainAvailability(availabilityRequest)
        println("$domainSuggestion is ${response.availability}")
    }
}

suspend fun listDomainSuggestions(domainSuggestion: String?) {
    val suggestionsRequest =
        GetDomainSuggestionsRequest {
            domainName = domainSuggestion
            suggestionCount = 5
            onlyAvailable = true
        }
    Route53DomainsClient { region = "us-east-1" }.use { route53DomainsClient ->
```



```

        val response = route53DomainsClient.getDomainSuggestions(suggestionsRequest)
        response.suggestionsList?.forEach { suggestion ->
            println("Suggestion Name: ${suggestion.domainName}")
            println("Availability: ${suggestion.availability}")
            println(" ")
        }
    }
}

suspend fun listAllPrices(domainType: String?) {
    val pricesRequest =
        ListPricesRequest {
            tld = domainType
        }

    Route53DomainsClient { region = "us-east-1" }.use { route53DomainsClient ->
        route53DomainsClient
            .listPricesPaginated(pricesRequest)
            .transform { it.prices?.forEach { obj -> emit(obj) } }
            .collect { pr ->
                println("Registration: ${pr.registrationPrice}
${pr.registrationPrice?.currency}")
                println("Renewal: ${pr.renewalPrice?.price}
${pr.renewalPrice?.currency}")
                println("Transfer: ${pr.transferPrice?.price}
${pr.transferPrice?.currency}")
                println("Restoration: ${pr.restorationPrice?.price}
${pr.restorationPrice?.currency}")
            }
    }
}

suspend fun listBillingRecords() {
    val currentDate = Date()
    val localDateTime =
        currentDate.toInstant().atZone(ZoneId.systemDefault()).toLocalDateTime()
    val zoneOffset = ZoneOffset.of("+01:00")
    val localDateTime2 = localDateTime.minusYears(1)
    val myStartTime = localDateTime2.toInstant(zoneOffset)
    val myEndTime = localDateTime.toInstant(zoneOffset)
    val timeStart: Instant? = myStartTime?.let { Instant(it) }
    val timeEnd: Instant? = myEndTime?.let { Instant(it) }

    val viewBillingRequest =

```

```

        ViewBillingRequest {
            start = timeStart
            end = timeEnd
        }

Route53DomainsClient { region = "us-east-1" }.use { route53DomainsClient ->
    route53DomainsClient
        .viewBillingPaginated(viewBillingRequest)
        .transform { it.billingRecords?.forEach { obj -> emit(obj) } }
        .collect { billing ->
            println("Bill Date: ${billing.billDate}")
            println("Operation: ${billing.operation}")
            println("Price: ${billing.price}")
        }
    }
}

suspend fun listOperations() {
    val currentDate = Date()
    var localDateTime =
        currentDate.toInstant().atZone(ZoneId.systemDefault()).toLocalDateTime()
    val zoneOffset = ZoneOffset.of("+01:00")
    localDateTime = localDateTime.minusYears(1)
    val myTime: java.time.Instant? = localDateTime.toInstant(zoneOffset)
    val time2: Instant? = myTime?.let { Instant(it) }
    val operationsRequest =
        ListOperationsRequest {
            submittedSince = time2
        }

Route53DomainsClient { region = "us-east-1" }.use { route53DomainsClient ->
    route53DomainsClient
        .listOperationsPaginated(operationsRequest)
        .transform { it.operations?.forEach { obj -> emit(obj) } }
        .collect { content ->
            println("Operation Id: ${content.operationId}")
            println("Status: ${content.status}")
            println("Date: ${content.submittedDate}")
        }
    }
}

suspend fun listDomains() {
    Route53DomainsClient { region = "us-east-1" }.use { route53DomainsClient ->

```

```
route53DomainsClient
    .listDomainsPaginated(ListDomainsRequest {})
    .transform { it.domains?.forEach { obj -> emit(obj) } }
    .collect { content ->
        println("The domain name is ${content.domainName}")
    }
}
```

- For API details, see the following topics in *AWS SDK for Kotlin API reference*.
  - [CheckDomainAvailability](#)
  - [CheckDomainTransferability](#)
  - [GetDomainDetail](#)
  - [GetDomainSuggestions](#)
  - [GetOperationDetail](#)
  - [ListDomains](#)
  - [ListOperations](#)
  - [ListPrices](#)
  - [RegisterDomain](#)
  - [ViewBilling](#)

## Actions

### CheckDomainAvailability

The following code example shows how to use CheckDomainAvailability.

#### SDK for Kotlin

##### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun checkDomainAvailability(domainSuggestion: String) {
```

```
val availabilityRequest =
    CheckDomainAvailabilityRequest {
        domainName = domainSuggestion
    }
Route53DomainsClient { region = "us-east-1" }.use { route53DomainsClient ->
    val response =
route53DomainsClient.checkDomainAvailability(availabilityRequest)
    println("$domainSuggestion is ${response.availability}")
}
}
```

- For API details, see [CheckDomainAvailability](#) in *AWS SDK for Kotlin API reference*.

## CheckDomainTransferability

The following code example shows how to use CheckDomainTransferability.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun checkDomainTransferability(domainSuggestion: String?) {
    val transferabilityRequest =
        CheckDomainTransferabilityRequest {
            domainName = domainSuggestion
        }
    Route53DomainsClient { region = "us-east-1" }.use { route53DomainsClient ->
        val response =
route53DomainsClient.checkDomainTransferability(transferabilityRequest)
        println("Transferability: ${response.transferability?.transferable}")
    }
}
```

- For API details, see [CheckDomainTransferability](#) in *AWS SDK for Kotlin API reference*.

## GetDomainDetail

The following code example shows how to use `GetDomainDetail`.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun getDomainDetails(domainSuggestion: String?) {
    val detailRequest =
        GetDomainDetailRequest {
            domainName = domainSuggestion
        }
    Route53DomainsClient { region = "us-east-1" }.use { route53DomainsClient ->
        val response = route53DomainsClient.getDomainDetail(detailRequest)
        println("The contact first name is
        ${response.registrantContact?.firstName}")
        println("The contact last name is ${response.registrantContact?.lastName}")
        println("The contact org name is
        ${response.registrantContact?.organizationName}")
    }
}
```

- For API details, see [GetDomainDetail](#) in *AWS SDK for Kotlin API reference*.

## GetDomainSuggestions

The following code example shows how to use `GetDomainSuggestions`.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun listDomainSuggestions(domainSuggestion: String?) {
    val suggestionsRequest =
        GetDomainSuggestionsRequest {
            domainName = domainSuggestion
            suggestionCount = 5
            onlyAvailable = true
        }
    Route53DomainsClient { region = "us-east-1" }.use { route53DomainsClient ->
        val response = route53DomainsClient.getDomainSuggestions(suggestionsRequest)
        response.suggestionsList?.forEach { suggestion ->
            println("Suggestion Name: ${suggestion.domainName}")
            println("Availability: ${suggestion.availability}")
            println(" ")
        }
    }
}
```

- For API details, see [GetDomainSuggestions](#) in *AWS SDK for Kotlin API reference*.

## GetOperationDetail

The following code example shows how to use `GetOperationDetail`.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun getOperationalDetail(opId: String?) {
    val detailRequest =
        GetOperationDetailRequest {
            operationId = opId
        }
    Route53DomainsClient { region = "us-east-1" }.use { route53DomainsClient ->
        val response = route53DomainsClient.getOperationDetail(detailRequest)
        println("Operation detail message is ${response.message}")
    }
}
```

```
}
```

- For API details, see [GetOperationDetail](#) in *AWS SDK for Kotlin API reference*.

## ListDomains

The following code example shows how to use `ListDomains`.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun listDomains() {
    Route53DomainsClient { region = "us-east-1" }.use { route53DomainsClient ->
        route53DomainsClient
            .listDomainsPaginated(ListDomainsRequest {})
            .transform { it.domains?.forEach { obj -> emit(obj) } }
            .collect { content ->
                println("The domain name is ${content.domainName}")
            }
    }
}
```

- For API details, see [ListDomains](#) in *AWS SDK for Kotlin API reference*.

## ListOperations

The following code example shows how to use `ListOperations`.

## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun listOperations() {
    val currentDate = Date()
    var localDateTime =
currentDate.toInstant().atZone(ZoneId.systemDefault()).toLocalDateTime()
    val zoneOffset = ZoneOffset.of("+01:00")
    localDateTime = localDateTime.minusYears(1)
    val myTime: java.time.Instant? = localDateTime.toInstant(zoneOffset)
    val time2: Instant? = myTime?.let { Instant(it) }
    val operationsRequest =
        ListOperationsRequest {
            submittedSince = time2
        }

    Route53DomainsClient { region = "us-east-1" }.use { route53DomainsClient ->
        route53DomainsClient
            .listOperationsPaginated(operationsRequest)
            .transform { it.operations?.forEach { obj -> emit(obj) } }
            .collect { content ->
                println("Operation Id: ${content.operationId}")
                println("Status: ${content.status}")
                println("Date: ${content.submittedDate}")
            }
    }
}
```

- For API details, see [ListOperations](#) in *AWS SDK for Kotlin API reference*.

## ListPrices

The following code example shows how to use ListPrices.



## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun listAllPrices(domainType: String?) {
    val pricesRequest =
        ListPricesRequest {
            tld = domainType
        }

    Route53DomainsClient { region = "us-east-1" }.use { route53DomainsClient ->
        route53DomainsClient
            .listPricesPaginated(pricesRequest)
            .transform { it.prices?.forEach { obj -> emit(obj) } }
            .collect { pr ->
                println("Registration: ${pr.registrationPrice}
${pr.registrationPrice?.currency}")
                println("Renewal: ${pr.renewalPrice?.price}
${pr.renewalPrice?.currency}")
                println("Transfer: ${pr.transferPrice?.price}
${pr.transferPrice?.currency}")
                println("Restoration: ${pr.restorationPrice?.price}
${pr.restorationPrice?.currency}")
            }
    }
}
```

- For API details, see [ListPrices](#) in *AWS SDK for Kotlin API reference*.

## RegisterDomain

The following code example shows how to use RegisterDomain.

## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun requestDomainRegistration(
    domainSuggestion: String?,
    phoneNumberVal: String?,
    emailVal: String?,
    firstNameVal: String?,
    lastNameVal: String?,
    cityVal: String?,
): String? {
    val contactDetail =
        ContactDetail {
            contactType = ContactType.Company
            state = "LA"
            countryCode = CountryCode.In
            email = emailVal
            firstName = firstNameVal
            lastName = lastNameVal
            city = cityVal
            phoneNumber = phoneNumberVal
            organizationName = "My Org"
            addressLine1 = "My Address"
            zipCode = "123 123"
        }

    val domainRequest =
        RegisterDomainRequest {
            adminContact = contactDetail
            registrantContact = contactDetail
            techContact = contactDetail
            domainName = domainSuggestion
            autoRenew = true
            durationInYears = 1
        }

    Route53DomainsClient { region = "us-east-1" }.use { route53DomainsClient ->
```

```
        val response = route53DomainsClient.registerDomain(domainRequest)
        println("Registration requested. Operation Id: ${response.operationId}")
        return response.operationId
    }
}
```

- For API details, see [RegisterDomain](#) in *AWS SDK for Kotlin API reference*.

## ViewBilling

The following code example shows how to use ViewBilling.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun listBillingRecords() {
    val currentDate = Date()
    val localDateTime =
        currentDate.toInstant().atZone(ZoneId.systemDefault()).toLocalDateTime()
    val zoneOffset = ZoneOffset.of("+01:00")
    val localDateTime2 = localDateTime.minusYears(1)
    val myStartTime = localDateTime2.toInstant(zoneOffset)
    val myEndTime = localDateTime.toInstant(zoneOffset)
    val timeStart: Instant? = myStartTime?.let { Instant(it) }
    val timeEnd: Instant? = myEndTime?.let { Instant(it) }

    val viewBillingRequest =
        ViewBillingRequest {
            start = timeStart
            end = timeEnd
        }

    Route53DomainsClient { region = "us-east-1" }.use { route53DomainsClient ->
        route53DomainsClient
            .viewBillingPaginated(viewBillingRequest)
            .transform { it.billingRecords?.forEach { obj -> emit(obj) } }
    }
}
```

```
        .collect { billing ->
            println("Bill Date: ${billing.billDate}")
            println("Operation: ${billing.operation}")
            println("Price: ${billing.price}")
        }
    }
}
```

- For API details, see [ViewBilling](#) in *AWS SDK for Kotlin API reference*.

## Amazon S3 examples using SDK for Kotlin

The following code examples show you how to perform actions and implement common scenarios by using the AWS SDK for Kotlin with Amazon S3.

*Basics* are code examples that show you how to perform the essential operations within a service.

*Actions* are code excerpts from larger programs and must be run in context. While actions show you how to call individual service functions, you can see actions in context in their related scenarios.

*Scenarios* are code examples that show you how to accomplish specific tasks by calling multiple functions within a service or combined with other AWS services.

Each example includes a link to the complete source code, where you can find instructions on how to set up and run the code in context.

### Topics

- [Basics](#)
- [Actions](#)
- [Scenarios](#)

## Basics

### Learn the basics

The following code example shows how to:

- Create a bucket and upload a file to it.
- Download an object from a bucket.

- Copy an object to a subfolder in a bucket.
- List the objects in a bucket.
- Delete the bucket objects and the bucket.

## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun main(args: Array<String>) {
    val usage = """
    Usage:
        <bucketName> <key> <objectPath> <savePath> <toBucket>

    Where:
        bucketName - The Amazon S3 bucket to create.
        key - The key to use.
        objectPath - The path where the file is located (for example, C:/AWS/
book2.pdf).
        savePath - The path where the file is saved after it's downloaded (for
example, C:/AWS/book2.pdf).
        toBucket - An Amazon S3 bucket to where an object is copied to (for example,
C:/AWS/book2.pdf).
    """

    if (args.size != 4) {
        println(usage)
        exitProcess(1)
    }

    val bucketName = args[0]
    val key = args[1]
    val objectPath = args[2]
    val savePath = args[3]
    val toBucket = args[4]

    // Create an Amazon S3 bucket.
    createBucket(bucketName)
```

```
// Update a local file to the Amazon S3 bucket.
putObject(bucketName, key, objectPath)

// Download the object to another local file.
getObjectFromMrap(bucketName, key, savePath)

// List all objects located in the Amazon S3 bucket.
listBucketObs(bucketName)

// Copy the object to another Amazon S3 bucket
copyBucketOb(bucketName, key, toBucket)

// Delete the object from the Amazon S3 bucket.
deleteBucketObs(bucketName, key)

// Delete the Amazon S3 bucket.
deleteBucket(bucketName)
println("All Amazon S3 operations were successfully performed")
}

suspend fun createBucket(bucketName: String) {
    val request =
        CreateBucketRequest {
            bucket = bucketName
        }

    S3Client { region = "us-east-1" }.use { s3 ->
        s3.createBucket(request)
        println("$bucketName is ready")
    }
}

suspend fun putObject(
    bucketName: String,
    objectKey: String,
    objectPath: String,
) {
    val metadataVal = mutableMapOf<String, String>()
    metadataVal["myVal"] = "test"

    val request =
        PutObjectRequest {
            bucket = bucketName
```

```
        key = objectKey
        metadata = metadataVal
        this.body = Paths.get(objectPath).asByteStream()
    }

    S3Client { region = "us-east-1" }.use { s3 ->
        val response = s3.putObject(request)
        println("Tag information is ${response.eTag}")
    }
}

suspend fun getObjectFromMrap(
    bucketName: String,
    keyName: String,
    path: String,
) {
    val request =
        GetObjectRequest {
            key = keyName
            bucket = bucketName
        }

    S3Client { region = "us-east-1" }.use { s3 ->
        s3.getObject(request) { resp ->
            val myFile = File(path)
            resp.body?.writeToFile(myFile)
            println("Successfully read $keyName from $bucketName")
        }
    }
}

suspend fun listBucketObs(bucketName: String) {
    val request =
        ListObjectsRequest {
            bucket = bucketName
        }

    S3Client { region = "us-east-1" }.use { s3 ->

        val response = s3.listObjects(request)
        response.contents?.forEach { myObject ->
            println("The name of the key is ${myObject.key}")
            println("The owner is ${myObject.owner}")
        }
    }
}
```

```
    }
}

suspend fun copyBucketObj(
    fromBucket: String,
    objectKey: String,
    toBucket: String,
) {
    var encodedUrl = ""
    try {
        encodedUrl = URLEncoder.encode("$fromBucket/$objectKey",
StandardCharsets.UTF_8.toString())
    } catch (e: UnsupportedOperationException) {
        println("URL could not be encoded: " + e.message)
    }

    val request =
        CopyObjectRequest {
            copySource = encodedUrl
            bucket = toBucket
            key = objectKey
        }
    S3Client { region = "us-east-1" }.use { s3 ->
        s3.copyObject(request)
    }
}

suspend fun deleteBucketObs(
    bucketName: String,
    objectName: String,
) {
    val objectId =
        ObjectIdentifier {
            key = objectName
        }

    val delObj =
        Delete {
            objects = listOf(objectId)
        }

    val request =
        DeleteObjectsRequest {
            bucket = bucketName
        }
}
```



```
        delete = delObj
    }

    S3Client { region = "us-east-1" }.use { s3 ->
        s3.deleteObjects(request)
        println("$objectName was deleted from $bucketName")
    }
}

suspend fun deleteBucket(bucketName: String?) {
    val request =
        DeleteBucketRequest {
            bucket = bucketName
        }
    S3Client { region = "us-east-1" }.use { s3 ->
        s3.deleteBucket(request)
        println("The $bucketName was successfully deleted!")
    }
}
```

- For API details, see the following topics in *AWS SDK for Kotlin API reference*.
  - [CopyObject](#)
  - [CreateBucket](#)
  - [DeleteBucket](#)
  - [DeleteObjects](#)
  - [GetObject](#)
  - [ListObjectsV2](#)
  - [PutObject](#)

## Actions

### CopyObject

The following code example shows how to use CopyObject.

## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun copyBucketObject(
    fromBucket: String,
    objectKey: String,
    toBucket: String,
) {
    var encodedUrl = ""
    try {
        encodedUrl = URLEncoder.encode("$fromBucket/$objectKey",
StandardCharsets.UTF_8.toString())
    } catch (e: UnsupportedOperationException) {
        println("URL could not be encoded: " + e.message)
    }

    val request =
        CopyObjectRequest {
            copySource = encodedUrl
            bucket = toBucket
            key = objectKey
        }
    S3Client { region = "us-east-1" }.use { s3 ->
        s3.copyObject(request)
    }
}
```

- For API details, see [CopyObject](#) in *AWS SDK for Kotlin API reference*.

## CreateBucket

The following code example shows how to use CreateBucket.

## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun createNewBucket(bucketName: String) {
    val request =
        CreateBucketRequest {
            bucket = bucketName
        }

    S3Client { region = "us-east-1" }.use { s3 ->
        s3.createBucket(request)
        println("$bucketName is ready")
    }
}
```

- For API details, see [CreateBucket](#) in *AWS SDK for Kotlin API reference*.

## CreateMultiRegionAccessPoint

The following code example shows how to use `CreateMultiRegionAccessPoint`.

## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

Configure the S3 control client to send request to the us-west-2 Region.

```
suspend fun createS3ControlClient(): S3ControlClient {
    // Configure your S3ControlClient to send requests to US West (Oregon).
    val s3Control = S3ControlClient.fromEnvironment {
```

```

        region = "us-west-2"
    }
    return s3Control
}

```

## Create the Multi-Region Access Point.

```

suspend fun createMrap(
    s3Control: S3ControlClient,
    accountIdParam: String,
    bucketName1: String,
    bucketName2: String,
    mrapName: String,
): String {
    println("Creating MRAP ...")
    val createMrapResponse: CreateMultiRegionAccessPointResponse =
        s3Control.createMultiRegionAccessPoint {
            accountId = accountIdParam
            clientToken = UUID.randomUUID().toString()
            details {
                name = mrapName
                regions = listOf(
                    Region {
                        bucket = bucketName1
                    },
                    Region {
                        bucket = bucketName2
                    },
                )
            }
        }
    val requestToken: String? = createMrapResponse.requestTokenArn

    // Use the request token to check for the status of the
    CreateMultiRegionAccessPoint operation.
    if (requestToken != null) {
        waitForSucceededStatus(s3Control, requestToken, accountIdParam)
        println("MRAP created")
    }

    val getMrapResponse =
        s3Control.getMultiRegionAccessPoint(

```

```

        input = GetMultiRegionAccessPointRequest {
            accountId = accountIdParam
            name = mrapName
        },
    )
    val mrapAlias = getMrapResponse.accessPoint?.alias
    return "arn:aws:s3:::$accountIdParam:accesspoint/$mrapAlias"
}

```

Wait for the Multi-Region Access Point to become available.

```

suspend fun waitForSucceededStatus(
    s3Control: S3ControlClient,
    requestToken: String,
    accountIdParam: String,
    timeBetweenChecks: Duration = 1.minutes,
) {
    var describeResponse: DescribeMultiRegionAccessPointOperationResponse
    describeResponse = s3Control.describeMultiRegionAccessPointOperation(
        input = DescribeMultiRegionAccessPointOperationRequest {
            accountId = accountIdParam
            requestTokenArn = requestToken
        },
    )

    var status: String? = describeResponse.asyncOperation?.requestStatus
    while (status != "SUCCEEDED") {
        delay(timeBetweenChecks)
        describeResponse =
s3Control.describeMultiRegionAccessPointOperation(
            input = DescribeMultiRegionAccessPointOperationRequest {
                accountId = accountIdParam
                requestTokenArn = requestToken
            },
        )
        status = describeResponse.asyncOperation?.requestStatus
        println(status)
    }
}

```

- For more information, see [AWS SDK for Kotlin developer guide](#).

- For API details, see [CreateMultiRegionAccessPoint](#) in *AWS SDK for Kotlin API reference*.

## DeleteBucketPolicy

The following code example shows how to use DeleteBucketPolicy.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun deleteS3BucketPolicy(bucketName: String?) {
    val request =
        DeleteBucketPolicyRequest {
            bucket = bucketName
        }

    S3Client { region = "us-east-1" }.use { s3 ->
        s3.deleteBucketPolicy(request)
        println("Done!")
    }
}
```

- For API details, see [DeleteBucketPolicy](#) in *AWS SDK for Kotlin API reference*.

## DeleteObjects

The following code example shows how to use DeleteObjects.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun deleteBucketObjects(
    bucketName: String,
    objectName: String,
) {
    val objectId =
        ObjectIdentifier {
            key = objectName
        }

    val delOb =
        Delete {
            objects = listOf(objectId)
        }

    val request =
        DeleteObjectsRequest {
            bucket = bucketName
            delete = delOb
        }

    S3Client { region = "us-east-1" }.use { s3 ->
        s3.deleteObjects(request)
        println("$objectName was deleted from $bucketName")
    }
}
```

- For API details, see [DeleteObjects](#) in *AWS SDK for Kotlin API reference*.

## GetBucketPolicy

The following code example shows how to use `GetBucketPolicy`.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun getPolicy(bucketName: String): String? {
    println("Getting policy for bucket $bucketName")

    val request =
        GetBucketPolicyRequest {
            bucket = bucketName
        }

    S3Client { region = "us-east-1" }.use { s3 ->
        val policyRes = s3.getBucketPolicy(request)
        return policyRes.policy
    }
}
```

- For API details, see [GetBucketPolicy](#) in *AWS SDK for Kotlin API reference*.

## GetObject

The following code example shows how to use `GetObject`.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun getObjectBytes(
    bucketName: String,
    keyName: String,
    path: String,
) {
    val request =
        GetObjectRequest {
            key = keyName
            bucket = bucketName
        }

    S3Client { region = "us-east-1" }.use { s3 ->
```



```
s3.getObject(request) { resp ->
    val myFile = File(path)
    resp.body?.writeToFile(myFile)
    println("Successfully read $keyName from $bucketName")
}
}
```

- For API details, see [GetObject](#) in *AWS SDK for Kotlin API reference*.

## GetObjectAcl

The following code example shows how to use `GetObjectAcl`.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun getBucketACL(
    objectKey: String,
    bucketName: String,
) {
    val request =
        GetObjectAclRequest {
            bucket = bucketName
            key = objectKey
        }

    S3Client { region = "us-east-1" }.use { s3 ->
        val response = s3.getObjectAcl(request)
        response.grants?.forEach { grant ->
            println("Grant permission is ${grant.permission}")
        }
    }
}
```

- For API details, see [GetObjectAcl](#) in *AWS SDK for Kotlin API reference*.

## ListObjectsV2

The following code example shows how to use ListObjectsV2.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun listBucketObjects(bucketName: String) {
    val request =
        ListObjectsRequest {
            bucket = bucketName
        }

    S3Client { region = "us-east-1" }.use { s3 ->
        val response = s3.listObjects(request)
        response.contents?.forEach { myObject ->
            println("The name of the key is ${myObject.key}")
            println("The object is ${myObject.size?.let { calKb(it) }} KBs")
            println("The owner is ${myObject.owner}")
        }
    }
}

private fun calKb(intValue: Long): Long = intValue / 1024
```

- For API details, see [ListObjectsV2](#) in *AWS SDK for Kotlin API reference*.

## PutBucketAcl

The following code example shows how to use PutBucketAcl.

## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun setBucketAcl(
    bucketName: String,
    idVal: String,
) {
    val myGrant =
        Grantee {
            id = idVal
            type = Type.CanonicalUser
        }

    val ownerGrant =
        Grant {
            grantee = myGrant
            permission = Permission.FullControl
        }

    val grantList = mutableListOf<Grant>()
    grantList.add(ownerGrant)

    val ownerOb =
        Owner {
            id = idVal
        }

    val acl =
        AccessControlPolicy {
            owner = ownerOb
            grants = grantList
        }

    val request =
        PutBucketAclRequest {
            bucket = bucketName
            accessControlPolicy = acl
        }
}
```

```
    }

    S3Client { region = "us-east-1" }.use { s3 ->
        s3.putBucketAcl(request)
        println("An ACL was successfully set on $bucketName")
    }
}
```

- For API details, see [PutBucketAcl](#) in *AWS SDK for Kotlin API reference*.

## PutObject

The following code example shows how to use PutObject.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun putS3Object(
    bucketName: String,
    objectKey: String,
    objectPath: String,
) {
    val metadataVal = mutableMapOf<String, String>()
    metadataVal["myVal"] = "test"

    val request =
        PutObjectRequest {
            bucket = bucketName
            key = objectKey
            metadata = metadataVal
            body = File(objectPath).asByteStream()
        }

    S3Client { region = "us-east-1" }.use { s3 ->
        val response = s3.putObject(request)
        println("Tag information is ${response.eTag}")
    }
}
```

```
}  
}
```

- For API details, see [PutObject](#) in *AWS SDK for Kotlin API reference*.

## Scenarios

### Create a presigned URL

The following code example shows how to create a presigned URL for Amazon S3 and upload an object.

#### SDK for Kotlin

##### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

Create a `GetObject` presigned request and use the URL to download an object.

```
suspend fun getObjectPresigned(  
    s3: S3Client,  
    bucketName: String,  
    keyName: String,  
): String {  
    // Create a GetObjectRequest.  
    val unsignedRequest =  
        GetObjectRequest {  
            bucket = bucketName  
            key = keyName  
        }  
  
    // Presign the GetObject request.  
    val presignedRequest = s3.presignGetObject(unsignedRequest, 24.hours)  
  
    // Use the URL from the presigned HttpRequest in a subsequent HTTP GET request  
    to retrieve the object.  
    val objectContents = URL(presignedRequest.url.toString()).readText()
```

```
    return objectContents
}
```

Create a `GetObject` presigned request with advanced options.

```
suspend fun getObjectPresignedMoreOptions(
    s3: S3Client,
    bucketName: String,
    keyName: String,
): HttpRequest {
    // Create a GetObjectRequest.
    val unsignedRequest =
        GetObjectRequest {
            bucket = bucketName
            key = keyName
        }

    // Presign the GetObject request.
    val presignedRequest =
        s3.presignGetObject(unsignedRequest, signer = CrtAwsSigner) {
            signingDate = Instant.now() + 12.hours // Presigned request can be used
            12 hours from now.
            algorithm = AwsSigningAlgorithm.SIGV4_ASYMMETRIC
            signatureType = AwsSignatureType.HTTP_REQUEST_VIA_QUERY_PARAMS
            expiresAfter = 8.hours // Presigned request expires 8 hours later.
        }
    return presignedRequest
}
```

Create a `PutObject` presigned request and use it to upload an object.

```
suspend fun putObjectPresigned(
    s3: S3Client,
    bucketName: String,
    keyName: String,
    content: String,
) {
    // Create a PutObjectRequest.
    val unsignedRequest =
        PutObjectRequest {
```

```
        bucket = bucketName
        key = keyName
    }

    // Presign the request.
    val presignedRequest = s3.presignPutObject(unsignedRequest, 24.hours)

    // Use the URL and any headers from the presigned HttpRequest in a subsequent
    HTTP PUT request to retrieve the object.
    // Create a PUT request using the OkHttpClient API.
    val putRequest =
        Request
            .Builder()
            .url(presignedRequest.url.toString())
            .apply {
                presignedRequest.headers.forEach { key, values ->
                    header(key, values.joinToString(", "))
                }
            }.put(content.toRequestBody())
            .build()

    val response = OkHttpClient().newCall(putRequest).execute()
    assert(response.isSuccessful)
}
```

- For more information, see [AWS SDK for Kotlin developer guide](#).

## Create a serverless application to manage photos

The following code example shows how to create a serverless application that lets users manage photos using labels.

### SDK for Kotlin

Shows how to develop a photo asset management application that detects labels in images using Amazon Rekognition and stores them for later retrieval.

For complete source code and instructions on how to set up and run, see the full example on [GitHub](#).

For a deep dive into the origin of this example see the post on [AWS Community](#).

### Services used in this example

- API Gateway
- DynamoDB
- Lambda
- Amazon Rekognition
- Amazon S3
- Amazon SNS

### Detect objects in images

The following code example shows how to build an app that uses Amazon Rekognition to detect objects by category in images.

#### SDK for Kotlin

Shows how to use Amazon Rekognition Kotlin API to create an app that uses Amazon Rekognition to identify objects by category in images located in an Amazon Simple Storage Service (Amazon S3) bucket. The app sends the admin an email notification with the results using Amazon Simple Email Service (Amazon SES).

For complete source code and instructions on how to set up and run, see the full example on [GitHub](#).

### Services used in this example

- Amazon Rekognition
- Amazon S3
- Amazon SES

### Get an object from a Multi-Region Access Point

The following code example shows how to get an object from a Multi-Region Access Point.



## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

Configure the S3 client to use the Asymmetric Sigv4 (Sigv4a) signing algorithm.

```
suspend fun createS3Client(): S3Client {
    // Configure your S3Client to use the Asymmetric Sigv4 (Sigv4a) signing
algorithm.
    val sigV4AScheme = SigV4AsymmetricAuthScheme(CrtAwsSigner)
    val s3 = S3Client.fromEnvironment {
        authSchemes = listOf(sigV4AScheme)
    }
    return s3
}
```

Use the Multi-Region Access Point ARN instead of a bucket name to retrieve the object.

```
suspend fun getObjectFromMrap(
    s3: S3Client,
    mrapArn: String,
    keyName: String,
): String? {
    val request = GetObjectRequest {
        bucket = mrapArn // Use the ARN instead of the bucket name for object
operations.
        key = keyName
    }

    var stringObj: String? = null
    s3.getObject(request) { resp ->
        stringObj = resp.body?.decodeToString()
        if (stringObj != null) {
            println("Successfully read $keyName from $mrapArn")
        }
    }
    return stringObj
}
```

```
}
```

- For more information, see [AWS SDK for Kotlin developer guide](#).
- For API details, see [GetObject](#) in *AWS SDK for Kotlin API reference*.

## SageMaker examples using SDK for Kotlin

The following code examples show you how to perform actions and implement common scenarios by using the AWS SDK for Kotlin with SageMaker.

*Actions* are code excerpts from larger programs and must be run in context. While actions show you how to call individual service functions, you can see actions in context in their related scenarios.

*Scenarios* are code examples that show you how to accomplish specific tasks by calling multiple functions within a service or combined with other AWS services.

Each example includes a link to the complete source code, where you can find instructions on how to set up and run the code in context.

### Get started

#### Hello SageMaker

The following code examples show how to get started using SageMaker.

#### SDK for Kotlin

##### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun listBooks() {
    SageMakerClient { region = "us-west-2" }.use { sagemakerClient ->
        val response =
            sagemakerClient.listNotebookInstances(ListNotebookInstancesRequest {})
        response.notebookInstances?.forEach { item ->
            println("The notebook name is: ${item.notebookInstanceName}")
        }
    }
}
```

```
    }  
  }  
}
```

- For API details, see [ListNotebookInstances](#) in *AWS SDK for Kotlin API reference*.

## Topics

- [Actions](#)
- [Scenarios](#)

## Actions

### CreatePipeline

The following code example shows how to use `CreatePipeline`.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
// Create a pipeline from the example pipeline JSON.  
suspend fun setupPipeline(filePath: String?, roleArnVal: String?, functionArnVal:  
String?, pipelineNameVal: String?) {  
    println("Setting up the pipeline.")  
    val parser = JSONParser()  
  
    // Read JSON and get pipeline definition.  
    FileReader(filePath).use { reader ->  
        val obj: Any = parser.parse(reader)  
        val jsonObject: JSONObject = obj as JSONObject  
        val stepsArray: JSONArray = jsonObject.get("Steps") as JSONArray  
        for (stepObj in stepsArray) {  
            val step: JSONObject = stepObj as JSONObject  
            if (step.containsKey("FunctionArn")) {
```

```
        step.put("FunctionArn", functionArnVal)
    }
}
println(jsonObject)

// Create the pipeline.
val pipelineRequest = CreatePipelineRequest {
    pipelineDescription = "Kotlin SDK example pipeline"
    roleArn = roleArnVal
    pipelineName = pipelineNameVal
    pipelineDefinition = jsonObject.toString()
}

SageMakerClient { region = "us-west-2" }.use { sageMakerClient ->
    sageMakerClient.createPipeline(pipelineRequest)
}
}
```

- For API details, see [CreatePipeline](#) in *AWS SDK for Kotlin API reference*.

## DeletePipeline

The following code example shows how to use DeletePipeline.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
// Delete a SageMaker pipeline by name.
suspend fun deletePipeline(pipelineNameVal: String) {
    val pipelineRequest = DeletePipelineRequest {
        pipelineName = pipelineNameVal
    }

    SageMakerClient { region = "us-west-2" }.use { sageMakerClient ->
        sageMakerClient.deletePipeline(pipelineRequest)
    }
}
```

```
        println("*** Successfully deleted $pipelineNameVal")
    }
}
```

- For API details, see [DeletePipeline](#) in *AWS SDK for Kotlin API reference*.

## DescribePipelineExecution

The following code example shows how to use DescribePipelineExecution.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun waitForPipelineExecution(executionArn: String?) {
    var status: String
    var index = 0
    do {
        val pipelineExecutionRequest = DescribePipelineExecutionRequest {
            pipelineExecutionArn = executionArn
        }

        SageMakerClient { region = "us-west-2" }.use { sageMakerClient ->
            val response =
sageMakerClient.describePipelineExecution(pipelineExecutionRequest)
            status = response.pipelineExecutionStatus.toString()
            println("$index. The status of the pipeline is $status")
            TimeUnit.SECONDS.sleep(4)
            index++
        }
    } while ("Executing" == status)
    println("Pipeline finished with status $status")
}
```

- For API details, see [DescribePipelineExecution](#) in *AWS SDK for Kotlin API reference*.

## StartPipelineExecution

The following code example shows how to use StartPipelineExecution.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
// Start a pipeline run with job configurations.
suspend fun executePipeline(bucketName: String, queueUrl: String?, roleArn: String?,
    pipelineNameVal: String): String? {
    println("Starting pipeline execution.")
    val inputBucketLocation = "s3://$bucketName/samplefiles/latlongtest.csv"
    val output = "s3://$bucketName/outputfiles/"

    val gson = GsonBuilder()
        .setFieldNamingPolicy(FieldNamingPolicy.UPPER_CAMEL_CASE)
        .setPrettyPrinting()
        .create()

    // Set up all parameters required to start the pipeline.
    val parameters: MutableList<Parameter> = java.util.ArrayList<Parameter>()

    val para1 = Parameter {
        name = "parameter_execution_role"
        value = roleArn
    }
    val para2 = Parameter {
        name = "parameter_queue_url"
        value = queueUrl
    }

    val inputJSON = """{
        "DataSourceConfig": {
            "S3Data": {
                "S3Uri": "s3://$bucketName/samplefiles/latlongtest.csv"
            },
            "Type": "S3_DATA"
        },
    },"
```

```
        "DocumentType": "CSV"
    }""
println(inputJSON)
val para3 = Parameter {
    name = "parameter_vej_input_config"
    value = inputJSON
}

// Create an ExportVectorEnrichmentJobOutputConfig object.
val jobS3Data = VectorEnrichmentJobS3Data {
    s3Uri = output
}

val outputConfig = ExportVectorEnrichmentJobOutputConfig {
    s3Data = jobS3Data
}

val gson4: String = gson.toJson(outputConfig)
val para4: Parameter = Parameter {
    name = "parameter_vej_export_config"
    value = gson4
}
println("parameter_vej_export_config:" + gson.toJson(outputConfig))

val para5JSON =
    "{\"MapMatchingConfig\":null,\"ReverseGeocodingConfig\":{\"XAttributeName\":
    \"Longitude\"},\"YAttributeName\":\"Latitude\"}"

val para5: Parameter = Parameter {
    name = "parameter_step_1_vej_config"
    value = para5JSON
}

parameters.add(para1)
parameters.add(para2)
parameters.add(para3)
parameters.add(para4)
parameters.add(para5)

val pipelineExecutionRequest = StartPipelineExecutionRequest {
    pipelineExecutionDescription = "Created using Kotlin SDK"
    pipelineExecutionDisplayName = "$pipelineName-example-execution"
    pipelineParameters = parameters
    pipelineName = pipelineNameVal
}
```

```
    }

    SageMakerClient { region = "us-west-2" }.use { sageMakerClient ->
        val response =
            sageMakerClient.startPipelineExecution(pipelineExecutionRequest)
        return response.pipelineExecutionArn
    }
}
```

- For API details, see [StartPipelineExecution](#) in *AWS SDK for Kotlin API reference*.

## Scenarios

### Get started with geospatial jobs and pipelines

The following code example shows how to:

- Set up resources for a pipeline.
- Set up a pipeline that executes a geospatial job.
- Start a pipeline execution.
- Monitor the status of the execution.
- View the output of the pipeline.
- Clean up resources.

For more information, see [Create and run SageMaker pipelines using AWS SDKs on Community.aws](#).

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
val DASHES = String(CharArray(80)).replace("\u0000", "-")
private var eventSourceMapping = ""
```



```
suspend fun main(args: Array<String>) {
    val usage = """
    Usage:
        <sageMakerRoleName> <lambdaRoleName> <functionName> <functionKey>
<queueName> <bucketName> <bucketFunction> <lnglatData> <spatialPipelinePath>
<pipelineName>

    Where:
        sageMakerRoleName - The name of the Amazon SageMaker role.
        lambdaRoleName - The name of the AWS Lambda role.
        functionName - The name of the AWS Lambda function (for
example, SageMakerExampleFunction).
        functionKey - The name of the Amazon S3 key name that represents the Lambda
function (for example, SageMakerLambda.zip).
        queueName - The name of the Amazon Simple Queue Service (Amazon SQS) queue.
        bucketName - The name of the Amazon Simple Storage Service (Amazon S3)
bucket.
        bucketFunction - The name of the Amazon S3 bucket that contains the Lambda
ZIP file.
        lnglatData - The file location of the latlongtest.csv file required for this
use case.
        spatialPipelinePath - The file location of the GeoSpatialPipeline.json file
required for this use case.
        pipelineName - The name of the pipeline to create (for example, sagemaker-
sdk-example-pipeline).
    """

    if (args.size != 10) {
        println(usage)
        exitProcess(1)
    }

    val sageMakerRoleName = args[0]
    val lambdaRoleName = args[1]
    val functionKey = args[2]
    val functionName = args[3]
    val queueName = args[4]
    val bucketName = args[5]
    val bucketFunction = args[6]
    val lnglatData = args[7]
    val spatialPipelinePath = args[8]
    val pipelineName = args[9]
    val handlerName = "org.example.SageMakerLambdaFunction::handleRequest"
```

```

println(DASHES)
println("Welcome to the Amazon SageMaker pipeline example scenario.")
println(
    """
        This example workflow will guide you through setting up and running an
        Amazon SageMaker pipeline. The pipeline uses an AWS Lambda function and an
        Amazon SQS Queue. It runs a vector enrichment reverse geocode job to
        reverse geocode addresses in an input file and store the results in an
        export file.
    """
)
println(DASHES)

println(DASHES)
println("First, we will set up the roles, functions, and queue needed by the
SageMaker pipeline.")
val lambdaRoleArn: String = checkLambdaRole(lambdaRoleName)
val sageMakerRoleArn: String = checkSageMakerRole(sageMakerRoleName)
val functionArn = checkFunction(functionName, bucketFunction, functionKey,
handlerName, lambdaRoleArn)
val queueUrl = checkQueue(queueName, functionName)
println(DASHES)

println(DASHES)
println("Setting up bucket $bucketName")
if (!checkBucket(bucketName)) {
    setupBucket(bucketName)
    println("Put $lnglatData into $bucketName")
    val objectKey = "samplefiles/latlongtest.csv"
    putS3Object(bucketName, objectKey, lnglatData)
}
println(DASHES)

println(DASHES)
println("Now we can create and run our pipeline.")
setupPipeline(spatialPipelinePath, sageMakerRoleArn, functionArn, pipelineName)
val pipelineExecutionARN = executePipeline(bucketName, queueUrl,
sageMakerRoleArn, pipelineName)
println("The pipeline execution ARN value is $pipelineExecutionARN")
waitForPipelineExecution(pipelineExecutionARN)
println("Wait 30 secs to get output results $bucketName")
TimeUnit.SECONDS.sleep(30)
getOutputResults(bucketName)

```

```

println(DASHES)

println(DASHES)
println(
    """
        The pipeline has completed. To view the pipeline and runs in SageMaker
Studio, follow these instructions:
        https://docs.aws.amazon.com/sagemaker/latest/dg/pipelines-studio.html
    """.trimIndent(),
)
println(DASHES)

println(DASHES)
println("Do you want to delete the AWS resources used in this Workflow? (y/n)")
val `in` = Scanner(System.`in`)
val delResources = `in`.nextLine()
if (delResources.compareTo("y") == 0) {
    println("Lets clean up the AWS resources. Wait 30 seconds")
    TimeUnit.SECONDS.sleep(30)
    deleteEventSourceMapping(functionName)
    deleteSQSQueue(queueName)
    listBucketObjects(bucketName)
    deleteBucket(bucketName)
    delLambdaFunction(functionName)
    deleteLambdaRole(lambdaRoleName)
    deleteSagemakerRole(sageMakerRoleName)
    deletePipeline(pipelineName)
} else {
    println("The AWS Resources were not deleted!")
}
println(DASHES)

println(DASHES)
println("SageMaker pipeline scenario is complete.")
println(DASHES)
}

// Delete a SageMaker pipeline by name.
suspend fun deletePipeline(pipelineNameVal: String) {
    val pipelineRequest = DeletePipelineRequest {
        pipelineName = pipelineNameVal
    }

    SageMakerClient { region = "us-west-2" }.use { sagemakerClient ->

```

```
sageMakerClient.deletePipeline(pipelineRequest)
println("*** Successfully deleted $pipelineNameVal")
}
}

suspend fun deleteSagemakerRole(roleNameVal: String) {
    val sageMakerRolePolicies = getSageMakerRolePolicies()
    IAMClient { region = "us-west-2" }.use { iam ->
        for (policy in sageMakerRolePolicies) {
            // First the policy needs to be detached.
            val rolePolicyRequest = DetachRolePolicyRequest {
                policyArn = policy
                roleName = roleNameVal
            }
            iam.detachRolePolicy(rolePolicyRequest)
        }

        // Delete the role.
        val roleRequest = DeleteRoleRequest {
            roleName = roleNameVal
        }
        iam.deleteRole(roleRequest)
        println("*** Successfully deleted $roleNameVal")
    }
}

suspend fun deleteLambdaRole(roleNameVal: String) {
    val lambdaRolePolicies = getLambdaRolePolicies()
    IAMClient { region = "us-west-2" }.use { iam ->
        for (policy in lambdaRolePolicies) {
            // First the policy needs to be detached.
            val rolePolicyRequest = DetachRolePolicyRequest {
                policyArn = policy
                roleName = roleNameVal
            }
            iam.detachRolePolicy(rolePolicyRequest)
        }

        // Delete the role.
        val roleRequest = DeleteRoleRequest {
            roleName = roleNameVal
        }
        iam.deleteRole(roleRequest)
        println("*** Successfully deleted $roleNameVal")
    }
}
```

```
    }
}

suspend fun delLambdaFunction(myFunctionName: String) {
    val request = DeleteFunctionRequest {
        functionName = myFunctionName
    }

    LambdaClient { region = "us-west-2" }.use { awsLambda ->
        awsLambda.deleteFunction(request)
        println("$myFunctionName was deleted")
    }
}

suspend fun deleteBucket(bucketName: String?) {
    val request = DeleteBucketRequest {
        bucket = bucketName
    }
    S3Client { region = "us-east-1" }.use { s3 ->
        s3.deleteBucket(request)
        println("The $bucketName was successfully deleted!")
    }
}

suspend fun deleteBucketObjects(bucketName: String, objectName: String?) {
    val toDelete = ArrayList<ObjectIdentifier>()
    val obId = ObjectIdentifier {
        key = objectName
    }
    toDelete.add(obId)
    val delOb = Delete {
        objects = toDelete
    }
    val dor = DeleteObjectsRequest {
        bucket = bucketName
        delete = delOb
    }

    S3Client { region = "us-east-1" }.use { s3Client ->
        s3Client.deleteObjects(dor)
        println("*** $bucketName objects were deleted.")
    }
}
```

```
suspend fun listBucketObjects(bucketNameVal: String) {
    val listObjects = ListObjectsRequest {
        bucket = bucketNameVal
    }

    S3Client { region = "us-east-1" }.use { s3Client ->
        val res = s3Client.listObjects(listObjects)
        val objects = res.contents
        if (objects != null) {
            for (myValue in objects) {
                println("The name of the key is ${myValue.key}")
                deleteBucketObjects(bucketNameVal, myValue.key)
            }
        }
    }
}

// Delete the specific Amazon SQS queue.
suspend fun deleteSQSQueue(queueNameVal: String?) {
    val getQueueRequest = GetQueueUrlRequest {
        queueName = queueNameVal
    }

    SqsClient { region = "us-west-2" }.use { sqsClient ->
        val urlVal = sqsClient.getQueueUrl(getQueueRequest).queueUrl
        val deleteQueueRequest = DeleteQueueRequest {
            queueUrl = urlVal
        }
        sqsClient.deleteQueue(deleteQueueRequest)
    }
}

// Delete the queue event mapping.
suspend fun deleteEventSourceMapping(functionNameVal: String) {
    if (eventSourceMapping.compareTo("") == 0) {
        LambdaClient { region = "us-west-2" }.use { lambdaClient ->
            val request = ListEventSourceMappingsRequest {
                functionName = functionNameVal
            }
            val response = lambdaClient.listEventSourceMappings(request)
            val eventList = response.eventSourceMappings
            if (eventList != null) {
                for (event in eventList) {
                    eventSourceMapping = event.uuid.toString()
                }
            }
        }
    }
}
```

```

        }
    }
}

val eventSourceMappingRequest = DeleteEventSourceMappingRequest {
    uuid = eventSourceMapping
}
LambdaClient { region = "us-west-2" }.use { lambdaClient ->
    lambdaClient.deleteEventSourceMapping(eventSourceMappingRequest)
    println("The event mapping is deleted!")
}
}

// Reads the objects in the S3 bucket and displays the values.
private suspend fun readObject(bucketName: String, keyVal: String?) {
    println("Output file contents: \n")
    val objectRequest = GetObjectRequest {
        bucket = bucketName
        key = keyVal
    }
    S3Client { region = "us-east-1" }.use { s3Client ->
        s3Client.getObject(objectRequest) { resp ->
            val byteArray = resp.body?.toByteArray()
            val text = byteArray?.let { String(it, StandardCharsets.UTF_8) }
            println("Text output: $text")
        }
    }
}

// Display the results from the output directory.
suspend fun getOutputResults(bucketName: String?) {
    println("Getting output results $bucketName.")
    val listObjectsRequest = ListObjectsRequest {
        bucket = bucketName
        prefix = "outputfiles/"
    }
    S3Client { region = "us-east-1" }.use { s3Client ->
        val response = s3Client.listObjects(listObjectsRequest)
        val s3objects: List<Object>? = response.contents
        if (s3objects != null) {
            for (`object` in s3objects) {
                if (bucketName != null) {
                    readObject(bucketName, (`object`.key))
                }
            }
        }
    }
}
}

```

```

        }
    }
}

suspend fun waitForPipelineExecution(executionArn: String?) {
    var status: String
    var index = 0
    do {
        val pipelineExecutionRequest = DescribePipelineExecutionRequest {
            pipelineExecutionArn = executionArn
        }

        SageMakerClient { region = "us-west-2" }.use { sageMakerClient ->
            val response =
sageMakerClient.describePipelineExecution(pipelineExecutionRequest)
            status = response.pipelineExecutionStatus.toString()
            println("$index. The status of the pipeline is $status")
            TimeUnit.SECONDS.sleep(4)
            index++
        }
    } while ("Executing" == status)
    println("Pipeline finished with status $status")
}

// Start a pipeline run with job configurations.
suspend fun executePipeline(bucketName: String, queueUrl: String?, roleArn: String?,
    pipelineNameVal: String): String? {
    println("Starting pipeline execution.")
    val inputBucketLocation = "s3://$bucketName/samplefiles/latlongtest.csv"
    val output = "s3://$bucketName/outputfiles/"

    val gson = GsonBuilder()
        .setFieldNamingPolicy(FieldNamingPolicy.UPPER_CAMEL_CASE)
        .setPrettyPrinting()
        .create()

    // Set up all parameters required to start the pipeline.
    val parameters: MutableList<Parameter> = java.util.ArrayList<Parameter>()

    val para1 = Parameter {
        name = "parameter_execution_role"
        value = roleArn
    }
}

```



```

    }
    val para2 = Parameter {
        name = "parameter_queue_url"
        value = queueUrl
    }

    val inputJSON = """"{
        "DataSourceConfig": {
            "S3Data": {
                "S3Uri": "s3://$bucketName/samplefiles/latlongtest.csv"
            },
            "Type": "S3_DATA"
        },
        "DocumentType": "CSV"
    }""""
    println(inputJSON)
    val para3 = Parameter {
        name = "parameter_vej_input_config"
        value = inputJSON
    }

    // Create an ExportVectorEnrichmentJobOutputConfig object.
    val jobS3Data = VectorEnrichmentJobS3Data {
        s3Uri = output
    }

    val outputConfig = ExportVectorEnrichmentJobOutputConfig {
        s3Data = jobS3Data
    }

    val gson4: String = gson.toJson(outputConfig)
    val para4: Parameter = Parameter {
        name = "parameter_vej_export_config"
        value = gson4
    }
    println("parameter_vej_export_config:" + gson.toJson(outputConfig))

    val para5JSON =
        "{\"MapMatchingConfig\":null,\"ReverseGeocodingConfig\":{\"XAttributeName\":
        \"Longitude\", \"YAttributeName\": \"Latitude\"}}\"

    val para5: Parameter = Parameter {
        name = "parameter_step_1_vej_config"
        value = para5JSON
    }

```

```

    }

    parameters.add(para1)
    parameters.add(para2)
    parameters.add(para3)
    parameters.add(para4)
    parameters.add(para5)

    val pipelineExecutionRequest = StartPipelineExecutionRequest {
        pipelineExecutionDescription = "Created using Kotlin SDK"
        pipelineExecutionDisplayName = "$pipelineName-example-execution"
        pipelineParameters = parameters
        pipelineName = pipelineNameVal
    }

    SageMakerClient { region = "us-west-2" }.use { sageMakerClient ->
        val response =
    sageMakerClient.startPipelineExecution(pipelineExecutionRequest)
        return response.pipelineExecutionArn
    }
}

// Create a pipeline from the example pipeline JSON.
suspend fun setupPipeline(filePath: String?, roleArnVal: String?, functionArnVal:
String?, pipelineNameVal: String?) {
    println("Setting up the pipeline.")
    val parser = JSONParser()

    // Read JSON and get pipeline definition.
    FileReader(filePath).use { reader ->
        val obj: Any = parser.parse(reader)
        val jsonObject: JSONObject = obj as JSONObject
        val stepsArray: JSONArray = jsonObject.get("Steps") as JSONArray
        for (stepObj in stepsArray) {
            val step: JSONObject = stepObj as JSONObject
            if (step.containsKey("FunctionArn")) {
                step.put("FunctionArn", functionArnVal)
            }
        }
        println(jsonObject)

        // Create the pipeline.
        val pipelineRequest = CreatePipelineRequest {
            pipelineDescription = "Kotlin SDK example pipeline"

```

```
        roleArn = roleArnVal
        pipelineName = pipelineNameVal
        pipelineDefinition = jsonObject.toString()
    }

    SageMakerClient { region = "us-west-2" }.use { sageMakerClient ->
        sageMakerClient.createPipeline(pipelineRequest)
    }
}

suspend fun putS3Object(bucketName: String, objectKey: String, objectPath: String) {
    val request = PutObjectRequest {
        bucket = bucketName
        key = objectKey
        body = File(objectPath).asByteStream()
    }

    S3Client { region = "us-east-1" }.use { s3 ->
        s3.putObject(request)
        println("Successfully placed $objectKey into bucket $bucketName")
    }
}

suspend fun setupBucket(bucketName: String) {
    val request = CreateBucketRequest {
        bucket = bucketName
    }

    S3Client { region = "us-east-1" }.use { s3 ->
        s3.createBucket(request)
        println("$bucketName is ready")
    }
}

suspend fun checkBucket(bucketName: String): Boolean {
    try {
        val headBucketRequest = HeadBucketRequest {
            bucket = bucketName
        }

        S3Client { region = "us-east-1" }.use { s3Client ->
            s3Client.headBucket(headBucketRequest)
            println("$bucketName exists")
            return true
        }
    }
}
```

```
    }
} catch (e: S3Exception) {
    println("Bucket does not exist")
}
return false
}

// Connect the queue to the Lambda function as an event source.
suspend fun connectLambda(queueUrlVal: String?, lambdaNameVal: String?) {
    println("Connecting the Lambda function and queue for the pipeline.")
    var queueArn = ""

    // Specify the attributes to retrieve.
    val atts: MutableList<QueueAttributeName> = ArrayList()
    atts.add(QueueAttributeName.QueueArn)
    val attributesRequest = GetQueueAttributesRequest {
        queueUrl = queueUrlVal
        attributeNames = atts
    }

    SqsClient { region = "us-west-2" }.use { sqsClient ->
        val response = sqsClient.getQueueAttributes(attributesRequest)
        val queueAtts = response.attributes
        if (queueAtts != null) {
            for ((key, value) in queueAtts) {
                println("Key = $key, Value = $value")
                queueArn = value
            }
        }
    }

    val eventSourceMappingRequest = CreateEventSourceMappingRequest {
        eventSourceArn = queueArn
        functionName = lambdaNameVal
    }

    LambdaClient { region = "us-west-2" }.use { lambdaClient ->
        val response1 =
lambdaClient.createEventSourceMapping(eventSourceMappingRequest)
        eventSourceMapping = response1.uuid.toString()
        println("The mapping between the event source and Lambda function was
successful")
    }
}

// Set up the SQS queue to use with the pipeline.
```

```
suspend fun setupQueue(queueNameVal: String, lambdaNameVal: String): String {
    println("Setting up queue named $queueNameVal")
    val queueAtt: MutableMap<String, String> = HashMap()
    queueAtt.put("DelaySeconds", "5")
    queueAtt.put("ReceiveMessageWaitTimeSeconds", "5")
    queueAtt.put("VisibilityTimeout", "300")

    val createQueueRequest = CreateQueueRequest {
        queueName = queueNameVal
        attributes = queueAtt
    }

    SqsClient { region = "us-west-2" }.use { sqsClient ->
        sqsClient.createQueue(createQueueRequest)
        println("\nGet queue url")
        val getQueueUrlResponse = sqsClient.getQueueUrl(GetQueueUrlRequest
{ queueName = queueNameVal })
        TimeUnit.SECONDS.sleep(15)
        connectLambda(getQueueUrlResponse.queueUrl, lambdaNameVal)
        println("Queue ready with Url " + getQueueUrlResponse.queueUrl)
        return getQueueUrlResponse.queueUrl.toString()
    }
}

// Checks to see if the Amazon SQS queue exists. If not, this method creates a new
// queue
// and returns the ARN value.
suspend fun checkQueue(queueNameVal: String, lambdaNameVal: String): String? {
    println("Checking to see if the queue exists. If not, a new queue will be
created for use in this workflow.")
    var queueUrl: String
    try {
        val request = GetQueueUrlRequest {
            queueName = queueNameVal
        }

        SqsClient { region = "us-west-2" }.use { sqsClient ->
            val response = sqsClient.getQueueUrl(request)
            queueUrl = response.queueUrl.toString()
            println(queueUrl)
        }
    } catch (e: SqsException) {
        println(e.message + " A new queue will be created")
        queueUrl = setupQueue(queueNameVal, lambdaNameVal)
    }
}
```

```
    }
    return queueUrl
}

suspend fun createNewFunction(myFunctionName: String, s3BucketName: String, myS3Key:
String, myHandler: String, myRole: String): String {
    val functionCode = FunctionCode {
        s3Bucket = s3BucketName
        s3Key = myS3Key
    }

    val request = CreateFunctionRequest {
        functionName = myFunctionName
        code = functionCode
        description = "Created by the Lambda Kotlin API"
        handler = myHandler
        role = myRole
        runtime = Runtime.Java11
        memorySize = 1024
        timeout = 200
    }

    LambdaClient { region = "us-west-2" }.use { awsLambda ->
        val functionResponse = awsLambda.createFunction(request)
        awsLambda.waitUntilFunctionActive {
            functionName = myFunctionName
        }
        println("${functionResponse.functionArn} was created")
        return functionResponse.functionArn.toString()
    }
}

suspend fun checkFunction(myFunctionName: String, s3BucketName: String, myS3Key:
String, myHandler: String, myRole: String): String {
    println("Checking to see if the function exists. If not, a new AWS Lambda
function will be created for use in this workflow.")
    var functionArn: String
    try {
        // Does this function already exist.
        val functionRequest = GetFunctionRequest {
            functionName = myFunctionName
        }
        LambdaClient { region = "us-west-2" }.use { lambdaClient ->
            val response = lambdaClient.getFunction(functionRequest)
```

```

        functionArn = response.configuration?.functionArn.toString()
        println("$functionArn exists")
    }
} catch (e: LambdaException) {
    println(e.message + " A new function will be created")
    functionArn = createNewFunction(myFunctionName, s3BucketName, myS3Key,
myHandler, myRole)
}
return functionArn
}

// Checks to see if the SageMaker role exists. If not, this method creates it.
suspend fun checkSageMakerRole(roleNameVal: String): String {
    println("Checking to see if the role exists. If not, a new role will be created
for AWS SageMaker to use.")
    var roleArn: String
    try {
        val roleRequest = GetRoleRequest {
            roleName = roleNameVal
        }
        IamClient { region = "AWS_GLOBAL" }.use { iamClient ->
            val response = iamClient.getRole(roleRequest)
            roleArn = response.role?.arn.toString()
            println(roleArn)
        }
    } catch (e: IamException) {
        println(e.message + " A new role will be created")
        roleArn = createSageMakerRole(roleNameVal)
    }
    return roleArn
}

suspend fun createSageMakerRole(roleNameVal: String): String {
    val sageMakerRolePolicies = getSageMakerRolePolicies()
    println("Creating a role to use with SageMaker.")
    val assumeRolePolicy = "{" +
        "\"Version\": \"2012-10-17\"," +
        "\"Statement\": [{" +
        "\"Effect\": \"Allow\"," +
        "\"Principal\": {" +
        "\"Service\": [" +
        "\"sagemaker.amazonaws.com\"," +
        "\"sagemaker-geospatial.amazonaws.com\"," +
        "\"lambda.amazonaws.com\"," +

```

```

        "\"s3.amazonaws.com\" +
        "]" +
        "}," +
        "\"Action\": \"sts:AssumeRole\" +
        "]" +
        "]"
    }

    val request = CreateRoleRequest {
        roleName = roleNameVal
        assumeRolePolicyDocument = assumeRolePolicy
        description = "Created using the AWS SDK for Kotlin"
    }

    iamClient { region = "AWS_GLOBAL" }.use { iamClient ->
        val roleResult = iamClient.createRole(request)

        // Attach the policies to the role.
        for (policy in sageMakerRolePolicies) {
            val attachRequest = AttachRolePolicyRequest {
                roleName = roleNameVal
                policyArn = policy
            }
            iamClient.attachRolePolicy(attachRequest)
        }

        // Allow time for the role to be ready.
        TimeUnit.SECONDS.sleep(15)
        System.out.println("Role ready with ARN ${roleResult.role?.arn}")
        return roleResult.role?.arn.toString()
    }
}

// Checks to see if the Lambda role exists. If not, this method creates it.
suspend fun checkLambdaRole(roleNameVal: String): String {
    println("Checking to see if the role exists. If not, a new role will be created
    for AWS Lambda to use.")
    var roleArn: String
    val roleRequest = GetRoleRequest {
        roleName = roleNameVal
    }

    try {
        iamClient { region = "AWS_GLOBAL" }.use { iamClient ->
            val response = iamClient.getRole(roleRequest)
            roleArn = response.role?.arn.toString()
        }
    }
}

```



```

        println(roleArn)
    }
} catch (e: IamException) {
    println(e.message + " A new role will be created")
    roleArn = createLambdaRole(roleNameVal)
}

return roleArn
}

private suspend fun createLambdaRole(roleNameVal: String): String {
    val lambdaRolePolicies = getLambdaRolePolicies()
    val assumeRolePolicy = "{" +
        "\"Version\": \"2012-10-17\"," +
        "\"Statement\": [{" +
        "\"Effect\": \"Allow\"," +
        "\"Principal\": {" +
        "\"Service\": [" +
        "\"sagemaker.amazonaws.com\"," +
        "\"sagemaker-geospatial.amazonaws.com\"," +
        "\"lambda.amazonaws.com\"," +
        "\"s3.amazonaws.com\"" +
        "]" +
        "}," +
        "\"Action\": \"sts:AssumeRole\"" +
        "}]}" +
        "}"

    val request = CreateRoleRequest {
        roleName = roleNameVal
        assumeRolePolicyDocument = assumeRolePolicy
        description = "Created using the AWS SDK for Kotlin"
    }

    IamClient { region = "AWS_GLOBAL" }.use { iamClient ->
        val roleResult = iamClient.createRole(request)

        // Attach the policies to the role.
        for (policy in lambdaRolePolicies) {
            val attachRequest = AttachRolePolicyRequest {
                roleName = roleNameVal
                policyArn = policy
            }
            iamClient.attachRolePolicy(attachRequest)
        }
    }
}

```

```
    }

    // Allow time for the role to be ready.
    TimeUnit.SECONDS.sleep(15)
    println("Role ready with ARN " + roleResult.role?.arn)
    return roleResult.role?.arn.toString()
}

fun getLambdaRolePolicies(): Array<String?> {
    val lambdaRolePolicies = arrayOfNulls<String>(5)
    lambdaRolePolicies[0] = "arn:aws:iam::aws:policy/AmazonSageMakerFullAccess"
    lambdaRolePolicies[1] = "arn:aws:iam::aws:policy/AmazonSQSFullAccess"
    lambdaRolePolicies[2] = "arn:aws:iam::aws:policy/service-role/" +
    "AmazonSageMakerGeospatialFullAccess"
    lambdaRolePolicies[3] = "arn:aws:iam::aws:policy/service-role/" +
    "AmazonSageMakerServiceCatalogProductsLambdaServiceRolePolicy"
    lambdaRolePolicies[4] = "arn:aws:iam::aws:policy/service-role/" +
    "AWSLambdaSQSQueueExecutionRole"
    return lambdaRolePolicies
}

fun getSageMakerRolePolicies(): Array<String?> {
    val sageMakerRolePolicies = arrayOfNulls<String>(3)
    sageMakerRolePolicies[0] = "arn:aws:iam::aws:policy/AmazonSageMakerFullAccess"
    sageMakerRolePolicies[1] = "arn:aws:iam::aws:policy/service-role/" +
    "AmazonSageMakerGeospatialFullAccess"
    sageMakerRolePolicies[2] = "arn:aws:iam::aws:policy/AmazonSQSFullAccess"
    return sageMakerRolePolicies
}
```

- For API details, see the following topics in *AWS SDK for Kotlin API reference*.
  - [CreatePipeline](#)
  - [DeletePipeline](#)
  - [DescribePipelineExecution](#)
  - [StartPipelineExecution](#)
  - [UpdatePipeline](#)

# Secrets Manager examples using SDK for Kotlin

The following code examples show you how to perform actions and implement common scenarios by using the AWS SDK for Kotlin with Secrets Manager.

*Actions* are code excerpts from larger programs and must be run in context. While actions show you how to call individual service functions, you can see actions in context in their related scenarios.

Each example includes a link to the complete source code, where you can find instructions on how to set up and run the code in context.

## Topics

- [Actions](#)

## Actions

### GetSecretValue

The following code example shows how to use `GetSecretValue`.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun getValue(secretName: String?) {
    val valueRequest =
        GetSecretValueRequest {
            secretId = secretName
        }

    SecretsManagerClient { region = "us-east-1" }.use { secretsClient ->
        val response = secretsClient.getSecretValue(valueRequest)
        val secret = response.secretString
        println("The secret value is $secret")
    }
}
```

```
}
```

- For API details, see [GetSecretValue](#) in *AWS SDK for Kotlin API reference*.

## Amazon SES examples using SDK for Kotlin

The following code examples show you how to perform actions and implement common scenarios by using the AWS SDK for Kotlin with Amazon SES.

*Scenarios* are code examples that show you how to accomplish specific tasks by calling multiple functions within a service or combined with other AWS services.

Each example includes a link to the complete source code, where you can find instructions on how to set up and run the code in context.

### Topics

- [Scenarios](#)

## Scenarios

### Create a web application to track DynamoDB data

The following code example shows how to create a web application that tracks work items in an Amazon DynamoDB table and uses Amazon Simple Email Service (Amazon SES) to send reports.

#### SDK for Kotlin

Shows how to use the Amazon DynamoDB API to create a dynamic web application that tracks DynamoDB work data.

For complete source code and instructions on how to set up and run, see the full example on [GitHub](#).

#### Services used in this example

- DynamoDB
- Amazon SES

## Create a web application to track Amazon Redshift data

The following code example shows how to create a web application that tracks and reports on work items using an Amazon Redshift database.

### SDK for Kotlin

Shows how to create a web application that tracks and reports on work items stored in an Amazon Redshift database.

For complete source code and instructions on how to set up a Spring REST API that queries Amazon Redshift data and for use by a React application, see the full example on [GitHub](#).

### Services used in this example

- Amazon Redshift
- Amazon SES

## Create an Aurora Serverless work item tracker

The following code example shows how to create a web application that tracks work items in an Amazon Aurora Serverless database and uses Amazon Simple Email Service (Amazon SES) to send reports.

### SDK for Kotlin

Shows how to create a web application that tracks and reports on work items stored in an Amazon RDS database.

For complete source code and instructions on how to set up a Spring REST API that queries Amazon Aurora Serverless data and for use by a React application, see the full example on [GitHub](#).

### Services used in this example

- Aurora
- Amazon RDS
- Amazon RDS Data Service
- Amazon SES

## Detect objects in images

The following code example shows how to build an app that uses Amazon Rekognition to detect objects by category in images.

### SDK for Kotlin

Shows how to use Amazon Rekognition Kotlin API to create an app that uses Amazon Rekognition to identify objects by category in images located in an Amazon Simple Storage Service (Amazon S3) bucket. The app sends the admin an email notification with the results using Amazon Simple Email Service (Amazon SES).

For complete source code and instructions on how to set up and run, see the full example on [GitHub](#).

### Services used in this example

- Amazon Rekognition
- Amazon S3
- Amazon SES

## Amazon SNS examples using SDK for Kotlin

The following code examples show you how to perform actions and implement common scenarios by using the AWS SDK for Kotlin with Amazon SNS.

*Actions* are code excerpts from larger programs and must be run in context. While actions show you how to call individual service functions, you can see actions in context in their related scenarios.

*Scenarios* are code examples that show you how to accomplish specific tasks by calling multiple functions within a service or combined with other AWS services.

Each example includes a link to the complete source code, where you can find instructions on how to set up and run the code in context.

### Get started

#### Hello Amazon SNS

The following code examples show how to get started using Amazon SNS.

## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
import aws.sdk.kotlin.services.sns.SnsClient
import aws.sdk.kotlin.services.sns.model.ListTopicsRequest
import aws.sdk.kotlin.services.sns.paginators.listTopicsPaginated
import kotlinx.coroutines.flow.transform

/**
Before running this Kotlin code example, set up your development environment,
including your credentials.

For more information, see the following documentation topic:
https://docs.aws.amazon.com/sdk-for-kotlin/latest/developer-guide/setup.html
*/
suspend fun main() {
    listTopicsPag()
}

suspend fun listTopicsPag() {
    SnsClient { region = "us-east-1" }.use { snsClient ->
        snsClient
            .listTopicsPaginated(ListTopicsRequest { })
            .transform { it.topics?.forEach { topic -> emit(topic) } }
            .collect { topic ->
                println("The topic ARN is ${topic.topicArn}")
            }
    }
}
```

- For API details, see [ListTopics](#) in *AWS SDK for Kotlin API reference*.

## Topics

- [Actions](#)

- [Scenarios](#)

## Actions

### CreateTopic

The following code example shows how to use CreateTopic.

#### SDK for Kotlin

##### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun createSNSTopic(topicName: String): String {
    val request =
        CreateTopicRequest {
            name = topicName
        }

    SnsClient { region = "us-east-1" }.use { snsClient ->
        val result = snsClient.createTopic(request)
        return result.topicArn.toString()
    }
}
```

- For API details, see [CreateTopic](#) in *AWS SDK for Kotlin API reference*.

### DeleteTopic

The following code example shows how to use DeleteTopic.



## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun deleteSNSTopic(topicArnVal: String) {
    val request =
        DeleteTopicRequest {
            topicArn = topicArnVal
        }

    SnsClient { region = "us-east-1" }.use { snsClient ->
        snsClient.deleteTopic(request)
        println("$topicArnVal was successfully deleted.")
    }
}
```

- For API details, see [DeleteTopic](#) in *AWS SDK for Kotlin API reference*.

## GetTopicAttributes

The following code example shows how to use `GetTopicAttributes`.

## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun getSNSTopicAttributes(topicArnVal: String) {
    val request =
        GetTopicAttributesRequest {
            topicArn = topicArnVal
        }
}
```

```
    }

    SnsClient { region = "us-east-1" }.use { snsClient ->
        val result = snsClient.getTopicAttributes(request)
        println("${result.attributes}")
    }
}
```

- For API details, see [GetTopicAttributes](#) in *AWS SDK for Kotlin API reference*.

## ListSubscriptions

The following code example shows how to use `ListSubscriptions`.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun listSNSSubscriptions() {
    SnsClient { region = "us-east-1" }.use { snsClient ->
        val response = snsClient.listSubscriptions(ListSubscriptionsRequest {})
        response.subscriptions?.forEach { sub ->
            println("Sub ARN is ${sub.subscriptionArn}")
            println("Sub protocol is ${sub.protocol}")
        }
    }
}
```

- For API details, see [ListSubscriptions](#) in *AWS SDK for Kotlin API reference*.

## ListTopics

The following code example shows how to use `ListTopics`.

## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun listSNSTopics() {
    SnsClient { region = "us-east-1" }.use { snsClient ->
        val response = snsClient.listTopics(ListTopicsRequest { })
        response.topics?.forEach { topic ->
            println("The topic ARN is ${topic.topicArn}")
        }
    }
}
```

- For API details, see [ListTopics](#) in *AWS SDK for Kotlin API reference*.

## Publish

The following code example shows how to use Publish.

## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun pubTopic(
    topicArnVal: String,
    messageVal: String,
) {
    val request =
        PublishRequest {
            message = messageVal
            topicArn = topicArnVal
        }
}
```

```
    }

    SnsClient { region = "us-east-1" }.use { snsClient ->
        val result = snsClient.publish(request)
        println("${result.messageId} message sent.")
    }
}
```

- For API details, see [Publish](#) in *AWS SDK for Kotlin API reference*.

## SetTopicAttributes

The following code example shows how to use `SetTopicAttributes`.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun setTopAttr(
    attribute: String?,
    topicArnVal: String?,
    value: String?,
) {
    val request =
        SetTopicAttributesRequest {
            attributeName = attribute
            attributeValue = value
            topicArn = topicArnVal
        }

    SnsClient { region = "us-east-1" }.use { snsClient ->
        snsClient.setTopicAttributes(request)
        println("Topic ${request.topicArn} was updated.")
    }
}
```

- For API details, see [SetTopicAttributes](#) in *AWS SDK for Kotlin API reference*.

## Subscribe

The following code example shows how to use `Subscribe`.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

Subscribe an email address to a topic.

```
suspend fun subEmail(
    topicArnVal: String,
    email: String,
): String {
    val request =
        SubscribeRequest {
            protocol = "email"
            endpoint = email
            returnSubscriptionArn = true
            topicArn = topicArnVal
        }

    SnsClient { region = "us-east-1" }.use { snsClient ->
        val result = snsClient.subscribe(request)
        return result.subscriptionArn.toString()
    }
}
```

Subscribe a Lambda function to a topic.

```
suspend fun subLambda(
    topicArnVal: String?,
    lambdaArn: String?,
) {
```

```
val request =
    SubscribeRequest {
        protocol = "lambda"
        endpoint = lambdaArn
        returnSubscriptionArn = true
        topicArn = topicArnVal
    }

SnsClient { region = "us-east-1" }.use { snsClient ->
    val result = snsClient.subscribe(request)
    println(" The subscription Arn is ${result.subscriptionArn}")
}
}
```

- For API details, see [Subscribe](#) in *AWS SDK for Kotlin API reference*.

## TagResource

The following code example shows how to use TagResource.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun addTopicTags(topicArn: String) {
    val tag =
        Tag {
            key = "Team"
            value = "Development"
        }

    val tag2 =
        Tag {
            key = "Environment"
            value = "Gamma"
        }
}
```

```
val tagList = mutableListOf<Tag>()
tagList.add(tag)
tagList.add(tag2)

val request =
    TagResourceRequest {
        resourceArn = topicArn
        tags = tagList
    }

SnsClient { region = "us-east-1" }.use { snsClient ->
    snsClient.tagResource(request)
    println("Tags have been added to $topicArn")
}
}
```

- For API details, see [TagResource](#) in *AWS SDK for Kotlin API reference*.

## Unsubscribe

The following code example shows how to use Unsubscribe.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun unSub(subscriptionArnVal: String) {
    val request =
        UnsubscribeRequest {
            subscriptionArn = subscriptionArnVal
        }

    SnsClient { region = "us-east-1" }.use { snsClient ->
        snsClient.unsubscribe(request)
        println("Subscription was removed for ${request.subscriptionArn}")
    }
}
```

- For API details, see [Unsubscribe](#) in *AWS SDK for Kotlin API reference*.

## Scenarios

### Build an app to submit data to a DynamoDB table

The following code example shows how to build an application that submits data to an Amazon DynamoDB table and notifies you when a user updates the table.

#### SDK for Kotlin

Shows how to create a native Android application that submits data using the Amazon DynamoDB Kotlin API and sends a text message using the Amazon SNS Kotlin API.

For complete source code and instructions on how to set up and run, see the full example on [GitHub](#).

#### Services used in this example

- DynamoDB
- Amazon SNS

### Building an Amazon SNS application

The following code example shows how to create an application that has subscription and publish functionality and translates messages.

#### SDK for Kotlin

Shows how to use the Amazon SNS Kotlin API to create an application that has subscription and publish functionality. In addition, this example application also translates messages.

For complete source code and instructions on how to create a web app, see the full example on [GitHub](#).

For complete source code and instructions on how to create a native Android app, see the full example on [GitHub](#).



### Services used in this example

- Amazon SNS
- Amazon Translate

## Create a serverless application to manage photos

The following code example shows how to create a serverless application that lets users manage photos using labels.

### SDK for Kotlin

Shows how to develop a photo asset management application that detects labels in images using Amazon Rekognition and stores them for later retrieval.

For complete source code and instructions on how to set up and run, see the full example on [GitHub](#).

For a deep dive into the origin of this example see the post on [AWS Community](#).

### Services used in this example

- API Gateway
- DynamoDB
- Lambda
- Amazon Rekognition
- Amazon S3
- Amazon SNS

## Publish an SMS text message

The following code example shows how to publish SMS messages using Amazon SNS.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun pubTextSMS(
    messageVal: String?,
    phoneNumberVal: String?,
) {
    val request =
        PublishRequest {
            message = messageVal
            phoneNumber = phoneNumberVal
        }

    SnsClient { region = "us-east-1" }.use { snsClient ->
        val result = snsClient.publish(request)
        println("${result.messageId} message sent.")
    }
}
```

- For API details, see [Publish](#) in *AWS SDK for Kotlin API reference*.

## Publish messages to queues

The following code example shows how to:

- Create topic (FIFO or non-FIFO).
- Subscribe several queues to the topic with an option to apply a filter.
- Publish messages to the topic.
- Poll the queues for messages received.

## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
package com.example.sns

import aws.sdk.kotlin.services.sns.SnsClient
```

```
import aws.sdk.kotlin.services.sns.model.CreateTopicRequest
import aws.sdk.kotlin.services.sns.model.DeleteTopicRequest
import aws.sdk.kotlin.services.sns.model.PublishRequest
import aws.sdk.kotlin.services.sns.model.SetSubscriptionAttributesRequest
import aws.sdk.kotlin.services.sns.model.SubscribeRequest
import aws.sdk.kotlin.services.sns.model.UnsubscribeRequest
import aws.sdk.kotlin.services.sqs.SqsClient
import aws.sdk.kotlin.services.sqs.model.CreateQueueRequest
import aws.sdk.kotlin.services.sqs.model.DeleteMessageBatchRequest
import aws.sdk.kotlin.services.sqs.model.DeleteMessageBatchRequestEntry
import aws.sdk.kotlin.services.sqs.model.DeleteQueueRequest
import aws.sdk.kotlin.services.sqs.model.GetQueueAttributesRequest
import aws.sdk.kotlin.services.sqs.model.GetQueueUrlRequest
import aws.sdk.kotlin.services.sqs.model.Message
import aws.sdk.kotlin.services.sqs.model.QueueAttributeName
import aws.sdk.kotlin.services.sqs.model.ReceiveMessageRequest
import aws.sdk.kotlin.services.sqs.model.SetQueueAttributesRequest
import com.google.gson.Gson
import com.google.gson.JsonObject
import com.google.gson.JsonPrimitive
import java.util.Scanner

/**
Before running this Kotlin code example, set up your development environment,
including your AWS credentials.

For more information, see the following documentation topic:
https://docs.aws.amazon.com/sdk-for-kotlin/latest/developer-guide/setup.html

This Kotlin example performs the following tasks:

1. Gives the user three options to choose from.
2. Creates an Amazon Simple Notification Service (Amazon SNS) topic.
3. Creates an Amazon Simple Queue Service (Amazon SQS) queue.
4. Gets the SQS queue Amazon Resource Name (ARN) attribute.
5. Attaches an AWS Identity and Access Management (IAM) policy to the queue.
6. Subscribes to the SQS queue.
7. Publishes a message to the topic.
8. Displays the messages.
9. Deletes the received message.
10. Unsubscribes from the topic.
11. Deletes the SNS topic.
*/
```

```

val DASHES: String = String(CharArray(80)).replace("\u0000", "-")
suspend fun main() {
    val input = Scanner(System.`in`)
    val useFIFO: String
    var duplication = "n"
    var topicName: String
    var deduplicationID: String? = null
    var groupId: String? = null
    val topicArn: String?
    var sqsQueueName: String
    val sqsQueueUrl: String?
    val sqsQueueArn: String
    val subscriptionArn: String?
    var selectFIFO = false
    val message: String
    val messageList: List<Message?>?
    val filterList = ArrayList<String>()
    var msgAttValue = ""

    println(DASHES)
    println("Welcome to the AWS SDK for Kotlin messaging with topics and queues.")
    println(
        """
            In this workflow, you will create an SNS topic and subscribe an SQS
            queue to the topic.
            You can select from several options for configuring the topic and
            the subscriptions for the queue.
            You can then post to the topic and see the results in the queue.
        """).trimIndent(),
    )
    println(DASHES)

    println(DASHES)
    println(
        """
            SNS topics can be configured as FIFO (First-In-First-Out).
            FIFO topics deliver messages in order and support deduplication and
            message filtering.
            Would you like to work with FIFO topics? (y/n)
        """).trimIndent(),
    )
    useFIFO = input.nextLine()
    if (useFIFO.compareTo("y") == 0) {
        selectFIFO = true
    }
}

```

```

println("You have selected FIFO")
println(
    """ Because you have chosen a FIFO topic, deduplication is supported.
    Deduplication IDs are either set in the message or automatically generated
    from content using a hash function.
    If a message is successfully published to an SNS FIFO topic, any message
    published and determined to have the same deduplication ID,
    within the five-minute deduplication interval, is accepted but not
    delivered.
    For more information about deduplication, see https://docs.aws.amazon.com/sns/latest/dg/fifo-message-dedup.html.""",
    )

println("Would you like to use content-based deduplication instead of
entering a deduplication ID? (y/n)")
duplication = input.nextLine()
if (duplication.compareTo("y") == 0) {
    println("Enter a group id value")
    groupId = input.nextLine()
} else {
    println("Enter deduplication Id value")
    deduplicationID = input.nextLine()
    println("Enter a group id value")
    groupId = input.nextLine()
}
}
println(DASHES)

println(DASHES)
println("2. Create a topic.")
println("Enter a name for your SNS topic.")
topicName = input.nextLine()
if (selectFIFO) {
    println("Because you have selected a FIFO topic, '.fifo' must be appended to
the topic name.")
    topicName = "$topicName.fifo"
    println("The name of the topic is $topicName")
    topicArn = createFIFO(topicName, duplication)
    println("The ARN of the FIFO topic is $topicArn")
} else {
    println("The name of the topic is $topicName")
    topicArn = createSNSTopic(topicName)
    println("The ARN of the non-FIFO topic is $topicArn")
}
}

```

```
println(DASHES)

println(DASHES)
println("3. Create an SQS queue.")
println("Enter a name for your SQS queue.")
sqsQueueName = input.nextLine()
if (selectFIFO) {
    sqsQueueName = "$sqsQueueName.fifo"
}
sqsQueueUrl = createQueue(sqsQueueName, selectFIFO)
println("The queue URL is $sqsQueueUrl")
println(DASHES)

println(DASHES)
println("4. Get the SQS queue ARN attribute.")
sqsQueueArn = getSqsQueueAttrs(sqsQueueUrl)
println("The ARN of the new queue is $sqsQueueArn")
println(DASHES)

println(DASHES)
println("5. Attach an IAM policy to the queue.")
// Define the policy to use.
val policy = """{
    "Statement": [
        {
            "Effect": "Allow",
            "Principal": {
                "Service": "sns.amazonaws.com"
            },
            "Action": "sqs:SendMessage",
            "Resource": "$sqsQueueArn",
            "Condition": {
                "ArnEquals": {
                    "aws:SourceArn": "$topicArn"
                }
            }
        }
    ]
}"""
setQueueAttr(sqsQueueUrl, policy)
println(DASHES)

println(DASHES)
println("6. Subscribe to the SQS queue.")
```

```

    if (selectFIFO) {
        println(
            ""If you add a filter to this subscription, then only the filtered
            messages will be received in the queue.
            For information about message filtering, see https://docs.aws.amazon.com/sns/latest/dg/sns-message-filtering.html
            For this example, you can filter messages by a "tone" attribute.""",
        )
        println("Would you like to filter messages for $sqsQueueName's subscription
            to the topic $topicName? (y/n)")
        val filterAns: String = input.nextLine()
        if (filterAns.compareTo("y") == 0) {
            var moreAns = false
            println("You can filter messages by using one or more of the following
            \"tone\" attributes.")
            println("1. cheerful")
            println("2. funny")
            println("3. serious")
            println("4. sincere")
            while (!moreAns) {
                println("Select a number or choose 0 to end.")
                val ans: String = input.nextLine()
                when (ans) {
                    "1" -> filterList.add("cheerful")
                    "2" -> filterList.add("funny")
                    "3" -> filterList.add("serious")
                    "4" -> filterList.add("sincere")
                    else -> moreAns = true
                }
            }
        }
    }
}
subscriptionArn = subQueue(topicArn, sqsQueueArn, filterList)
println(DASHES)

println(DASHES)
println("7. Publish a message to the topic.")
if (selectFIFO) {
    println("Would you like to add an attribute to this message? (y/n)")
    val msgAns: String = input.nextLine()
    if (msgAns.compareTo("y") == 0) {
        println("You can filter messages by one or more of the following \"tone
        \" attributes.")
        println("1. cheerful")
    }
}

```

```
println("2. funny")
println("3. serious")
println("4. sincere")
println("Select a number or choose 0 to end.")
val ans: String = input.nextLine()
msgAttValue = when (ans) {
    "1" -> "cheerful"
    "2" -> "funny"
    "3" -> "serious"
    else -> "sincere"
}
println("Selected value is $msgAttValue")
}
println("Enter a message.")
message = input.nextLine()
pubMessageFIFO(message, topicArn, msgAttValue, duplication, groupId,
deduplicationID)
} else {
    println("Enter a message.")
    message = input.nextLine()
    pubMessage(message, topicArn)
}
println(DASHES)

println(DASHES)
println("8. Display the message. Press any key to continue.")
input.nextLine()
messageList = receiveMessages(sqsQueueUrl, msgAttValue)
if (messageList != null) {
    for (mes in messageList) {
        println("Message Id: ${mes.messageId}")
        println("Full Message: ${mes.body}")
    }
}
println(DASHES)

println(DASHES)
println("9. Delete the received message. Press any key to continue.")
input.nextLine()
if (messageList != null) {
    deleteMessages(sqsQueueUrl, messageList)
}
println(DASHES)
```



```
println(DASHES)
println("10. Unsubscribe from the topic and delete the queue. Press any key to
continue.")
input.nextLine()
unSub(subscriptionArn)
deleteSQSQueue(sqsQueueName)
println(DASHES)

println(DASHES)
println("11. Delete the topic. Press any key to continue.")
input.nextLine()
deleteSNSTopic(topicArn)
println(DASHES)

println(DASHES)
println("The SNS/SQS workflow has completed successfully.")
println(DASHES)
}

suspend fun deleteSNSTopic(topicArnVal: String?) {
    val request = DeleteTopicRequest {
        topicArn = topicArnVal
    }

    SnsClient { region = "us-east-1" }.use { snsClient ->
        snsClient.deleteTopic(request)
        println("$topicArnVal was deleted")
    }
}

suspend fun deleteSQSQueue(queueNameVal: String) {
    val getQueueRequest = GetQueueUrlRequest {
        queueName = queueNameVal
    }

    SqsClient { region = "us-east-1" }.use { sqsClient ->
        val queueUrlVal = sqsClient.getQueueUrl(getQueueRequest).queueUrl
        val deleteQueueRequest = DeleteQueueRequest {
            queueUrl = queueUrlVal
        }

        sqsClient.deleteQueue(deleteQueueRequest)
        println("$queueNameVal was successfully deleted.")
    }
}
```

```
}

suspend fun unSub(subscripArn: String?) {
    val request = UnsubscribeRequest {
        subscriptionArn = subscripArn
    }
    SnsClient { region = "us-east-1" }.use { snsClient ->
        snsClient.unsubscribe(request)
        println("Subscription was removed for $subscripArn")
    }
}

suspend fun deleteMessages(queueUrlVal: String?, messages: List<Message>) {
    val entriesVal: MutableList<DeleteMessageBatchRequestEntry> = mutableListOf()
    for (msg in messages) {
        val entry = DeleteMessageBatchRequestEntry {
            id = msg.messageId
        }
        entriesVal.add(entry)
    }

    val deleteMessageBatchRequest = DeleteMessageBatchRequest {
        queueUrl = queueUrlVal
        entries = entriesVal
    }

    SqsClient { region = "us-east-1" }.use { sqsClient ->
        sqsClient.deleteMessageBatch(deleteMessageBatchRequest)
        println("The batch delete of messages was successful")
    }
}

suspend fun receiveMessages(queueUrlVal: String?, msgAttValue: String):
List<Message>? {
    if (msgAttValue.isEmpty()) {
        val request = ReceiveMessageRequest {
            queueUrl = queueUrlVal
            maxNumberOfMessages = 5
        }
        SqsClient { region = "us-east-1" }.use { sqsClient ->
            return sqsClient.receiveMessage(request).messages
        }
    } else {
        val receiveRequest = ReceiveMessageRequest {
```

```

        queueUrl = queueUrlVal
        waitTimeSeconds = 1
        maxNumberOfMessages = 5
    }
    SqsClient { region = "us-east-1" }.use { sqsClient ->
        return sqsClient.receiveMessage(receiveRequest).messages
    }
}

suspend fun pubMessage(messageVal: String?, topicArnVal: String?) {
    val request = PublishRequest {
        message = messageVal
        topicArn = topicArnVal
    }

    SnsClient { region = "us-east-1" }.use { snsClient ->
        val result = snsClient.publish(request)
        println("${result.messageId} message sent.")
    }
}

suspend fun pubMessageFIFO(
    messageVal: String?,
    topicArnVal: String?,
    msgAttValue: String,
    duplication: String,
    groupIdVal: String?,
    deduplicationID: String?,
) {
    // Means the user did not choose to use a message attribute.
    if (msgAttValue.isEmpty()) {
        if (duplication.compareTo("y") == 0) {
            val request = PublishRequest {
                message = messageVal
                messageGroupId = groupIdVal
                topicArn = topicArnVal
            }

            SnsClient { region = "us-east-1" }.use { snsClient ->
                val result = snsClient.publish(request)
                println(result.messageId.toString() + " Message sent.")
            }
        } else {

```

```
        val request = PublishRequest {
            message = messageVal
            messageDeduplicationId = deduplicationID
            messageGroupId = groupIdVal
            topicArn = topicArnVal
        }

        SnsClient { region = "us-east-1" }.use { snsClient ->
            val result = snsClient.publish(request)
            println(result.messageId.toString() + " Message sent.")
        }
    }
} else {
    val messAttr = aws.sdk.kotlin.services.sns.model.MessageAttributeValue {
        dataType = "String"
        stringValue = "true"
    }

    val mapAtt: Map<String,
aws.sdk.kotlin.services.sns.model.MessageAttributeValue> =
        mapOf(msgAttValue to messAttr)
    if (duplication.compareTo("y") == 0) {
        val request = PublishRequest {
            message = messageVal
            messageGroupId = groupIdVal
            topicArn = topicArnVal
        }

        SnsClient { region = "us-east-1" }.use { snsClient ->
            val result = snsClient.publish(request)
            println(result.messageId.toString() + " Message sent.")
        }
    } else {
        // Create a publish request with the message and attributes.
        val request = PublishRequest {
            topicArn = topicArnVal
            message = messageVal
            messageDeduplicationId = deduplicationID
            messageGroupId = groupIdVal
            messageAttributes = mapAtt
        }

        SnsClient { region = "us-east-1" }.use { snsClient ->
            val result = snsClient.publish(request)
        }
    }
}
```

```

        println(result.messageId.toString() + " Message sent.")
    }
}

// Subscribe to the SQS queue.
suspend fun subQueue(topicArnVal: String?, queueArnVal: String, filterList:
List<String?>): String? {
    val request: SubscribeRequest
    if (filterList.isEmpty()) {
        // No filter subscription is added.
        request = SubscribeRequest {
            protocol = "sqs"
            endpoint = queueArnVal
            returnSubscriptionArn = true
            topicArn = topicArnVal
        }

        SnsClient { region = "us-east-1" }.use { snsClient ->
            val result = snsClient.subscribe(request)
            println(
                "The queue " + queueArnVal + " has been subscribed to the topic " +
topicArnVal + "\n" +
                "with the subscription ARN " + result.subscriptionArn,
            )
            return result.subscriptionArn
        }
    } else {
        request = SubscribeRequest {
            protocol = "sqs"
            endpoint = queueArnVal
            returnSubscriptionArn = true
            topicArn = topicArnVal
        }

        SnsClient { region = "us-east-1" }.use { snsClient ->
            val result = snsClient.subscribe(request)
            println("The queue $queueArnVal has been subscribed to the topic
$topicArnVal with the subscription ARN ${result.subscriptionArn}")

            val attributeNameVal = "FilterPolicy"
            val gson = Gson()
            val jsonString = "{\"tone\": []}"

```

```

        val jsonObject = gson.fromJson(jsonString, JsonObject::class.java)
        val toneArray = jsonObject.getAsJsonArray("tone")
        for (value: String? in filterList) {
            toneArray.add(JsonPrimitive(value))
        }

        val updatedJsonString: String = gson.toJson(jsonObject)
        println(updatedJsonString)
        val attRequest = SetSubscriptionAttributesRequest {
            subscriptionArn = result.subscriptionArn
            attributeName = attributeNameVal
            attributeValue = updatedJsonString
        }

        snsClient.setSubscriptionAttributes(attRequest)
        return result.subscriptionArn
    }
}

suspend fun setQueueAttr(queueUrlVal: String?, policy: String) {
    val attrMap: MutableMap<String, String> = HashMap()
    attrMap[QueueAttributeName.Policy.toString()] = policy

    val attributesRequest = SetQueueAttributesRequest {
        queueUrl = queueUrlVal
        attributes = attrMap
    }

    SqsClient { region = "us-east-1" }.use { sqsClient ->
        sqsClient.setQueueAttributes(attributesRequest)
        println("The policy has been successfully attached.")
    }
}

suspend fun getSQSQueueAttrs(queueUrlVal: String?): String {
    val atts: MutableList<QueueAttributeName> = ArrayList()
    atts.add(QueueAttributeName.QueueArn)

    val attributesRequest = GetQueueAttributesRequest {
        queueUrl = queueUrlVal
        attributeNames = atts
    }

    SqsClient { region = "us-east-1" }.use { sqsClient ->

```

```
    val response = sqsClient.getQueueAttributes(attributesRequest)
    val mapAtts = response.attributes
    if (mapAtts != null) {
        mapAtts.forEach { entry ->
            println("${entry.key} : ${entry.value}")
            return entry.value
        }
    }
}
return ""
}

suspend fun createQueue(queueNameVal: String?, selectFIFO: Boolean): String? {
    println("\nCreate Queue")
    if (selectFIFO) {
        val attrs = mutableMapOf<String, String>()
        attrs[QueueAttributeName.FifoQueue.toString()] = "true"

        val createQueueRequest = CreateQueueRequest {
            queueName = queueNameVal
            attributes = attrs
        }

        SqsClient { region = "us-east-1" }.use { sqsClient ->
            sqsClient.createQueue(createQueueRequest)
            println("\nGet queue url")

            val urlRequest = GetQueueUrlRequest {
                queueName = queueNameVal
            }

            val getQueueUrlResponse = sqsClient.getQueueUrl(urlRequest)
            return getQueueUrlResponse.queueUrl
        }
    } else {
        val createQueueRequest = CreateQueueRequest {
            queueName = queueNameVal
        }

        SqsClient { region = "us-east-1" }.use { sqsClient ->
            sqsClient.createQueue(createQueueRequest)
            println("Get queue url")

            val urlRequest = GetQueueUrlRequest {
```

```

        queueName = queueNameVal
    }

    val getUrlResponse = sqsClient.getUrl(urlRequest)
    return getUrlResponse.queueUrl
}
}

suspend fun createSNSTopic(topicName: String?): String? {
    val request = CreateTopicRequest {
        name = topicName
    }

    SnsClient { region = "us-east-1" }.use { snsClient ->
        val result = snsClient.createTopic(request)
        return result.topicArn
    }
}

suspend fun createFIFO(topicName: String?, duplication: String): String? {
    val attributes: MutableMap<String, String> = HashMap()
    if (duplication.compareTo("n") == 0) {
        attributes["FifoTopic"] = "true"
        attributes["ContentBasedDeduplication"] = "false"
    } else {
        attributes["FifoTopic"] = "true"
        attributes["ContentBasedDeduplication"] = "true"
    }

    val request = CreateTopicRequest {
        name = topicName
        attributes = attributes
    }
    SnsClient { region = "us-east-1" }.use { snsClient ->
        val response = snsClient.createTopic(request)
        return response.topicArn
    }
}
}

```

- For API details, see the following topics in *AWS SDK for Kotlin API reference*.
  - [CreateQueue](#)



- [CreateTopic](#)
- [DeleteMessageBatch](#)
- [DeleteQueue](#)
- [DeleteTopic](#)
- [GetQueueAttributes](#)
- [Publish](#)
- [ReceiveMessage](#)
- [SetQueueAttributes](#)
- [Subscribe](#)
- [Unsubscribe](#)

## Amazon SQS examples using SDK for Kotlin

The following code examples show you how to perform actions and implement common scenarios by using the AWS SDK for Kotlin with Amazon SQS.

*Actions* are code excerpts from larger programs and must be run in context. While actions show you how to call individual service functions, you can see actions in context in their related scenarios.

*Scenarios* are code examples that show you how to accomplish specific tasks by calling multiple functions within a service or combined with other AWS services.

Each example includes a link to the complete source code, where you can find instructions on how to set up and run the code in context.

### Get started

#### Hello Amazon SQS

The following code examples show how to get started using Amazon SQS.

#### SDK for Kotlin

##### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
package com.kotlin.sqs

import aws.sdk.kotlin.services.sqs.SqsClient
import aws.sdk.kotlin.services.sqs.paginators.listQueuesPaginated
import kotlinx.coroutines.flow.transform

suspend fun main() {
    listTopicsPag()
}

suspend fun listTopicsPag() {
    SqsClient { region = "us-east-1" }.use { sqsClient ->
        sqsClient
            .listQueuesPaginated { }
            .transform { it.queueUrls?.forEach { queue -> emit(queue) } }
            .collect { queue ->
                println("The Queue URL is $queue")
            }
    }
}
```

- For API details, see [ListQueues](#) in *AWS SDK for Kotlin API reference*.

## Topics

- [Actions](#)
- [Scenarios](#)

## Actions

### CreateQueue

The following code example shows how to use CreateQueue.

## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun createQueue(queueNameVal: String): String {
    println("Create Queue")
    val createQueueRequest =
        CreateQueueRequest {
            queueName = queueNameVal
        }

    SqsClient { region = "us-east-1" }.use { sqsClient ->
        sqsClient.createQueue(createQueueRequest)
        println("Get queue url")

        val getQueueUrlRequest =
            GetQueueUrlRequest {
                queueName = queueNameVal
            }

        val getQueueUrlResponse = sqsClient.getQueueUrl(getQueueUrlRequest)
        return getQueueUrlResponse.queueUrl.toString()
    }
}
```

- For API details, see [CreateQueue](#) in *AWS SDK for Kotlin API reference*.

## DeleteMessage

The following code example shows how to use DeleteMessage.

## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun deleteMessages(queueUrlVal: String) {
    println("Delete Messages from $queueUrlVal")

    val purgeRequest =
        PurgeQueueRequest {
            queueUrl = queueUrlVal
        }

    SqsClient { region = "us-east-1" }.use { sqsClient ->
        sqsClient.purgeQueue(purgeRequest)
        println("Messages are successfully deleted from $queueUrlVal")
    }
}

suspend fun deleteQueue(queueUrlVal: String) {
    val request =
        DeleteQueueRequest {
            queueUrl = queueUrlVal
        }

    SqsClient { region = "us-east-1" }.use { sqsClient ->
        sqsClient.deleteQueue(request)
        println("$queueUrlVal was deleted!")
    }
}
```

- For API details, see [DeleteMessage](#) in *AWS SDK for Kotlin API reference*.

## DeleteQueue

The following code example shows how to use DeleteQueue.

## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun deleteMessages(queueUrlVal: String) {
    println("Delete Messages from $queueUrlVal")

    val purgeRequest =
        PurgeQueueRequest {
            queueUrl = queueUrlVal
        }

    SqsClient { region = "us-east-1" }.use { sqsClient ->
        sqsClient.purgeQueue(purgeRequest)
        println("Messages are successfully deleted from $queueUrlVal")
    }
}

suspend fun deleteQueue(queueUrlVal: String) {
    val request =
        DeleteQueueRequest {
            queueUrl = queueUrlVal
        }

    SqsClient { region = "us-east-1" }.use { sqsClient ->
        sqsClient.deleteQueue(request)
        println("$queueUrlVal was deleted!")
    }
}
```

- For API details, see [DeleteQueue](#) in *AWS SDK for Kotlin API reference*.

## ListQueues

The following code example shows how to use `ListQueues`.

## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun listQueues() {
    println("\nList Queues")

    val prefix = "que"
    val listQueuesRequest =
        ListQueuesRequest {
            queueNamePrefix = prefix
        }

    SqsClient { region = "us-east-1" }.use { sqsClient ->
        val response = sqsClient.listQueues(listQueuesRequest)
        response.queueUrls?.forEach { url ->
            println(url)
        }
    }
}
```

- For API details, see [ListQueues](#) in *AWS SDK for Kotlin API reference*.

## ReceiveMessage

The following code example shows how to use `ReceiveMessage`.

## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun receiveMessages(queueUrlVal: String?) {
    println("Retrieving messages from $queueUrlVal")

    val receiveMessageRequest =
        ReceiveMessageRequest {
            queueUrl = queueUrlVal
            numberOfMessages = 5
        }

    SqsClient { region = "us-east-1" }.use { sqsClient ->
        val response = sqsClient.receiveMessage(receiveMessageRequest)
        response.messages?.forEach { message ->
            println(message.body)
        }
    }
}
```

- For API details, see [ReceiveMessage](#) in *AWS SDK for Kotlin API reference*.

## SendMessage

The following code example shows how to use SendMessage.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun sendMessages(
    queueUrlVal: String,
    message: String,
) {
    println("Sending multiple messages")
    println("\nSend message")
    val sendRequest =
        SendMessageRequest {
            queueUrl = queueUrlVal
```

```
        messageBody = message
        delaySeconds = 10
    }

    SqsClient { region = "us-east-1" }.use { sqsClient ->
        sqsClient.sendMessage(sendRequest)
        println("A single message was successfully sent.")
    }
}

suspend fun sendBatchMessages(queueUrlVal: String?) {
    println("Sending multiple messages")

    val msg1 =
        SendMessageBatchRequestEntry {
            id = "id1"
            messageBody = "Hello from msg 1"
        }

    val msg2 =
        SendMessageBatchRequestEntry {
            id = "id2"
            messageBody = "Hello from msg 2"
        }

    val sendMessageBatchRequest =
        SendMessageBatchRequest {
            queueUrl = queueUrlVal
            entries = listOf(msg1, msg2)
        }

    SqsClient { region = "us-east-1" }.use { sqsClient ->
        sqsClient.sendMessageBatch(sendMessageBatchRequest)
        println("Batch message were successfully sent.")
    }
}
```

- For API details, see [SendMessage](#) in *AWS SDK for Kotlin API reference*.



## Scenarios

### Create a messaging application

The following code example shows how to create a messaging application by using Amazon SQS.

#### SDK for Kotlin

Shows how to use the Amazon SQS API to develop a Spring REST API that sends and retrieves messages.

For complete source code and instructions on how to set up and run, see the full example on [GitHub](#).

#### Services used in this example

- Amazon Comprehend
- Amazon SQS

### Publish messages to queues

The following code example shows how to:

- Create topic (FIFO or non-FIFO).
- Subscribe several queues to the topic with an option to apply a filter.
- Publish messages to the topic.
- Poll the queues for messages received.

#### SDK for Kotlin

##### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
package com.example.sns

import aws.sdk.kotlin.services.sns.SnsClient
import aws.sdk.kotlin.services.sns.model.CreateTopicRequest
```

```
import aws.sdk.kotlin.services.sns.model.DeleteTopicRequest
import aws.sdk.kotlin.services.sns.model.PublishRequest
import aws.sdk.kotlin.services.sns.model.SetSubscriptionAttributesRequest
import aws.sdk.kotlin.services.sns.model.SubscribeRequest
import aws.sdk.kotlin.services.sns.model.UnsubscribeRequest
import aws.sdk.kotlin.services.sqs.SqsClient
import aws.sdk.kotlin.services.sqs.model.CreateQueueRequest
import aws.sdk.kotlin.services.sqs.model.DeleteMessageBatchRequest
import aws.sdk.kotlin.services.sqs.model.DeleteMessageBatchRequestEntry
import aws.sdk.kotlin.services.sqs.model.DeleteQueueRequest
import aws.sdk.kotlin.services.sqs.model.GetQueueAttributesRequest
import aws.sdk.kotlin.services.sqs.model.GetQueueUrlRequest
import aws.sdk.kotlin.services.sqs.model.Message
import aws.sdk.kotlin.services.sqs.model.QueueAttributeName
import aws.sdk.kotlin.services.sqs.model.ReceiveMessageRequest
import aws.sdk.kotlin.services.sqs.model.SetQueueAttributesRequest
import com.google.gson.Gson
import com.google.gson.JsonObject
import com.google.gson.JsonPrimitive
import java.util.Scanner

/**
Before running this Kotlin code example, set up your development environment,
including your AWS credentials.

For more information, see the following documentation topic:
https://docs.aws.amazon.com/sdk-for-kotlin/latest/developer-guide/setup.html

This Kotlin example performs the following tasks:

1. Gives the user three options to choose from.
2. Creates an Amazon Simple Notification Service (Amazon SNS) topic.
3. Creates an Amazon Simple Queue Service (Amazon SQS) queue.
4. Gets the SQS queue Amazon Resource Name (ARN) attribute.
5. Attaches an AWS Identity and Access Management (IAM) policy to the queue.
6. Subscribes to the SQS queue.
7. Publishes a message to the topic.
8. Displays the messages.
9. Deletes the received message.
10. Unsubscribes from the topic.
11. Deletes the SNS topic.
*/

val DASHES: String = String(CharArray(80)).replace("\u0000", "-")
```

```
suspend fun main() {
    val input = Scanner(System.`in`)
    val useFIFO: String
    var duplication = "n"
    var topicName: String
    var deduplicationID: String? = null
    var groupId: String? = null
    val topicArn: String?
    var sqsQueueName: String
    val sqsQueueUrl: String?
    val sqsQueueArn: String
    val subscriptionArn: String?
    var selectFIFO = false
    val message: String
    val messageList: List<Message?>?
    val filterList = ArrayList<String>()
    var msgAttValue = ""

    println(DASHES)
    println("Welcome to the AWS SDK for Kotlin messaging with topics and queues.")
    println(
        """
            In this workflow, you will create an SNS topic and subscribe an SQS
queue to the topic.
            You can select from several options for configuring the topic and
the subscriptions for the queue.
            You can then post to the topic and see the results in the queue.
        """).trimIndent(),
    )
    println(DASHES)

    println(DASHES)
    println(
        """
            SNS topics can be configured as FIFO (First-In-First-Out).
            FIFO topics deliver messages in order and support deduplication and
message filtering.
            Would you like to work with FIFO topics? (y/n)
        """).trimIndent(),
    )
    useFIFO = input.nextLine()
    if (useFIFO.compareTo("y") == 0) {
        selectFIFO = true
        println("You have selected FIFO")
    }
}
```

```

println(
    """ Because you have chosen a FIFO topic, deduplication is supported.
    Deduplication IDs are either set in the message or automatically generated
    from content using a hash function.
    If a message is successfully published to an SNS FIFO topic, any message
    published and determined to have the same deduplication ID,
    within the five-minute deduplication interval, is accepted but not
    delivered.
    For more information about deduplication, see https://docs.aws.amazon.com/sns/latest/dg/fifo-message-dedup.html.""",
    )

    println("Would you like to use content-based deduplication instead of
    entering a deduplication ID? (y/n)")
    duplication = input.nextLine()
    if (duplication.compareTo("y") == 0) {
        println("Enter a group id value")
        groupId = input.nextLine()
    } else {
        println("Enter deduplication Id value")
        deduplicationID = input.nextLine()
        println("Enter a group id value")
        groupId = input.nextLine()
    }
}
println(DASHES)

println(DASHES)
println("2. Create a topic.")
println("Enter a name for your SNS topic.")
topicName = input.nextLine()
if (selectFIFO) {
    println("Because you have selected a FIFO topic, '.fifo' must be appended to
    the topic name.")
    topicName = "$topicName.fifo"
    println("The name of the topic is $topicName")
    topicArn = createFIFO(topicName, duplication)
    println("The ARN of the FIFO topic is $topicArn")
} else {
    println("The name of the topic is $topicName")
    topicArn = createSNSTopic(topicName)
    println("The ARN of the non-FIFO topic is $topicArn")
}
println(DASHES)

```

```
println(DASHES)
println("3. Create an SQS queue.")
println("Enter a name for your SQS queue.")
sqsQueueName = input.nextLine()
if (selectFIFO) {
    sqsQueueName = "$sqsQueueName.fifo"
}
sqsQueueUrl = createQueue(sqsQueueName, selectFIFO)
println("The queue URL is $sqsQueueUrl")
println(DASHES)

println(DASHES)
println("4. Get the SQS queue ARN attribute.")
sqsQueueArn = getSqsQueueAttrs(sqsQueueUrl)
println("The ARN of the new queue is $sqsQueueArn")
println(DASHES)

println(DASHES)
println("5. Attach an IAM policy to the queue.")
// Define the policy to use.
val policy = """{
  "Statement": [
    {
      "Effect": "Allow",
      "Principal": {
        "Service": "sns.amazonaws.com"
      },
      "Action": "sqs:SendMessage",
      "Resource": "$sqsQueueArn",
      "Condition": {
        "ArnEquals": {
          "aws:SourceArn": "$topicArn"
        }
      }
    }
  ]
}"""
setQueueAttr(sqsQueueUrl, policy)
println(DASHES)

println(DASHES)
println("6. Subscribe to the SQS queue.")
if (selectFIFO) {
```

```

        println(
            ""If you add a filter to this subscription, then only the filtered
            messages will be received in the queue.
            For information about message filtering, see https://docs.aws.amazon.com/sns/latest/dg/sns-message-filtering.html
            For this example, you can filter messages by a "tone" attribute.""",
        )
        println("Would you like to filter messages for $sqsQueueName's subscription
        to the topic $topicName? (y/n)")
        val filterAns: String = input.nextLine()
        if (filterAns.compareTo("y") == 0) {
            var moreAns = false
            println("You can filter messages by using one or more of the following
            \"tone\" attributes.")
            println("1. cheerful")
            println("2. funny")
            println("3. serious")
            println("4. sincere")
            while (!moreAns) {
                println("Select a number or choose 0 to end.")
                val ans: String = input.nextLine()
                when (ans) {
                    "1" -> filterList.add("cheerful")
                    "2" -> filterList.add("funny")
                    "3" -> filterList.add("serious")
                    "4" -> filterList.add("sincere")
                    else -> moreAns = true
                }
            }
        }
    }
}
subscriptionArn = subQueue(topicArn, sqsQueueArn, filterList)
println(DASHES)

println(DASHES)
println("7. Publish a message to the topic.")
if (selectFIFO) {
    println("Would you like to add an attribute to this message? (y/n)")
    val msgAns: String = input.nextLine()
    if (msgAns.compareTo("y") == 0) {
        println("You can filter messages by one or more of the following \"tone
        \" attributes.")
        println("1. cheerful")
        println("2. funny")
    }
}

```

```
println("3. serious")
println("4. sincere")
println("Select a number or choose 0 to end.")
val ans: String = input.nextLine()
msgAttValue = when (ans) {
    "1" -> "cheerful"
    "2" -> "funny"
    "3" -> "serious"
    else -> "sincere"
}
println("Selected value is $msgAttValue")
}
println("Enter a message.")
message = input.nextLine()
pubMessageFIFO(message, topicArn, msgAttValue, duplication, groupId,
deduplicationID)
} else {
    println("Enter a message.")
    message = input.nextLine()
    pubMessage(message, topicArn)
}
println(DASHES)

println(DASHES)
println("8. Display the message. Press any key to continue.")
input.nextLine()
messageList = receiveMessages(sqsQueueUrl, msgAttValue)
if (messageList != null) {
    for (mes in messageList) {
        println("Message Id: ${mes.messageId}")
        println("Full Message: ${mes.body}")
    }
}
println(DASHES)

println(DASHES)
println("9. Delete the received message. Press any key to continue.")
input.nextLine()
if (messageList != null) {
    deleteMessages(sqsQueueUrl, messageList)
}
println(DASHES)

println(DASHES)
```

```
    println("10. Unsubscribe from the topic and delete the queue. Press any key to
continue.")
    input.nextLine()
    unSub(subscriptionArn)
    deleteSQSQueue(sqsQueueName)
    println(DASHES)

    println(DASHES)
    println("11. Delete the topic. Press any key to continue.")
    input.nextLine()
    deleteSNSTopic(topicArn)
    println(DASHES)

    println(DASHES)
    println("The SNS/SQS workflow has completed successfully.")
    println(DASHES)
}

suspend fun deleteSNSTopic(topicArnVal: String?) {
    val request = DeleteTopicRequest {
        topicArn = topicArnVal
    }

    SnsClient { region = "us-east-1" }.use { snsClient ->
        snsClient.deleteTopic(request)
        println("$topicArnVal was deleted")
    }
}

suspend fun deleteSQSQueue(queueNameVal: String) {
    val getQueueRequest = GetQueueUrlRequest {
        queueName = queueNameVal
    }

    SqsClient { region = "us-east-1" }.use { sqsClient ->
        val queueUrlVal = sqsClient.getQueueUrl(getQueueRequest).queueUrl
        val deleteQueueRequest = DeleteQueueRequest {
            queueUrl = queueUrlVal
        }

        sqsClient.deleteQueue(deleteQueueRequest)
        println("$queueNameVal was successfully deleted.")
    }
}
```



```
suspend fun unSub(subscripArn: String?) {
    val request = UnsubscribeRequest {
        subscriptionArn = subscripArn
    }
    SnsClient { region = "us-east-1" }.use { snsClient ->
        snsClient.unsubscribe(request)
        println("Subscription was removed for $subscripArn")
    }
}

suspend fun deleteMessages(queueUrlVal: String?, messages: List<Message>) {
    val entriesVal: MutableList<DeleteMessageBatchRequestEntry> = mutableListOf()
    for (msg in messages) {
        val entry = DeleteMessageBatchRequestEntry {
            id = msg.messageId
        }
        entriesVal.add(entry)
    }

    val deleteMessageBatchRequest = DeleteMessageBatchRequest {
        queueUrl = queueUrlVal
        entries = entriesVal
    }

    SqsClient { region = "us-east-1" }.use { sqsClient ->
        sqsClient.deleteMessageBatch(deleteMessageBatchRequest)
        println("The batch delete of messages was successful")
    }
}

suspend fun receiveMessages(queueUrlVal: String?, msgAttValue: String):
List<Message>? {
    if (msgAttValue.isEmpty()) {
        val request = ReceiveMessageRequest {
            queueUrl = queueUrlVal
            maxNumberOfMessages = 5
        }
        SqsClient { region = "us-east-1" }.use { sqsClient ->
            return sqsClient.receiveMessage(request).messages
        }
    } else {
        val receiveRequest = ReceiveMessageRequest {
            queueUrl = queueUrlVal
        }
    }
}
```

```
        waitTimeSeconds = 1
        maxNumberOfMessages = 5
    }
    SqsClient { region = "us-east-1" }.use { sqsClient ->
        return sqsClient.receiveMessage(receiveRequest).messages
    }
}

suspend fun pubMessage(messageVal: String?, topicArnVal: String?) {
    val request = PublishRequest {
        message = messageVal
        topicArn = topicArnVal
    }

    SnsClient { region = "us-east-1" }.use { snsClient ->
        val result = snsClient.publish(request)
        println("${result.messageId} message sent.")
    }
}

suspend fun pubMessageFIFO(
    messageVal: String?,
    topicArnVal: String?,
    msgAttValue: String,
    duplication: String,
    groupIdVal: String?,
    deduplicationID: String?,
) {
    // Means the user did not choose to use a message attribute.
    if (msgAttValue.isEmpty()) {
        if (duplication.compareTo("y") == 0) {
            val request = PublishRequest {
                message = messageVal
                messageGroupId = groupIdVal
                topicArn = topicArnVal
            }

            SnsClient { region = "us-east-1" }.use { snsClient ->
                val result = snsClient.publish(request)
                println(result.messageId.toString() + " Message sent.")
            }
        } else {
            val request = PublishRequest {
```

```

        message = messageVal
        messageDeduplicationId = deduplicationID
        messageGroupId = groupIdVal
        topicArn = topicArnVal
    }

    SnsClient { region = "us-east-1" }.use { snsClient ->
        val result = snsClient.publish(request)
        println(result.messageId.toString() + " Message sent.")
    }
}
} else {
    val messAttr = aws.sdk.kotlin.services.sns.model.MessageAttributeValue {
        dataType = "String"
        stringValue = "true"
    }

    val mapAtt: Map<String,
aws.sdk.kotlin.services.sns.model.MessageAttributeValue> =
        mapOf(msgAttValue to messAttr)
    if (duplication.compareTo("y") == 0) {
        val request = PublishRequest {
            message = messageVal
            messageGroupId = groupIdVal
            topicArn = topicArnVal
        }

        SnsClient { region = "us-east-1" }.use { snsClient ->
            val result = snsClient.publish(request)
            println(result.messageId.toString() + " Message sent.")
        }
    } else {
        // Create a publish request with the message and attributes.
        val request = PublishRequest {
            topicArn = topicArnVal
            message = messageVal
            messageDeduplicationId = deduplicationID
            messageGroupId = groupIdVal
            messageAttributes = mapAtt
        }

        SnsClient { region = "us-east-1" }.use { snsClient ->
            val result = snsClient.publish(request)
            println(result.messageId.toString() + " Message sent.")
        }
    }
}

```

```

    }
  }
}

// Subscribe to the SQS queue.
suspend fun subQueue(topicArnVal: String?, queueArnVal: String, filterList:
List<String?>): String? {
    val request: SubscribeRequest
    if (filterList.isEmpty()) {
        // No filter subscription is added.
        request = SubscribeRequest {
            protocol = "sqs"
            endpoint = queueArnVal
            returnSubscriptionArn = true
            topicArn = topicArnVal
        }

        SnsClient { region = "us-east-1" }.use { snsClient ->
            val result = snsClient.subscribe(request)
            println(
                "The queue " + queueArnVal + " has been subscribed to the topic " +
topicArnVal + "\n" +
                "with the subscription ARN " + result.subscriptionArn,
            )
            return result.subscriptionArn
        }
    } else {
        request = SubscribeRequest {
            protocol = "sqs"
            endpoint = queueArnVal
            returnSubscriptionArn = true
            topicArn = topicArnVal
        }

        SnsClient { region = "us-east-1" }.use { snsClient ->
            val result = snsClient.subscribe(request)
            println("The queue $queueArnVal has been subscribed to the topic
$topicArnVal with the subscription ARN ${result.subscriptionArn}")

            val attributeNameVal = "FilterPolicy"
            val gson = Gson()
            val jsonString = "{\\"tone\\": []}"
            val jsonObject = gson.fromJson(jsonString, JsonObject::class.java)

```

```

        val toneArray = jsonObject.getAsJsonArray("tone")
        for (value: String? in filterList) {
            toneArray.add(JsonPrimitive(value))
        }

        val updatedJsonString: String = gson.toJson(jsonObject)
        println(updatedJsonString)
        val attRequest = SetSubscriptionAttributesRequest {
            subscriptionArn = result.subscriptionArn
            attributeName = attributeNameVal
            attributeValue = updatedJsonString
        }

        snsClient.setSubscriptionAttributes(attRequest)
        return result.subscriptionArn
    }
}

suspend fun setQueueAttr(queueUrlVal: String?, policy: String) {
    val attrMap: MutableMap<String, String> = HashMap()
    attrMap[QueueAttributeName.Policy.toString()] = policy

    val attributesRequest = SetQueueAttributesRequest {
        queueUrl = queueUrlVal
        attributes = attrMap
    }

    SqsClient { region = "us-east-1" }.use { sqsClient ->
        sqsClient.setQueueAttributes(attributesRequest)
        println("The policy has been successfully attached.")
    }
}

suspend fun getSQSQueueAttrs(queueUrlVal: String?): String {
    val atts: MutableList<QueueAttributeName> = ArrayList()
    atts.add(QueueAttributeName.QueueArn)

    val attributesRequest = GetQueueAttributesRequest {
        queueUrl = queueUrlVal
        attributeNames = atts
    }

    SqsClient { region = "us-east-1" }.use { sqsClient ->
        val response = sqsClient.getQueueAttributes(attributesRequest)
    }
}

```

```

        val mapAtts = response.attributes
        if (mapAtts != null) {
            mapAtts.forEach { entry ->
                println("${entry.key} : ${entry.value}")
                return entry.value
            }
        }
    }
    return ""
}

suspend fun createQueue(queueNameVal: String?, selectFIFO: Boolean): String? {
    println("\nCreate Queue")
    if (selectFIFO) {
        val attrs = mutableMapOf<String, String>()
        attrs[QueueAttributeName.FifoQueue.toString()] = "true"

        val createQueueRequest = CreateQueueRequest {
            queueName = queueNameVal
            attributes = attrs
        }

        SqsClient { region = "us-east-1" }.use { sqsClient ->
            sqsClient.createQueue(createQueueRequest)
            println("\nGet queue url")

            val urlRequest = GetQueueUrlRequest {
                queueName = queueNameVal
            }

            val getQueueUrlResponse = sqsClient.getQueueUrl(urlRequest)
            return getQueueUrlResponse.queueUrl
        }
    } else {
        val createQueueRequest = CreateQueueRequest {
            queueName = queueNameVal
        }

        SqsClient { region = "us-east-1" }.use { sqsClient ->
            sqsClient.createQueue(createQueueRequest)
            println("Get queue url")

            val urlRequest = GetQueueUrlRequest {
                queueName = queueNameVal
            }

```

```
        }

        val getUrlResponse = sqsClient.getUrl(urlRequest)
        return getUrlResponse.queueUrl
    }
}

suspend fun createSNSTopic(topicName: String?): String? {
    val request = CreateTopicRequest {
        name = topicName
    }

    SnsClient { region = "us-east-1" }.use { snsClient ->
        val result = snsClient.createTopic(request)
        return result.topicArn
    }
}

suspend fun createFIFO(topicName: String?, duplication: String): String? {
    val topicAttributes: MutableMap<String, String> = HashMap()
    if (duplication.compareTo("n") == 0) {
        topicAttributes["FifoTopic"] = "true"
        topicAttributes["ContentBasedDeduplication"] = "false"
    } else {
        topicAttributes["FifoTopic"] = "true"
        topicAttributes["ContentBasedDeduplication"] = "true"
    }

    val topicRequest = CreateTopicRequest {
        name = topicName
        attributes = topicAttributes
    }
    SnsClient { region = "us-east-1" }.use { snsClient ->
        val response = snsClient.createTopic(topicRequest)
        return response.topicArn
    }
}
```

- For API details, see the following topics in *AWS SDK for Kotlin API reference*.
  - [CreateQueue](#)
  - [CreateTopic](#)

- [DeleteMessageBatch](#)
- [DeleteQueue](#)
- [DeleteTopic](#)
- [GetQueueAttributes](#)
- [Publish](#)
- [ReceiveMessage](#)
- [SetQueueAttributes](#)
- [Subscribe](#)
- [Unsubscribe](#)

## Step Functions examples using SDK for Kotlin

The following code examples show you how to perform actions and implement common scenarios by using the AWS SDK for Kotlin with Step Functions.

*Basics* are code examples that show you how to perform the essential operations within a service.

*Actions* are code excerpts from larger programs and must be run in context. While actions show you how to call individual service functions, you can see actions in context in their related scenarios.

Each example includes a link to the complete source code, where you can find instructions on how to set up and run the code in context.

### Get started

#### Hello Step Functions

The following code examples show how to get started using Step Functions.

#### SDK for Kotlin

##### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
import aws.sdk.kotlin.services.sfn.SfnClient
```



```
import aws.sdk.kotlin.services.sfn.model.ListStateMachinesRequest

/**
 * Before running this Kotlin code example, set up your development environment,
 * including your credentials.
 *
 * For more information, see the following documentation topic:
 * https://docs.aws.amazon.com/sdk-for-kotlin/latest/developer-guide/setup.html
 */

suspend fun main() {
    println(DASHES)
    println("Welcome to the AWS Step Functions Hello example.")
    println("Lets list up to ten of your state machines:")
    println(DASHES)

    listMachines()
}

suspend fun listMachines() {
    SfnClient { region = "us-east-1" }.use { sfnClient ->
        val response = sfnClient.listStateMachines(ListStateMachinesRequest {})
        response.stateMachines?.forEach { machine ->
            println("The name of the state machine is ${machine.name}")
            println("The ARN value is ${machine.stateMachineArn}")
        }
    }
}
```

- For API details, see [ListStateMachines](#) in *AWS SDK for Kotlin API reference*.

## Topics

- [Basics](#)
- [Actions](#)

## Basics

### Learn the basics

The following code example shows how to:

- Create an activity.
- Create a state machine from an Amazon States Language definition that contains the previously created activity as a step.
- Run the state machine and respond to the activity with user input.
- Get the final status and output after the run completes, then clean up resources.

## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
import aws.sdk.kotlin.services.iam.IamClient
import aws.sdk.kotlin.services.iam.model.CreateRoleRequest
import aws.sdk.kotlin.services.sfn.SfnClient
import aws.sdk.kotlin.services.sfn.model.CreateActivityRequest
import aws.sdk.kotlin.services.sfn.model.CreateStateMachineRequest
import aws.sdk.kotlin.services.sfn.model.DeleteActivityRequest
import aws.sdk.kotlin.services.sfn.model.DeleteStateMachineRequest
import aws.sdk.kotlin.services.sfn.model.DescribeExecutionRequest
import aws.sdk.kotlin.services.sfn.model.DescribeStateMachineRequest
import aws.sdk.kotlin.services.sfn.model.GetActivityTaskRequest
import aws.sdk.kotlin.services.sfn.model.ListActivitiesRequest
import aws.sdk.kotlin.services.sfn.model.ListStateMachinesRequest
import aws.sdk.kotlin.services.sfn.model.SendTaskSuccessRequest
import aws.sdk.kotlin.services.sfn.model.StartExecutionRequest
import aws.sdk.kotlin.services.sfn.model.StateMachineType
import aws.sdk.kotlin.services.sfn.paginators.listActivitiesPaginated
import aws.sdk.kotlin.services.sfn.paginators.listStateMachinesPaginated
import com.fasterxml.jackson.databind.JsonNode
import com.fasterxml.jackson.databind.ObjectMapper
import com.fasterxml.jackson.databind.node.ObjectNode
import kotlinx.coroutines.flow.transform
import java.util.Scanner
import java.util.UUID
import kotlin.collections.ArrayList
import kotlin.system.exitProcess
```

```
/**
To run this code example, place the chat_sfn_state_machine.json file into your
project's resources folder.

You can obtain the JSON file to create a state machine in the following GitHub
location:

https://github.com/awsdocs/aws-doc-sdk-examples/tree/main/resources/sample\_files

Before running this Kotlin code example, set up your development environment,
including your credentials.

For more information, see the following documentation topic:
https://docs.aws.amazon.com/sdk-for-kotlin/latest/developer-guide/setup.html

This Kotlin code example performs the following tasks:

1. List activities using a paginator.
2. List state machines using a paginator.
3. Creates an activity.
4. Creates a state machine.
5. Describes the state machine.
6. Starts execution of the state machine and interacts with it.
7. Describes the execution.
8. Deletes the activity.
9. Deletes the state machine.
*/

val DASHES: String = String(CharArray(80)).replace("\u0000", "-")

suspend fun main(args: Array<String>) {
    val usage = """
Usage:
    <roleARN> <activityName> <stateMachineName>

Where:
    roleName - The name of the IAM role to create for this state machine.
    activityName - The name of an activity to create.
    stateMachineName - The name of the state machine to create.
    """

    if (args.size != 3) {
        println(usage)
        exitProcess(0)
    }
}
```

```
}

val roleName = args[0]
val activityName = args[1]
val stateMachineName = args[2]
val sc = Scanner(System.`in`)
var action = false

val polJSON = """{
"Version": "2012-10-17",
"Statement": [
  {
    "Sid": "",
    "Effect": "Allow",
    "Principal": {
      "Service": "states.amazonaws.com"
    },
    "Action": "sts:AssumeRole"
  }
]
}"""

println(DASHES)
println("Welcome to the AWS Step Functions example scenario.")
println(DASHES)

println(DASHES)
println("1. List activities using a Paginator.")
listActivitesPagnator()
println(DASHES)

println(DASHES)
println("2. List state machines using a paginator.")
listStatemachinesPagnator()
println(DASHES)

println(DASHES)
println("3. Create a new activity.")
val activityArn = createActivity(activityName)
println("The ARN of the Activity is $activityArn")
println(DASHES)

// Get JSON to use for the state machine and place the activityArn value into
it.
```

```
val stream = GetStream()
val jsonString = stream.getStream()

// Modify the Resource node.
val objectMapper = ObjectMapper()
val root: JsonNode = objectMapper.readTree(jsonString)
(root.path("States").path("GetInput") as ObjectNode).put("Resource",
activityArn)

// Convert the modified Java object back to a JSON string.
val stateDefinition = objectMapper.writeValueAsString(root)
println(stateDefinition)

println(DASHES)
println("4. Create a state machine.")
val roleARN = createIAMRole(roleName, polJSON)
val stateMachineArn = createMachine(roleARN, stateMachineName, stateDefinition)
println("The ARN of the state machine is $stateMachineArn")
println(DASHES)

println(DASHES)
println("5. Describe the state machine.")
describeStateMachine(stateMachineArn)
println("What should ChatSFN call you?")
val userName = sc.nextLine()
println("Hello $userName")
println(DASHES)

println(DASHES)
// The JSON to pass to the StartExecution call.
val executionJson = "{ \"name\" : \"$userName\" }"
println(executionJson)
println("6. Start execution of the state machine and interact with it.")
val runArn = startWorkflow(stateMachineArn, executionJson)
println("The ARN of the state machine execution is $runArn")
var myList: List<String>
while (!action) {
    myList = getActivityTask(activityArn)
    println("ChatSFN: " + myList[1])
    println("$userName please specify a value.")
    val myAction = sc.nextLine()
    if (myAction.compareTo("done") == 0) {
        action = true
    }
}
```

```

        println("You have selected $myAction")
        val taskJson = "{ \"action\" : \"$myAction\" }"
        println(taskJson)
        sendTaskSuccess(myList[0], taskJson)
    }
    println(DASHES)

    println(DASHES)
    println("7. Describe the execution.")
    describeExe(runArn)
    println(DASHES)

    println(DASHES)
    println("8. Delete the activity.")
    deleteActivity(activityArn)
    println(DASHES)

    println(DASHES)
    println("9. Delete the state machines.")
    deleteMachine(stateMachineArn)
    println(DASHES)

    println(DASHES)
    println("The AWS Step Functions example scenario is complete.")
    println(DASHES)
}

suspend fun listStatemachinesPagnator() {
    val machineRequest =
        ListStateMachinesRequest {
            maxResults = 10
        }

    SfnClient { region = "us-east-1" }.use { sfnClient ->
        sfnClient
            .listStateMachinesPaginated(machineRequest)
            .transform { it.stateMachines?.forEach { obj -> emit(obj) } }
            .collect { obj ->
                println(" The state machine ARN is ${obj.stateMachineArn}")
            }
    }
}

suspend fun listActivitesPagnator() {

```

```
val activitiesRequest =
    ListActivitiesRequest {
        maxResults = 10
    }

SfnClient { region = "us-east-1" }.use { sfnClient ->
    sfnClient
        .listActivitiesPaginated(activitiesRequest)
        .transform { it.activities?.forEach { obj -> emit(obj) } }
        .collect { obj ->
            println(" The activity ARN is ${obj.activityArn}")
        }
    }
}

suspend fun deleteMachine(stateMachineArnVal: String?) {
    val deleteStateMachineRequest =
        DeleteStateMachineRequest {
            stateMachineArn = stateMachineArnVal
        }

    SfnClient { region = "us-east-1" }.use { sfnClient ->
        sfnClient.deleteStateMachine(deleteStateMachineRequest)
        println("$stateMachineArnVal was successfully deleted.")
    }
}

suspend fun deleteActivity(actArn: String?) {
    val activityRequest =
        DeleteActivityRequest {
            activityArn = actArn
        }

    SfnClient { region = "us-east-1" }.use { sfnClient ->
        sfnClient.deleteActivity(activityRequest)
        println("You have deleted $actArn")
    }
}

suspend fun describeExe(executionArnVal: String?) {
    val executionRequest =
        DescribeExecutionRequest {
            executionArn = executionArnVal
        }
}
```

```

var status = ""
var hasSucceeded = false
while (!hasSucceeded) {
    SfnClient { region = "us-east-1" }.use { sfnClient ->
        val response = sfnClient.describeExecution(executionRequest)
        status = response.status.toString()
        if (status.compareTo("RUNNING") == 0) {
            println("The state machine is still running, let's wait for it to
finish.")
            Thread.sleep(2000)
        } else if (status.compareTo("SUCCEEDED") == 0) {
            println("The Step Function workflow has succeeded")
            hasSucceeded = true
        } else {
            println("The Status is neither running or succeeded")
        }
    }
}
println("The Status is $status")
}

suspend fun sendTaskSuccess(
    token: String?,
    json: String?,
) {
    val successRequest =
        SendTaskSuccessRequest {
            taskToken = token
            output = json
        }
    SfnClient { region = "us-east-1" }.use { sfnClient ->
        sfnClient.sendTaskSuccess(successRequest)
    }
}

suspend fun getActivityTask(actArn: String?): List<String> {
    val myList: MutableList<String> = ArrayList()
    val getActivityTaskRequest =
        GetActivityTaskRequest {
            activityArn = actArn
        }
    SfnClient { region = "us-east-1" }.use { sfnClient ->
        val response = sfnClient.getActivityTask(getActivityTaskRequest)

```



```
        myList.add(response.taskToken.toString())
        myList.add(response.input.toString())
        return myList
    }
}

suspend fun startWorkflow(
    stateMachineArnVal: String?,
    jsonEx: String?,
): String? {
    val uuid = UUID.randomUUID()
    val uuidValue = uuid.toString()
    val executionRequest =
        StartExecutionRequest {
            input = jsonEx
            stateMachineArn = stateMachineArnVal
            name = uuidValue
        }
    SfnClient { region = "us-east-1" }.use { sfnClient ->
        val response = sfnClient.startExecution(executionRequest)
        return response.executionArn
    }
}

suspend fun describeStateMachine(stateMachineArnVal: String?) {
    val stateMachineRequest =
        DescribeStateMachineRequest {
            stateMachineArn = stateMachineArnVal
        }
    SfnClient { region = "us-east-1" }.use { sfnClient ->
        val response = sfnClient.describeStateMachine(stateMachineRequest)
        println("The name of the State machine is ${response.name}")
        println("The status of the State machine is ${response.status}")
        println("The ARN value of the State machine is ${response.stateMachineArn}")
        println("The role ARN value is ${response.roleArn}")
    }
}

suspend fun createMachine(
    roleARNVal: String?,
    stateMachineName: String?,
    jsonVal: String?,
): String? {
    val machineRequest =
```

```
        CreateStateMachineRequest {
            definition = jsonVal
            name = stateMachineName
            roleArn = roleARNVal
            type = StateMachineType.Standard
        }

    SfnClient { region = "us-east-1" }.use { sfnClient ->
        val response = sfnClient.createStateMachine(machineRequest)
        return response.stateMachineArn
    }
}

suspend fun createIAMRole(
    roleNameVal: String?,
    polJSON: String?,
): String? {
    val request =
        CreateRoleRequest {
            roleName = roleNameVal
            assumeRolePolicyDocument = polJSON
            description = "Created using the AWS SDK for Kotlin"
        }

    IamClient { region = "AWS_GLOBAL" }.use { iamClient ->
        val response = iamClient.createRole(request)
        return response.role?.arn
    }
}

suspend fun createActivity(activityName: String): String? {
    val activityRequest =
        CreateActivityRequest {
            name = activityName
        }

    SfnClient { region = "us-east-1" }.use { sfnClient ->
        val response = sfnClient.createActivity(activityRequest)
        return response.activityArn
    }
}
```

- For API details, see the following topics in *AWS SDK for Kotlin API reference*.

- [CreateActivity](#)
- [CreateStateMachine](#)
- [DeleteActivity](#)
- [DeleteStateMachine](#)
- [DescribeExecution](#)
- [DescribeStateMachine](#)
- [GetActivityTask](#)
- [ListActivities](#)
- [ListStateMachines](#)
- [SendTaskSuccess](#)
- [StartExecution](#)
- [StopExecution](#)

## Actions

### CreateActivity

The following code example shows how to use CreateActivity.

#### SDK for Kotlin

##### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun createActivity(activityName: String): String? {
    val activityRequest =
        CreateActivityRequest {
            name = activityName
        }

    SfnClient { region = "us-east-1" }.use { sfnClient ->
        val response = sfnClient.createActivity(activityRequest)
        return response.activityArn
    }
}
```

```
}  
}
```

- For API details, see [CreateActivity](#) in *AWS SDK for Kotlin API reference*.

## CreateStateMachine

The following code example shows how to use `CreateStateMachine`.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun createMachine(  
    roleARNVal: String?,  
    stateMachineName: String?,  
    jsonVal: String?,  
    ): String? {  
    val machineRequest =  
        CreateStateMachineRequest {  
            definition = jsonVal  
            name = stateMachineName  
            roleArn = roleARNVal  
            type = StateMachineType.Standard  
        }  
  
    SfnClient { region = "us-east-1" }.use { sfnClient ->  
        val response = sfnClient.createStateMachine(machineRequest)  
        return response.stateMachineArn  
    }  
}
```

- For API details, see [CreateStateMachine](#) in *AWS SDK for Kotlin API reference*.

## DeleteActivity

The following code example shows how to use DeleteActivity.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun deleteActivity(actArn: String?) {
    val activityRequest =
        DeleteActivityRequest {
            activityArn = actArn
        }

    SfnClient { region = "us-east-1" }.use { sfnClient ->
        sfnClient.deleteActivity(activityRequest)
        println("You have deleted $actArn")
    }
}
```

- For API details, see [DeleteActivity](#) in *AWS SDK for Kotlin API reference*.

## DeleteStateMachine

The following code example shows how to use DeleteStateMachine.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun deleteMachine(stateMachineArnVal: String?) {
```

```
val deleteStateMachineRequest =
    DeleteStateMachineRequest {
        stateMachineArn = stateMachineArnVal
    }

SfnClient { region = "us-east-1" }.use { sfnClient ->
    sfnClient.deleteStateMachine(deleteStateMachineRequest)
    println("$stateMachineArnVal was successfully deleted.")
}
}
```

- For API details, see [DeleteStateMachine](#) in *AWS SDK for Kotlin API reference*.

## DescribeExecution

The following code example shows how to use DescribeExecution.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun describeExe(executionArnVal: String?) {
    val executionRequest =
        DescribeExecutionRequest {
            executionArn = executionArnVal
        }

    var status = ""
    var hasSucceeded = false
    while (!hasSucceeded) {
        SfnClient { region = "us-east-1" }.use { sfnClient ->
            val response = sfnClient.describeExecution(executionRequest)
            status = response.status.toString()
            if (status.compareTo("RUNNING") == 0) {
                println("The state machine is still running, let's wait for it to
finish.")
            }
        }
    }
}
```

```

        Thread.sleep(2000)
    } else if (status.compareTo("SUCCEEDED") == 0) {
        println("The Step Function workflow has succeeded")
        hasSucceeded = true
    } else {
        println("The Status is neither running or succeeded")
    }
    }
}
println("The Status is $status")
}

```

- For API details, see [DescribeExecution](#) in *AWS SDK for Kotlin API reference*.

## DescribeStateMachine

The following code example shows how to use DescribeStateMachine.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```

suspend fun describeStateMachine(stateMachineArnVal: String?) {
    val stateMachineRequest =
        DescribeStateMachineRequest {
            stateMachineArn = stateMachineArnVal
        }
    SfnClient { region = "us-east-1" }.use { sfnClient ->
        val response = sfnClient.describeStateMachine(stateMachineRequest)
        println("The name of the State machine is ${response.name}")
        println("The status of the State machine is ${response.status}")
        println("The ARN value of the State machine is ${response.stateMachineArn}")
        println("The role ARN value is ${response.roleArn}")
    }
}

```

- For API details, see [DescribeStateMachine](#) in *AWS SDK for Kotlin API reference*.

## GetActivityTask

The following code example shows how to use `GetActivityTask`.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun getActivityTask(actArn: String?): List<String> {
    val myList: MutableList<String> = ArrayList()
    val getActivityTaskRequest =
        GetActivityTaskRequest {
            activityArn = actArn
        }
    SfnClient { region = "us-east-1" }.use { sfnClient ->
        val response = sfnClient.getActivityTask(getActivityTaskRequest)
        myList.add(response.taskToken.toString())
        myList.add(response.input.toString())
        return myList
    }
}
```

- For API details, see [GetActivityTask](#) in *AWS SDK for Kotlin API reference*.

## ListActivities

The following code example shows how to use `ListActivities`.



## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun listAllActivites() {
    val activitiesRequest =
        ListActivitiesRequest {
            maxResults = 10
        }

    SfnClient { region = "us-east-1" }.use { sfnClient ->
        val response = sfnClient.listActivities(activitiesRequest)
        response.activities?.forEach { item ->
            println("The activity ARN is ${item.activityArn}")
            println("The activity name is ${item.name}")
        }
    }
}
```

- For API details, see [ListActivities](#) in *AWS SDK for Kotlin API reference*.

## ListExecutions

The following code example shows how to use ListExecutions.

## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun getExeHistory(exeARN: String?) {
```

```
val historyRequest =
    GetExecutionHistoryRequest {
        executionArn = exeARN
        maxResults = 10
    }

SfnClient { region = "us-east-1" }.use { sfnClient ->
    val response = sfnClient.getExecutionHistory(historyRequest)
    response.events?.forEach { event ->
        println("The event type is ${event.type}")
    }
}
}
```

- For API details, see [ListExecutions](#) in *AWS SDK for Kotlin API reference*.

## ListStateMachines

The following code example shows how to use `ListStateMachines`.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
import aws.sdk.kotlin.services.sfn.SfnClient
import aws.sdk.kotlin.services.sfn.model.ListStateMachinesRequest

/**
 * Before running this Kotlin code example, set up your development environment,
 * including your credentials.
 *
 * For more information, see the following documentation topic:
 * https://docs.aws.amazon.com/sdk-for-kotlin/latest/developer-guide/setup.html
 */

suspend fun main() {
```

```
println(DASHES)
println("Welcome to the AWS Step Functions Hello example.")
println("Lets list up to ten of your state machines:")
println(DASHES)

listMachines()
}

suspend fun listMachines() {
    SfnClient { region = "us-east-1" }.use { sfnClient ->
        val response = sfnClient.listStateMachines(ListStateMachinesRequest {})
        response.stateMachines?.forEach { machine ->
            println("The name of the state machine is ${machine.name}")
            println("The ARN value is ${machine.stateMachineArn}")
        }
    }
}
```

- For API details, see [ListStateMachines](#) in *AWS SDK for Kotlin API reference*.

## SendTaskSuccess

The following code example shows how to use SendTaskSuccess.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun sendTaskSuccess(
    token: String?,
    json: String?,
) {
    val successRequest =
        SendTaskSuccessRequest {
            taskToken = token
            output = json
        }
}
```

```
    }
    SfnClient { region = "us-east-1" }.use { sfnClient ->
        sfnClient.sendTaskSuccess(successRequest)
    }
}
```

- For API details, see [SendTaskSuccess](#) in *AWS SDK for Kotlin API reference*.

## StartExecution

The following code example shows how to use StartExecution.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun startWorkflow(
    stateMachineArnVal: String?,
    jsonEx: String?,
): String? {
    val uuid = UUID.randomUUID()
    val uuidValue = uuid.toString()
    val executionRequest =
        StartExecutionRequest {
            input = jsonEx
            stateMachineArn = stateMachineArnVal
            name = uuidValue
        }
    SfnClient { region = "us-east-1" }.use { sfnClient ->
        val response = sfnClient.startExecution(executionRequest)
        return response.executionArn
    }
}
```

- For API details, see [StartExecution](#) in *AWS SDK for Kotlin API reference*.

# AWS Support examples using SDK for Kotlin

The following code examples show you how to perform actions and implement common scenarios by using the AWS SDK for Kotlin with AWS Support.

*Basics* are code examples that show you how to perform the essential operations within a service.

*Actions* are code excerpts from larger programs and must be run in context. While actions show you how to call individual service functions, you can see actions in context in their related scenarios.

Each example includes a link to the complete source code, where you can find instructions on how to set up and run the code in context.

## Get started

### Hello AWS Support

The following code examples show how to get started using AWS Support.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
/**
```

```
Before running this Kotlin code example, set up your development environment, including your credentials.
```

```
For more information, see the following documentation topic:
```

```
https://docs.aws.amazon.com/sdk-for-kotlin/latest/developer-guide/setup.html
```

```
In addition, you must have the AWS Business Support Plan to use the AWS Support Java API. For more information, see:
```

```
https://aws.amazon.com/premiumsupport/plans/
```

```
This Kotlin example performs the following task:
```

```
1. Gets and displays available services.
*/

suspend fun main() {
    displaySomeServices()
}

// Return a List that contains a Service name and Category name.
suspend fun displaySomeServices() {
    val servicesRequest =
        DescribeServicesRequest {
            language = "en"
        }

    SupportClient { region = "us-west-2" }.use { supportClient ->
        val response = supportClient.describeServices(servicesRequest)
        println("Get the first 10 services")
        var index = 1

        response.services?.forEach { service ->
            if (index == 11) {
                return@forEach
            }

            println("The Service name is: " + service.name)

            // Get the categories for this service.
            service.categories?.forEach { cat ->
                println("The category name is ${cat.name}")
                index++
            }
        }
    }
}
```

- For API details, see [DescribeServices](#) in *AWS SDK for Kotlin API reference*.

## Topics

- [Basics](#)
- [Actions](#)

# Basics

## Learn the basics

The following code example shows how to:

- Get and display available services and severity levels for cases.
- Create a support case using a selected service, category, and severity level.
- Get and display a list of open cases for the current day.
- Add an attachment set and a communication to the new case.
- Describe the new attachment and communication for the case.
- Resolve the case.
- Get and display a list of resolved cases for the current day.

## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
/**
```

```
Before running this Kotlin code example, set up your development environment, including your credentials.
```

```
For more information, see the following documentation topic:
```

```
https://docs.aws.amazon.com/sdk-for-kotlin/latest/developer-guide/setup.html
```

```
In addition, you must have the AWS Business Support Plan to use the AWS Support Java API. For more information, see:
```

```
https://aws.amazon.com/premiumsupport/plans/
```

```
This Kotlin example performs the following tasks:
```

- ```
1. Gets and displays available services.  
2. Gets and displays severity levels.
```

3. Creates a support case by using the selected service, category, and severity level.
  4. Gets a list of open cases for the current day.
  5. Creates an attachment set with a generated file.
  6. Adds a communication with the attachment to the support case.
  7. Lists the communications of the support case.
  8. Describes the attachment set included with the communication.
  9. Resolves the support case.
  10. Gets a list of resolved cases for the current day.
- \*/

```
suspend fun main(args: Array<String>) {
    val usage = """
Usage:
    <fileAttachment>
Where:
    fileAttachment - The file can be a simple saved .txt file to use as an
email attachment.
    """

    if (args.size != 1) {
        println(usage)
        exitProcess(0)
    }

    val fileAttachment = args[0]
    println("***** Welcome to the AWS Support case example scenario.")
    println("***** Step 1. Get and display available services.")
    val sevCatList = displayServices()

    println("***** Step 2. Get and display Support severity levels.")
    val sevLevel = displaySevLevels()

    println("***** Step 3. Create a support case using the selected service,
category, and severity level.")
    val caseIdVal = createSupportCase(sevCatList, sevLevel)
    if (caseIdVal != null) {
        println("Support case $caseIdVal was successfully created!")
    } else {
        println("A support case was not successfully created!")
        exitProcess(1)
    }

    println("***** Step 4. Get open support cases.")
}
```



```

    getOpenCase()

    println("***** Step 5. Create an attachment set with a generated file to add to
the case.")
    val attachmentSetId = addAttachment(fileAttachment)
    println("The Attachment Set id value is $attachmentSetId")

    println("***** Step 6. Add communication with the attachment to the support
case.")
    addAttachSupportCase(caseIdVal, attachmentSetId)

    println("***** Step 7. List the communications of the support case.")
    val attachId = listCommunications(caseIdVal)
    println("The Attachment id value is $attachId")

    println("***** Step 8. Describe the attachment set included with the
communication.")
    describeAttachment(attachId)

    println("***** Step 9. Resolve the support case.")
    resolveSupportCase(caseIdVal)

    println("***** Step 10. Get a list of resolved cases for the current day.")
    getResolvedCase()
    println("***** This Scenario has successfully completed")
}

suspend fun getResolvedCase() {
    // Specify the start and end time.
    val now = Instant.now()
    LocalDate.now()
    val yesterday = now.minus(1, ChronoUnit.DAYS)
    val describeCasesRequest =
        DescribeCasesRequest {
            maxResults = 30
            afterTime = yesterday.toString()
            beforeTime = now.toString()
            includeResolvedCases = true
        }

    SupportClient { region = "us-west-2" }.use { supportClient ->
        val response = supportClient.describeCases(describeCasesRequest)
        response.cases?.forEach { sinCase ->
            println("The case status is ${sinCase.status}")
        }
    }
}

```

```
        println("The case Id is ${sinCase.caseId}")
        println("The case subject is ${sinCase.subject}")
    }
}

suspend fun resolveSupportCase(caseIdVal: String) {
    val caseRequest =
        ResolveCaseRequest {
            caseId = caseIdVal
        }
    SupportClient { region = "us-west-2" }.use { supportClient ->
        val response = supportClient.resolveCase(caseRequest)
        println("The status of case $caseIdVal is ${response.finalCaseStatus}")
    }
}

suspend fun describeAttachment(attachId: String?) {
    val attachmentRequest =
        DescribeAttachmentRequest {
            attachmentId = attachId
        }

    SupportClient { region = "us-west-2" }.use { supportClient ->
        val response = supportClient.describeAttachment(attachmentRequest)
        println("The name of the file is ${response.attachment?.fileName}")
    }
}

suspend fun listCommunications(caseIdVal: String?): String? {
    val communicationsRequest =
        DescribeCommunicationsRequest {
            caseId = caseIdVal
            maxResults = 10
        }

    SupportClient { region = "us-west-2" }.use { supportClient ->
        val response = supportClient.describeCommunications(communicationsRequest)
        response.communications?.forEach { comm ->
            println("the body is: " + comm.body)
            comm.attachmentSet?.forEach { detail ->
                return detail.attachmentId
            }
        }
    }
}
```

```
    }
    return ""
}

suspend fun addAttachSupportCase(
    caseIdVal: String?,
    attachmentSetIdVal: String?,
) {
    val caseRequest =
        AddCommunicationToCaseRequest {
            caseId = caseIdVal
            attachmentSetId = attachmentSetIdVal
            communicationBody = "Please refer to attachment for details."
        }

    SupportClient { region = "us-west-2" }.use { supportClient ->
        val response = supportClient.addCommunicationToCase(caseRequest)
        if (response.result) {
            println("You have successfully added a communication to an AWS Support
case")
        } else {
            println("There was an error adding the communication to an AWS Support
case")
        }
    }
}

suspend fun addAttachment(fileAttachment: String): String? {
    val myFile = File(fileAttachment)
    val sourceBytes = (File(fileAttachment).readBytes())
    val attachmentVal =
        Attachment {
            fileName = myFile.name
            data = sourceBytes
        }

    val setRequest =
        AddAttachmentsToSetRequest {
            attachments = listOf(attachmentVal)
        }

    SupportClient { region = "us-west-2" }.use { supportClient ->
        val response = supportClient.addAttachmentsToSet(setRequest)
        return response.attachmentSetId
    }
}
```

```
    }
}

suspend fun getOpenCase() {
    // Specify the start and end time.
    val now = Instant.now()
    LocalDate.now()
    val yesterday = now.minus(1, ChronoUnit.DAYS)
    val describeCasesRequest =
        DescribeCasesRequest {
            maxResults = 20
            afterTime = yesterday.toString()
            beforeTime = now.toString()
        }

    SupportClient { region = "us-west-2" }.use { supportClient ->
        val response = supportClient.describeCases(describeCasesRequest)
        response.cases?.forEach { sinCase ->
            println("The case status is ${sinCase.status}")
            println("The case Id is ${sinCase.caseId}")
            println("The case subject is ${sinCase.subject}")
        }
    }
}

suspend fun createSupportCase(
    sevCatListVal: List<String>,
    sevLevelVal: String,
): String? {
    val serCode = sevCatListVal[0]
    val caseCategory = sevCatListVal[1]
    val caseRequest =
        CreateCaseRequest {
            categoryCode = caseCategory.lowercase(Locale.getDefault())
            serviceCode = serCode.lowercase(Locale.getDefault())
            severityCode = sevLevelVal.lowercase(Locale.getDefault())
            communicationBody = "Test issue with
${serCode.lowercase(Locale.getDefault())}"
            subject = "Test case, please ignore"
            language = "en"
            issueType = "technical"
        }

    SupportClient { region = "us-west-2" }.use { supportClient ->
```

```
        val response = supportClient.createCase(caseRequest)
        return response.caseId
    }
}

suspend fun displaySevLevels(): String {
    var levelName = ""
    val severityLevelsRequest =
        DescribeSeverityLevelsRequest {
            language = "en"
        }

    SupportClient { region = "us-west-2" }.use { supportClient ->
        val response = supportClient.describeSeverityLevels(severityLevelsRequest)
        response.severityLevels?.forEach { sevLevel ->
            println("The severity level name is: ${sevLevel.name}")
            if (sevLevel.name == "High") {
                levelName = sevLevel.name!!
            }
        }
        return levelName
    }
}

// Return a List that contains a Service name and Category name.
suspend fun displayServices(): List<String> {
    var serviceCode = ""
    var catName = ""
    val sevCatList = mutableListOf<String>()
    val servicesRequest =
        DescribeServicesRequest {
            language = "en"
        }

    SupportClient { region = "us-west-2" }.use { supportClient ->
        val response = supportClient.describeServices(servicesRequest)
        println("Get the first 10 services")
        var index = 1

        response.services?.forEach { service ->
            if (index == 11) {
                return@forEach
            }
        }
    }
}
```

```
println("The Service name is ${service.name}")
if (service.name == "Account") {
    serviceCode = service.code.toString()
}

// Get the categories for this service.
service.categories?.forEach { cat ->
    println("The category name is ${cat.name}")
    if (cat.name == "Security") {
        catName = cat.name!!
    }
}
index++
}

// Push the two values to the list.
serviceCode.let { sevCatList.add(it) }
catName.let { sevCatList.add(it) }
return sevCatList
}
```

- For API details, see the following topics in *AWS SDK for Kotlin API reference*.
  - [AddAttachmentsToSet](#)
  - [AddCommunicationToCase](#)
  - [CreateCase](#)
  - [DescribeAttachment](#)
  - [DescribeCases](#)
  - [DescribeCommunications](#)
  - [DescribeServices](#)
  - [DescribeSeverityLevels](#)
  - [ResolveCase](#)

## Actions

### AddAttachmentsToSet

The following code example shows how to use AddAttachmentsToSet.

## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun addAttachment(fileAttachment: String): String? {
    val myFile = File(fileAttachment)
    val sourceBytes = (File(fileAttachment).readBytes())
    val attachmentVal =
        Attachment {
            fileName = myFile.name
            data = sourceBytes
        }

    val setRequest =
        AddAttachmentsToSetRequest {
            attachments = listOf(attachmentVal)
        }

    SupportClient { region = "us-west-2" }.use { supportClient ->
        val response = supportClient.addAttachmentsToSet(setRequest)
        return response.attachmentSetId
    }
}
```

- For API details, see [AddAttachmentsToSet](#) in *AWS SDK for Kotlin API reference*.

### AddCommunicationToCase

The following code example shows how to use AddCommunicationToCase.

## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun addAttachSupportCase(
    caseIdVal: String?,
    attachmentSetIdVal: String?,
) {
    val caseRequest =
        AddCommunicationToCaseRequest {
            caseId = caseIdVal
            attachmentSetId = attachmentSetIdVal
            communicationBody = "Please refer to attachment for details."
        }

    SupportClient { region = "us-west-2" }.use { supportClient ->
        val response = supportClient.addCommunicationToCase(caseRequest)
        if (response.result) {
            println("You have successfully added a communication to an AWS Support
case")
        } else {
            println("There was an error adding the communication to an AWS Support
case")
        }
    }
}
```

- For API details, see [AddCommunicationToCase](#) in *AWS SDK for Kotlin API reference*.

## CreateCase

The following code example shows how to use CreateCase.



## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun createSupportCase(
    sevCatListVal: List<String>,
    sevLevelVal: String,
): String? {
    val serCode = sevCatListVal[0]
    val caseCategory = sevCatListVal[1]
    val caseRequest =
        CreateCaseRequest {
            categoryCode = caseCategory.lowercase(Locale.getDefault())
            serviceCode = serCode.lowercase(Locale.getDefault())
            severityCode = sevLevelVal.lowercase(Locale.getDefault())
            communicationBody = "Test issue with
${serCode.lowercase(Locale.getDefault())}"
            subject = "Test case, please ignore"
            language = "en"
            issueType = "technical"
        }

    SupportClient { region = "us-west-2" }.use { supportClient ->
        val response = supportClient.createCase(caseRequest)
        return response.caseId
    }
}
```

- For API details, see [CreateCase](#) in *AWS SDK for Kotlin API reference*.

## DescribeAttachment

The following code example shows how to use DescribeAttachment.

## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun describeAttachment(attachId: String?) {
    val attachmentRequest =
        DescribeAttachmentRequest {
            attachmentId = attachId
        }

    SupportClient { region = "us-west-2" }.use { supportClient ->
        val response = supportClient.describeAttachment(attachmentRequest)
        println("The name of the file is ${response.attachment?.fileName}")
    }
}
```

- For API details, see [DescribeAttachment](#) in *AWS SDK for Kotlin API reference*.

## DescribeCases

The following code example shows how to use DescribeCases.

## SDK for Kotlin

### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun getOpenCase() {
    // Specify the start and end time.
    val now = Instant.now()
    LocalDate.now()
```

```
val yesterday = now.minus(1, ChronoUnit.DAYS)
val describeCasesRequest =
    DescribeCasesRequest {
        maxResults = 20
        afterTime = yesterday.toString()
        beforeTime = now.toString()
    }

SupportClient { region = "us-west-2" }.use { supportClient ->
    val response = supportClient.describeCases(describeCasesRequest)
    response.cases?.forEach { sinCase ->
        println("The case status is ${sinCase.status}")
        println("The case Id is ${sinCase.caseId}")
        println("The case subject is ${sinCase.subject}")
    }
}
```

- For API details, see [DescribeCases](#) in *AWS SDK for Kotlin API reference*.

## DescribeCommunications

The following code example shows how to use DescribeCommunications.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun listCommunications(caseIdVal: String?): String? {
    val communicationsRequest =
        DescribeCommunicationsRequest {
            caseId = caseIdVal
            maxResults = 10
        }

    SupportClient { region = "us-west-2" }.use { supportClient ->
        val response = supportClient.describeCommunications(communicationsRequest)
    }
}
```

```
        response.communications?.forEach { comm ->
            println("the body is: " + comm.body)
            comm.attachmentSet?.forEach { detail ->
                return detail.attachmentId
            }
        }
    }
    return ""
}
```

- For API details, see [DescribeCommunications](#) in *AWS SDK for Kotlin API reference*.

## DescribeServices

The following code example shows how to use DescribeServices.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
// Return a List that contains a Service name and Category name.
suspend fun displayServices(): List<String> {
    var serviceCode = ""
    var catName = ""
    val sevCatList = mutableListOf<String>()
    val servicesRequest =
        DescribeServicesRequest {
            language = "en"
        }

    SupportClient { region = "us-west-2" }.use { supportClient ->
        val response = supportClient.describeServices(servicesRequest)
        println("Get the first 10 services")
        var index = 1

        response.services?.forEach { service ->
            if (index == 11) {
```

```
        return@forEach
    }

    println("The Service name is ${service.name}")
    if (service.name == "Account") {
        serviceCode = service.code.toString()
    }

    // Get the categories for this service.
    service.categories?.forEach { cat ->
        println("The category name is ${cat.name}")
        if (cat.name == "Security") {
            catName = cat.name!!
        }
    }
    index++
}

// Push the two values to the list.
serviceCode.let { sevCatList.add(it) }
catName.let { sevCatList.add(it) }
return sevCatList
}
```

- For API details, see [DescribeServices](#) in *AWS SDK for Kotlin API reference*.

## DescribeSeverityLevels

The following code example shows how to use `DescribeSeverityLevels`.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun displaySevLevels(): String {
    var levelName = ""
```

```
val severityLevelsRequest =
    DescribeSeverityLevelsRequest {
        language = "en"
    }

SupportClient { region = "us-west-2" }.use { supportClient ->
    val response = supportClient.describeSeverityLevels(severityLevelsRequest)
    response.severityLevels?.forEach { sevLevel ->
        println("The severity level name is: ${sevLevel.name}")
        if (sevLevel.name == "High") {
            levelName = sevLevel.name!!
        }
    }
    return levelName
}
```

- For API details, see [DescribeSeverityLevels](#) in *AWS SDK for Kotlin API reference*.

## ResolveCase

The following code example shows how to use `ResolveCase`.

### SDK for Kotlin

#### Note

There's more on GitHub. Find the complete example and learn how to set up and run in the [AWS Code Examples Repository](#).

```
suspend fun resolveSupportCase(caseIdVal: String) {
    val caseRequest =
        ResolveCaseRequest {
            caseId = caseIdVal
        }
    SupportClient { region = "us-west-2" }.use { supportClient ->
        val response = supportClient.resolveCase(caseRequest)
        println("The status of case $caseIdVal is ${response.finalCaseStatus}")
    }
}
```

- For API details, see [ResolveCase](#) in *AWS SDK for Kotlin API reference*.

## Amazon Translate examples using SDK for Kotlin

The following code examples show you how to perform actions and implement common scenarios by using the AWS SDK for Kotlin with Amazon Translate.

*Scenarios* are code examples that show you how to accomplish specific tasks by calling multiple functions within a service or combined with other AWS services.

Each example includes a link to the complete source code, where you can find instructions on how to set up and run the code in context.

### Topics

- [Scenarios](#)

## Scenarios

### Building an Amazon SNS application

The following code example shows how to create an application that has subscription and publish functionality and translates messages.

#### SDK for Kotlin

Shows how to use the Amazon SNS Kotlin API to create an application that has subscription and publish functionality. In addition, this example application also translates messages.

For complete source code and instructions on how to create a web app, see the full example on [GitHub](#).

For complete source code and instructions on how to create a native Android app, see the full example on [GitHub](#).

#### Services used in this example

- Amazon SNS
- Amazon Translate

# Security for the AWS SDK for Kotlin

Cloud security at Amazon Web Services (AWS) is the highest priority. As an AWS customer, you benefit from a data center and network architecture that is built to meet the requirements of the most security-sensitive organizations. Security is a shared responsibility between AWS and you. The [Shared Responsibility Model](#) describes this as Security of the Cloud and Security in the Cloud.

**Security of the Cloud** – AWS is responsible for protecting the infrastructure that runs all of the services offered in the AWS Cloud and providing you with services that you can use securely. Our security responsibility is the highest priority at AWS, and the effectiveness of our security is regularly tested and verified by third-party auditors as part of the [AWS Compliance Programs](#).

**Security in the Cloud** – Your responsibility is determined by the AWS service you are using, and other factors including the sensitivity of your data, your organization's requirements, and applicable laws and regulations.

This AWS product or service follows the [shared responsibility model](#) through the specific Amazon Web Services (AWS) services it supports. For AWS service security information, see the [AWS service security documentation page](#) and [AWS services that are in scope of AWS compliance efforts by compliance program](#).

## Topics

- [Data protection in AWS SDK for Kotlin](#)
- [AWS SDK for Kotlin support for TLS 1.2](#)
- [Identity and Access Management](#)
- [Compliance Validation for this AWS Product or Service](#)
- [Resilience for this AWS Product or Service](#)
- [Infrastructure Security for this AWS Product or Service](#)

## Data protection in AWS SDK for Kotlin

The AWS [shared responsibility model](#) applies to data protection in AWS SDK for Kotlin. As described in this model, AWS is responsible for protecting the global infrastructure that runs all of the AWS Cloud. You are responsible for maintaining control over your content that is hosted on this infrastructure. You are also responsible for the security configuration and management tasks



for the AWS services that you use. For more information about data privacy, see the [Data Privacy FAQ](#). For information about data protection in Europe, see the [AWS Shared Responsibility Model and GDPR](#) blog post on the *AWS Security Blog*.

For data protection purposes, we recommend that you protect AWS account credentials and set up individual users with AWS IAM Identity Center or AWS Identity and Access Management (IAM). That way, each user is given only the permissions necessary to fulfill their job duties. We also recommend that you secure your data in the following ways:

- Use multi-factor authentication (MFA) with each account.
- Use SSL/TLS to communicate with AWS resources. We require TLS 1.2 and recommend TLS 1.3.
- Set up API and user activity logging with AWS CloudTrail.
- Use AWS encryption solutions, along with all default security controls within AWS services.
- Use advanced managed security services such as Amazon Macie, which assists in discovering and securing sensitive data that is stored in Amazon S3.
- If you require FIPS 140-3 validated cryptographic modules when accessing AWS through a command line interface or an API, use a FIPS endpoint. For more information about the available FIPS endpoints, see [Federal Information Processing Standard \(FIPS\) 140-3](#).

We strongly recommend that you never put confidential or sensitive information, such as your customers' email addresses, into tags or free-form text fields such as a **Name** field. This includes when you work with SDK for Kotlin or other AWS services using the console, API, AWS CLI, or AWS SDKs. Any data that you enter into tags or free-form text fields used for names may be used for billing or diagnostic logs. If you provide a URL to an external server, we strongly recommend that you do not include credentials information in the URL to validate your request to that server.

## AWS SDK for Kotlin support for TLS 1.2

The following information applies only to Java SSL implementation (the default SSL implementation in the AWS SDK for Kotlin targeting the JVM). If you're using a different SSL implementation, see your specific SSL implementation to learn how to enforce TLS versions.

### TLS support in Java

TLS 1.2 is supported starting in Java 7.

## How to check the TLS version

To check what TLS version is supported in your Java virtual machine (JVM), you can use the following code.

```
println(SSLContext.getDefault().supportedSSLParameters.protocols.joinToString(separator = ", "))
```

To see the SSL handshake in action and what version of TLS is used, you can use the system property `javax.net.debug`.

```
-Djavax.net.debug=ssl
```

## Identity and Access Management

AWS Identity and Access Management (IAM) is an AWS service that helps an administrator securely control access to AWS resources. IAM administrators control who can be *authenticated* (signed in) and *authorized* (have permissions) to use AWS resources. IAM is an AWS service that you can use with no additional charge.

### Topics

- [Audience](#)
- [Authenticating with identities](#)
- [Managing access using policies](#)
- [How AWS services work with IAM](#)
- [Troubleshooting AWS identity and access](#)

## Audience

How you use AWS Identity and Access Management (IAM) differs, depending on the work that you do in AWS.

**Service user** – If you use AWS services to do your job, then your administrator provides you with the credentials and permissions that you need. As you use more AWS features to do your work, you might need additional permissions. Understanding how access is managed can help you

request the right permissions from your administrator. If you cannot access a feature in AWS, see [Troubleshooting AWS identity and access](#) or the user guide of the AWS service you are using.

**Service administrator** – If you're in charge of AWS resources at your company, you probably have full access to AWS. It's your job to determine which AWS features and resources your service users should access. You must then submit requests to your IAM administrator to change the permissions of your service users. Review the information on this page to understand the basic concepts of IAM. To learn more about how your company can use IAM with AWS, see the user guide of the AWS service you are using.

**IAM administrator** – If you're an IAM administrator, you might want to learn details about how you can write policies to manage access to AWS. To view example AWS identity-based policies that you can use in IAM, see the user guide of the AWS service you are using.

## Authenticating with identities

Authentication is how you sign in to AWS using your identity credentials. You must be *authenticated* (signed in to AWS) as the AWS account root user, as an IAM user, or by assuming an IAM role.

You can sign in to AWS as a federated identity by using credentials provided through an identity source. AWS IAM Identity Center (IAM Identity Center) users, your company's single sign-on authentication, and your Google or Facebook credentials are examples of federated identities. When you sign in as a federated identity, your administrator previously set up identity federation using IAM roles. When you access AWS by using federation, you are indirectly assuming a role.

Depending on the type of user you are, you can sign in to the AWS Management Console or the AWS access portal. For more information about signing in to AWS, see [How to sign in to your AWS account](#) in the *AWS Sign-In User Guide*.

If you access AWS programmatically, AWS provides a software development kit (SDK) and a command line interface (CLI) to cryptographically sign your requests by using your credentials. If you don't use AWS tools, you must sign requests yourself. For more information about using the recommended method to sign requests yourself, see [Signing AWS API requests](#) in the *IAM User Guide*.

Regardless of the authentication method that you use, you might be required to provide additional security information. For example, AWS recommends that you use multi-factor authentication (MFA) to increase the security of your account. To learn more, see [Multi-factor authentication](#) in the

*AWS IAM Identity Center User Guide* and [Using multi-factor authentication \(MFA\) in AWS](#) in the *IAM User Guide*.

## AWS account root user

When you create an AWS account, you begin with one sign-in identity that has complete access to all AWS services and resources in the account. This identity is called the AWS account *root user* and is accessed by signing in with the email address and password that you used to create the account. We strongly recommend that you don't use the root user for your everyday tasks. Safeguard your root user credentials and use them to perform the tasks that only the root user can perform. For the complete list of tasks that require you to sign in as the root user, see [Tasks that require root user credentials](#) in the *IAM User Guide*.

## Federated identity

As a best practice, require human users, including users that require administrator access, to use federation with an identity provider to access AWS services by using temporary credentials.

A *federated identity* is a user from your enterprise user directory, a web identity provider, the AWS Directory Service, the Identity Center directory, or any user that accesses AWS services by using credentials provided through an identity source. When federated identities access AWS accounts, they assume roles, and the roles provide temporary credentials.

For centralized access management, we recommend that you use AWS IAM Identity Center. You can create users and groups in IAM Identity Center, or you can connect and synchronize to a set of users and groups in your own identity source for use across all your AWS accounts and applications. For information about IAM Identity Center, see [What is IAM Identity Center?](#) in the *AWS IAM Identity Center User Guide*.

## IAM users and groups

An [IAM user](#) is an identity within your AWS account that has specific permissions for a single person or application. Where possible, we recommend relying on temporary credentials instead of creating IAM users who have long-term credentials such as passwords and access keys. However, if you have specific use cases that require long-term credentials with IAM users, we recommend that you rotate access keys. For more information, see [Rotate access keys regularly for use cases that require long-term credentials](#) in the *IAM User Guide*.

An [IAM group](#) is an identity that specifies a collection of IAM users. You can't sign in as a group. You can use groups to specify permissions for multiple users at a time. Groups make permissions easier

to manage for large sets of users. For example, you could have a group named *IAMAdmins* and give that group permissions to administer IAM resources.

Users are different from roles. A user is uniquely associated with one person or application, but a role is intended to be assumable by anyone who needs it. Users have permanent long-term credentials, but roles provide temporary credentials. To learn more, see [When to create an IAM user \(instead of a role\)](#) in the *IAM User Guide*.

## IAM roles

An [IAM role](#) is an identity within your AWS account that has specific permissions. It is similar to an IAM user, but is not associated with a specific person. You can temporarily assume an IAM role in the AWS Management Console by [switching roles](#). You can assume a role by calling an AWS CLI or AWS API operation or by using a custom URL. For more information about methods for using roles, see [Using IAM roles](#) in the *IAM User Guide*.

IAM roles with temporary credentials are useful in the following situations:

- **Federated user access** – To assign permissions to a federated identity, you create a role and define permissions for the role. When a federated identity authenticates, the identity is associated with the role and is granted the permissions that are defined by the role. For information about roles for federation, see [Creating a role for a third-party Identity Provider](#) in the *IAM User Guide*. If you use IAM Identity Center, you configure a permission set. To control what your identities can access after they authenticate, IAM Identity Center correlates the permission set to a role in IAM. For information about permission sets, see [Permission sets](#) in the *AWS IAM Identity Center User Guide*.
- **Temporary IAM user permissions** – An IAM user or role can assume an IAM role to temporarily take on different permissions for a specific task.
- **Cross-account access** – You can use an IAM role to allow someone (a trusted principal) in a different account to access resources in your account. Roles are the primary way to grant cross-account access. However, with some AWS services, you can attach a policy directly to a resource (instead of using a role as a proxy). To learn the difference between roles and resource-based policies for cross-account access, see [Cross account resource access in IAM](#) in the *IAM User Guide*.
- **Cross-service access** – Some AWS services use features in other AWS services. For example, when you make a call in a service, it's common for that service to run applications in Amazon EC2 or store objects in Amazon S3. A service might do this using the calling principal's permissions, using a service role, or using a service-linked role.

- **Forward access sessions (FAS)** – When you use an IAM user or role to perform actions in AWS, you are considered a principal. When you use some services, you might perform an action that then initiates another action in a different service. FAS uses the permissions of the principal calling an AWS service, combined with the requesting AWS service to make requests to downstream services. FAS requests are only made when a service receives a request that requires interactions with other AWS services or resources to complete. In this case, you must have permissions to perform both actions. For policy details when making FAS requests, see [Forward access sessions](#).
- **Service role** – A service role is an [IAM role](#) that a service assumes to perform actions on your behalf. An IAM administrator can create, modify, and delete a service role from within IAM. For more information, see [Creating a role to delegate permissions to an AWS service](#) in the *IAM User Guide*.
- **Service-linked role** – A service-linked role is a type of service role that is linked to an AWS service. The service can assume the role to perform an action on your behalf. Service-linked roles appear in your AWS account and are owned by the service. An IAM administrator can view, but not edit the permissions for service-linked roles.
- **Applications running on Amazon EC2** – You can use an IAM role to manage temporary credentials for applications that are running on an EC2 instance and making AWS CLI or AWS API requests. This is preferable to storing access keys within the EC2 instance. To assign an AWS role to an EC2 instance and make it available to all of its applications, you create an instance profile that is attached to the instance. An instance profile contains the role and enables programs that are running on the EC2 instance to get temporary credentials. For more information, see [Using an IAM role to grant permissions to applications running on Amazon EC2 instances](#) in the *IAM User Guide*.

To learn whether to use IAM roles or IAM users, see [When to create an IAM role \(instead of a user\)](#) in the *IAM User Guide*.

## Managing access using policies

You control access in AWS by creating policies and attaching them to AWS identities or resources. A policy is an object in AWS that, when associated with an identity or resource, defines their permissions. AWS evaluates these policies when a principal (user, root user, or role session) makes a request. Permissions in the policies determine whether the request is allowed or denied. Most policies are stored in AWS as JSON documents. For more information about the structure and contents of JSON policy documents, see [Overview of JSON policies](#) in the *IAM User Guide*.

Administrators can use AWS JSON policies to specify who has access to what. That is, which **principal** can perform **actions** on what **resources**, and under what **conditions**.

By default, users and roles have no permissions. To grant users permission to perform actions on the resources that they need, an IAM administrator can create IAM policies. The administrator can then add the IAM policies to roles, and users can assume the roles.

IAM policies define permissions for an action regardless of the method that you use to perform the operation. For example, suppose that you have a policy that allows the `iam:GetRole` action. A user with that policy can get role information from the AWS Management Console, the AWS CLI, or the AWS API.

## Identity-based policies

Identity-based policies are JSON permissions policy documents that you can attach to an identity, such as an IAM user, group of users, or role. These policies control what actions users and roles can perform, on which resources, and under what conditions. To learn how to create an identity-based policy, see [Creating IAM policies](#) in the *IAM User Guide*.

Identity-based policies can be further categorized as *inline policies* or *managed policies*. Inline policies are embedded directly into a single user, group, or role. Managed policies are standalone policies that you can attach to multiple users, groups, and roles in your AWS account. Managed policies include AWS managed policies and customer managed policies. To learn how to choose between a managed policy or an inline policy, see [Choosing between managed policies and inline policies](#) in the *IAM User Guide*.

## Resource-based policies

Resource-based policies are JSON policy documents that you attach to a resource. Examples of resource-based policies are IAM *role trust policies* and Amazon S3 *bucket policies*. In services that support resource-based policies, service administrators can use them to control access to a specific resource. For the resource where the policy is attached, the policy defines what actions a specified principal can perform on that resource and under what conditions. You must [specify a principal](#) in a resource-based policy. Principals can include accounts, users, roles, federated users, or AWS services.

Resource-based policies are inline policies that are located in that service. You can't use AWS managed policies from IAM in a resource-based policy.

## Access control lists (ACLs)

Access control lists (ACLs) control which principals (account members, users, or roles) have permissions to access a resource. ACLs are similar to resource-based policies, although they do not use the JSON policy document format.

Amazon S3, AWS WAF, and Amazon VPC are examples of services that support ACLs. To learn more about ACLs, see [Access control list \(ACL\) overview](#) in the *Amazon Simple Storage Service Developer Guide*.

## Other policy types

AWS supports additional, less-common policy types. These policy types can set the maximum permissions granted to you by the more common policy types.

- **Permissions boundaries** – A permissions boundary is an advanced feature in which you set the maximum permissions that an identity-based policy can grant to an IAM entity (IAM user or role). You can set a permissions boundary for an entity. The resulting permissions are the intersection of an entity's identity-based policies and its permissions boundaries. Resource-based policies that specify the user or role in the `Principal` field are not limited by the permissions boundary. An explicit deny in any of these policies overrides the allow. For more information about permissions boundaries, see [Permissions boundaries for IAM entities](#) in the *IAM User Guide*.
- **Service control policies (SCPs)** – SCPs are JSON policies that specify the maximum permissions for an organization or organizational unit (OU) in AWS Organizations. AWS Organizations is a service for grouping and centrally managing multiple AWS accounts that your business owns. If you enable all features in an organization, then you can apply service control policies (SCPs) to any or all of your accounts. The SCP limits permissions for entities in member accounts, including each AWS account root user. For more information about Organizations and SCPs, see [Service control policies](#) in the *AWS Organizations User Guide*.
- **Session policies** – Session policies are advanced policies that you pass as a parameter when you programmatically create a temporary session for a role or federated user. The resulting session's permissions are the intersection of the user or role's identity-based policies and the session policies. Permissions can also come from a resource-based policy. An explicit deny in any of these policies overrides the allow. For more information, see [Session policies](#) in the *IAM User Guide*.



## Multiple policy types

When multiple types of policies apply to a request, the resulting permissions are more complicated to understand. To learn how AWS determines whether to allow a request when multiple policy types are involved, see [Policy evaluation logic](#) in the *IAM User Guide*.

## How AWS services work with IAM

To get a high-level view of how AWS services work with most IAM features, see [AWS services that work with IAM](#) in the *IAM User Guide*.

To learn how to use a specific AWS service with IAM, see the security section of the relevant service's User Guide.

## Troubleshooting AWS identity and access

Use the following information to help you diagnose and fix common issues that you might encounter when working with AWS and IAM.

### Topics

- [I am not authorized to perform an action in AWS](#)
- [I am not authorized to perform iam:PassRole](#)
- [I want to allow people outside of my AWS account to access my AWS resources](#)

### I am not authorized to perform an action in AWS

If you receive an error that you're not authorized to perform an action, your policies must be updated to allow you to perform the action.

The following example error occurs when the `mateojackson` IAM user tries to use the console to view details about a fictional `my-example-widget` resource but doesn't have the fictional `aws:GetWidget` permissions.

```
User: arn:aws:iam::123456789012:user/mateojackson is not authorized to perform:
aws:GetWidget on resource: my-example-widget
```

In this case, the policy for the `mateojackson` user must be updated to allow access to the `my-example-widget` resource by using the `aws:GetWidget` action.

If you need help, contact your AWS administrator. Your administrator is the person who provided you with your sign-in credentials.

## I am not authorized to perform iam:PassRole

If you receive an error that you're not authorized to perform the `iam:PassRole` action, your policies must be updated to allow you to pass a role to AWS.

Some AWS services allow you to pass an existing role to that service instead of creating a new service role or service-linked role. To do this, you must have permissions to pass the role to the service.

The following example error occurs when an IAM user named `marymajor` tries to use the console to perform an action in AWS. However, the action requires the service to have permissions that are granted by a service role. Mary does not have permissions to pass the role to the service.

```
User: arn:aws:iam::123456789012:user/marymajor is not authorized to perform:
iam:PassRole
```

In this case, Mary's policies must be updated to allow her to perform the `iam:PassRole` action.

If you need help, contact your AWS administrator. Your administrator is the person who provided you with your sign-in credentials.

## I want to allow people outside of my AWS account to access my AWS resources

You can create a role that users in other accounts or people outside of your organization can use to access your resources. You can specify who is trusted to assume the role. For services that support resource-based policies or access control lists (ACLs), you can use those policies to grant people access to your resources.

To learn more, consult the following:

- To learn whether AWS supports these features, see [How AWS services work with IAM](#).
- To learn how to provide access to your resources across AWS accounts that you own, see [Providing access to an IAM user in another AWS account that you own](#) in the *IAM User Guide*.
- To learn how to provide access to your resources to third-party AWS accounts, see [Providing access to AWS accounts owned by third parties](#) in the *IAM User Guide*.
- To learn how to provide access through identity federation, see [Providing access to externally authenticated users \(identity federation\)](#) in the *IAM User Guide*.

- To learn the difference between using roles and resource-based policies for cross-account access, see [Cross account resource access in IAM](#) in the *IAM User Guide*.

## Compliance Validation for this AWS Product or Service

To learn whether an AWS service is within the scope of specific compliance programs, see [AWS services in Scope by Compliance Program](#) and choose the compliance program that you are interested in. For general information, see [AWS Compliance Programs](#).

You can download third-party audit reports using AWS Artifact. For more information, see [Downloading Reports in AWS Artifact](#).

Your compliance responsibility when using AWS services is determined by the sensitivity of your data, your company's compliance objectives, and applicable laws and regulations. AWS provides the following resources to help with compliance:

- [Security and Compliance Quick Start Guides](#) – These deployment guides discuss architectural considerations and provide steps for deploying baseline environments on AWS that are security and compliance focused.
- [Architecting for HIPAA Security and Compliance on Amazon Web Services](#) – This whitepaper describes how companies can use AWS to create HIPAA-eligible applications.

### Note

Not all AWS services are HIPAA eligible. For more information, see the [HIPAA Eligible Services Reference](#).

- [AWS Compliance Resources](#) – This collection of workbooks and guides might apply to your industry and location.
- [AWS Customer Compliance Guides](#) – Understand the shared responsibility model through the lens of compliance. The guides summarize the best practices for securing AWS services and map the guidance to security controls across multiple frameworks (including National Institute of Standards and Technology (NIST), Payment Card Industry Security Standards Council (PCI), and International Organization for Standardization (ISO)).
- [Evaluating Resources with Rules](#) in the *AWS Config Developer Guide* – The AWS Config service assesses how well your resource configurations comply with internal practices, industry guidelines, and regulations.

- [AWS Security Hub](#) – This AWS service provides a comprehensive view of your security state within AWS. Security Hub uses security controls to evaluate your AWS resources and to check your compliance against security industry standards and best practices. For a list of supported services and controls, see [Security Hub controls reference](#).
- [Amazon GuardDuty](#) – This AWS service detects potential threats to your AWS accounts, workloads, containers, and data by monitoring your environment for suspicious and malicious activities. GuardDuty can help you address various compliance requirements, like PCI DSS, by meeting intrusion detection requirements mandated by certain compliance frameworks.
- [AWS Audit Manager](#) – This AWS service helps you continuously audit your AWS usage to simplify how you manage risk and compliance with regulations and industry standards.

This AWS product or service follows the [shared responsibility model](#) through the specific Amazon Web Services (AWS) services it supports. For AWS service security information, see the [AWS service security documentation page](#) and [AWS services that are in scope of AWS compliance efforts by compliance program](#).

## Resilience for this AWS Product or Service

The AWS global infrastructure is built around AWS Regions and Availability Zones.

AWS Regions provide multiple physically separated and isolated Availability Zones, which are connected with low-latency, high-throughput, and highly redundant networking.

With Availability Zones, you can design and operate applications and databases that automatically fail over between zones without interruption. Availability Zones are more highly available, fault tolerant, and scalable than traditional single or multiple data center infrastructures.

For more information about AWS Regions and Availability Zones, see [AWS Global Infrastructure](#).

This AWS product or service follows the [shared responsibility model](#) through the specific Amazon Web Services (AWS) services it supports. For AWS service security information, see the [AWS service security documentation page](#) and [AWS services that are in scope of AWS compliance efforts by compliance program](#).

## Infrastructure Security for this AWS Product or Service

This AWS product or service uses managed services, and therefore is protected by the AWS global network security. For information about AWS security services and how AWS protects

infrastructure, see [AWS Cloud Security](#). To design your AWS environment using the best practices for infrastructure security, see [Infrastructure Protection](#) in *Security Pillar AWS Well-Architected Framework*.

You use AWS published API calls to access this AWS Product or Service through the network. Clients must support the following:

- Transport Layer Security (TLS). We require TLS 1.2 and recommend TLS 1.3.
- Cipher suites with perfect forward secrecy (PFS) such as DHE (Ephemeral Diffie-Hellman) or ECDHE (Elliptic Curve Ephemeral Diffie-Hellman). Most modern systems such as Java 7 and later support these modes.

Additionally, requests must be signed by using an access key ID and a secret access key that is associated with an IAM principal. Or you can use the [AWS Security Token Service](#) (AWS STS) to generate temporary security credentials to sign requests.

This AWS product or service follows the [shared responsibility model](#) through the specific Amazon Web Services (AWS) services it supports. For AWS service security information, see the [AWS service security documentation page](#) and [AWS services that are in scope of AWS compliance efforts by compliance program](#).

# Document history

This topic describes important changes to the AWS SDK for Kotlin Developer Guide over the course of its history.

| Change                                                                                                                | Description                                                                                | Date              |
|-----------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|-------------------|
| <a href="#">Update OpenTelemetry configuration example and configuration of the default global telemetry provider</a> | <a href="#">Observability</a>                                                              | May 2, 2024       |
| <a href="#">Provide more detail about the service client creation process</a>                                         | <a href="#">Create a service client</a>                                                    | March 14, 2024    |
| <a href="#">Add Multi-Region Access Point topic</a>                                                                   | <a href="#">Work with Amazon S3 Multi-Region Access Points by using the SDK for Kotlin</a> | February 6, 2024  |
| <a href="#">Add Gradle version catalog instructions</a>                                                               | <a href="#">Gradle version catalog (tab)</a>                                               | December 19, 2023 |
| <a href="#">General Availability release</a>                                                                          | <a href="#">AWS SDK for Kotlin Developer Guide</a>                                         | November 27, 2023 |
| <a href="#">Update the client endpoints configuration section based on SDK updates</a>                                | <a href="#">Client endpoints</a>                                                           | August 25, 2023   |
| <a href="#">Amazon S3 checksums</a>                                                                                   | Section added on how to use flexible checksums with Amazon S3.                             | August 14, 2023   |
| <a href="#">Add Observability topic</a>                                                                               | <a href="#">Observability</a>                                                              | August 3, 2023    |
| <a href="#">Add a topic that discusses retries</a>                                                                    | <a href="#">Retries</a>                                                                    | July 7, 2023      |

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|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|------------------|
| <a href="#">Update the HTTP client configuration section based on SDK updates</a> | <a href="#">HTTP client configuration</a>                                                                                                     | June 6, 2023     |
| <a href="#">Add HTTP presigning topic</a>                                         | <a href="#">Presigning requests</a>                                                                                                           | June 2, 2023     |
| <a href="#">Add HTTP interceptors topic</a>                                       | <a href="#">HTTP interceptors</a>                                                                                                             | May 22, 2023     |
| <a href="#">Support for automatic token refresh</a>                               | Update <a href="#">instructions for single sign-on access</a> .                                                                               | May 18, 2023     |
| <a href="#">Amazon S3 checksums</a>                                               | Add a section that describes how to <a href="#">use checksums with Amazon S3</a> .                                                            | May 15, 2023     |
| <a href="#">Override service client configuration</a>                             | Add a section that describes how to <a href="#">override the configuration of a service client and describes how resources are affected</a> . | May 8, 2023      |
| <a href="#">Enforce a minimum TLS version</a>                                     | Add a section that describes the options to <a href="#">enforce a minimum TLS version</a> .                                                   | May 3, 2023      |
| <a href="#">Client endpoint configuration</a>                                     | Add a topic that discusses <a href="#">client endpoint configuration</a> .                                                                    | April 7, 2023    |
| <a href="#">IAM best practices updates</a>                                        | Updated guide to align with the IAM best practices . For more information, see <a href="#">Security best practices in IAM</a> .               | March 22, 2023   |
| <a href="#">Add an example Maven project file</a>                                 | Show an example of a Maven project file in addition to a project file in Gradle in the <a href="#">Set up topic</a> .                         | December 2, 2022 |

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|--------------------------------------------------------------|-----------------------------------------------------------------|------------------|
| <a href="#">Revise content of Developer Guide Preview</a>    | Content updated to reflect recent development work              | October 4, 2022  |
| <a href="#">AWS SDK for Kotlin Developer Preview release</a> | <a href="#">AWS SDK for Kotlin</a>                              | December 2, 2021 |
| <a href="#">AWS SDK for Kotlin alpha release</a>             | <a href="#">Announcing new AWS SDK for Kotlin alpha release</a> | August 30, 2021  |