aws

Developer Guide

AWS SDK for Ruby



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AWS SDK for Ruby: Developer Guide

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What is the AWS SDK for Ruby?

Welcome to the AWS SDK for Ruby Developer Guide. The AWS SDK for Ruby provides support libraries for almost all AWS services, including Amazon Simple Storage Service (Amazon S3), Amazon Elastic Compute Cloud (Amazon EC2), and Amazon DynamoDB.

The AWS SDK for Ruby Developer Guide provides information about how to install, set up, and use the AWS SDK for Ruby to create Ruby applications that use AWS services.

Getting started with the AWS SDK for Ruby

Additional documentation and resources

For more resources for AWS SDK for Ruby developers, see the following:

- AWS SDKs and Tools Reference Guide – Contains settings, features, and other foundational concepts common among AWS SDKs
- AWS SDK for Ruby API Reference - Version 3
- AWS Code Examples Repository on GitHub
- RubyGems.org – Latest version of SDK is modularized into service-specific gems available here
  - Supported Services – Lists all gems that the AWS SDK for Ruby supports
- AWS SDK for Ruby source on GitHub:
  - Source and README
  - Change logs under each gem
  - Moving from v2 to v3
  - Issues
  - Core upgrade notes
- Developer blog

Deploying to the AWS Cloud

You can use AWS services such as AWS Elastic Beanstalk and AWS CodeDeploy to deploy your application to the AWS Cloud. For deploying Ruby applications with Elastic Beanstalk, see Deploying Elastic Beanstalk Applications in Ruby Using EB CLI and Git in the AWS Elastic Beanstalk

Developer Guide. For an overview of AWS deployment services, see Overview of Deployment Options on AWS.

Maintenance and support for SDK major versions

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

- AWS SDKs and Tools Maintenance Policy
- AWS SDKs and Tools Version Support Matrix

Getting started with the AWS SDK for Ruby

Learn how to install, set up, and use the SDK to create a Ruby application to access an AWS resource programmatically.

Topics

- Authenticating with AWS using AWS SDK for Ruby
- Installing the AWS SDK for Ruby
- Creating a simple application using the AWS SDK for Ruby

Authenticating with AWS using AWS SDK for Ruby

You must establish how your code authenticates with AWS when developing with AWS services. You can configure programmatic access to AWS resources in different ways depending on the environment and the AWS access available to you.

To choose your method of authentication and configure it for the SDK, see Authentication and access in the *AWS SDKs and Tools Reference Guide*.

Using console credentials

For local development, we recommend that new users use their existing AWS Management Console sign-in credentials for programmatic access to AWS services. After browser-based authentication, AWS generates temporary credentials that work with local development tools like the AWS Command Line Interface (AWS CLI) and the AWS SDK for Ruby.

If you choose this method, follow the instructions to Login for AWS local development using console credentials using the AWS CLI.

The AWS SDK for Ruby does not need additional gems (such as `aws-sdk-signin`) to be added to your application to use login with console credentials.

Using IAM Identity Center authentication

If you choose this method, complete the procedure for IAM Identity Center authentication in the *AWS SDKs and Tools Reference Guide*. Afterwards, your environment should contain the following elements:

- The AWS CLI, which you use to start an AWS access portal session before you run your application.
- A shared AWSconfig file having a `[default]` profile with a set of configuration values that can be referenced from the SDK. To find the location of this file, see Location of the shared files in the *AWS SDKs and Tools Reference Guide*.
- The shared `config` file sets the `region` setting. This sets the default AWS Region that the SDK uses for AWS requests. This Region is used for SDK service requests that aren't specified with a Region to use.
- The SDK 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, allows 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
```

The AWS SDK for Ruby does not need additional gems (such as `aws-sdk-sso` and `aws-sdk-ssooidc`) to be added to your application to use IAM Identity Center authentication.

Start an AWS access portal session

Before running an application that accesses AWS services, you need an active AWS access portal session for the SDK to use IAM Identity Center authentication to resolve credentials. Depending on your configured session lengths, your access will eventually expire and the SDK will encounter an authentication error. To sign in to the AWS access portal, run the following command in the AWS CLI.

```
aws sso login
```

If you followed the guidance and have a default profile setup, you do not need to call the command with a `--profile` option. If your SSO token provider configuration is using a named profile, the command is `aws sso login --profile named-profile`.

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

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

If your session is active, the response to this command reports 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.
> The sign-in process might prompt you to allow the AWS CLI access to your data. Because the AWS CLI is built on top of the SDK for Python (Boto), permission messages might contain variations of the `botocore` name.

More authentication information

Human users, also known as *human identities*, are the people, administrators, developers, operators, and consumers of your applications. They must have an identity to access your AWS environments and applications. Human users that are members of your organization - that means you, the developer - are known as *workforce identities*.

Use temporary credentials when accessing AWS. You can use an identity provider for your human users to provide federated access to AWS accounts by assuming roles, which provide temporary credentials. For centralized access management, we recommend that you use AWS IAM Identity Center (IAM Identity Center) to manage access to your accounts and permissions within those accounts. For more alternatives, see the following:

- To learn more about best practices, see Security best practices in IAM in the *IAM User Guide*.
- To create short-term AWS credentials, see Temporary Security Credentials in the *IAM User Guide*.

- To learn about the AWS SDK for Ruby credential provider chain, and how different authentication methods are attempted automatically by the SDK in a sequence, see Credential provider chain.
- For AWS SDK credential provider configuration settings, see Standardized credential providers in the *AWS SDKs and Tools Reference Guide*.

Installing the AWS SDK for Ruby

This section includes prerequisites and installation instructions for the AWS SDK for Ruby.

Prerequisites

Before you use the AWS SDK for Ruby, you must authenticate with AWS. For information about setting up authentication, see Authenticating with AWS using AWS SDK for Ruby.

Installing the SDK

You can install the AWS SDK for Ruby as you would any Ruby gem. The gems are available at RubyGems. The AWS SDK for Ruby is designed to be modular and is separated by AWS service. Installing the entire `aws-sdk` gem is large and may take over an hour.

We recommend only installing the gems for the AWS services you use. These are named like `aws-sdk-`*`service_abbreviation`* and the complete list is found in the Supported Services table of the AWS SDK for Ruby README file. For example, the gem for interfacing with the Amazon S3 service is directly available at `aws-sdk-s3`.

Ruby version manager

Instead of using system Ruby, we recommend using a Ruby version manager such as the following:

- RVM
- chruby
- rbenv

For example, if you are using an Amazon Linux 2 operating system, the following commands can be used to update RVM, list the available Ruby versions, then choose the version you want to use for development with the AWS SDK for Ruby. The minimum required Ruby version is 2.5.

```
$ rvm get head
```

```
$ rvm list known
$ rvm install ruby-3.1.3
$ rvm --default use 3.1.3
```

Bundler

If you use Bundler, the following commands install the AWS SDK for Ruby gem for Amazon S3:

1. Install Bundler and create the `Gemfile`:

   ```
   $ gem install bundler
   $ bundle init
   ```

2. Open the created `Gemfile` and add a `gem` line for each AWS service gem your code will use. To follow along with the Amazon S3 example, add the following line to the bottom of the file:

   ```
   gem "aws-sdk-s3"
   ```

3. Save the Gemfile.
4. Install the dependencies specified in your `Gemfile`:

   ```
   $ bundle install
   ```

Creating a simple application using the AWS SDK for Ruby

Say hello to Amazon S3 using the AWS SDK for Ruby. The following example displays a list of your Amazon S3 buckets.

Writing the code

Copy and paste the following code into a new source file. Name the file `hello-s3.rb`.

```
require 'aws-sdk-s3'

# Wraps Amazon S3 resource actions.
class BucketListWrapper
  attr_reader :s3_resource

  # @param s3_resource [Aws::S3::Resource] An Amazon S3 resource.
  def initialize(s3_resource)
```

```
    @s3_resource = s3_resource
  end

  # Lists buckets for the current account.
  #
  # @param count [Integer] The maximum number of buckets to list.
  def list_buckets(count)
    puts 'Found these buckets:'
    @s3_resource.buckets.each do |bucket|
      puts "\t#{bucket.name}"
      count -= 1
      break if count.zero?
    end
    true
  rescue Aws::Errors::ServiceError => e
    puts "Couldn't list buckets. Here's why: #{e.message}"
    false
  end
end

# Example usage:
def run_demo
  wrapper = BucketListWrapper.new(Aws::S3::Resource.new)
  wrapper.list_buckets(25)
end

run_demo if $PROGRAM_NAME == __FILE__
```

AWS SDK for Ruby is designed to be modular and is separated by AWS service. After the gem is installed, the `require` statement at the top of your Ruby source file imports the AWS SDK classes and methods for the Amazon S3 service. For a complete list of available AWS service gems, see the Supported Services table of the AWS SDK for Ruby README file.

```
require 'aws-sdk-s3'
```

Running the program

Open a command prompt to run your Ruby program. The typical command syntax to run a Ruby program is:

```
ruby [source filename] [arguments...]
```

This sample code uses no arguments. To run this code, enter the following into the command prompt:

```
$ ruby hello-s3.rb
```

Note for Windows users

When you use SSL certificates on Windows and run your Ruby code, you might see an error similar to the following.

```
C:\Ruby>ruby buckets.rb
C:/Ruby200-x64/lib/ruby/2.0.0/net/http.rb:921:in `connect': SSL_connect returned=1
 errno=0 state=SSLv3 read server certificate B: certificate verify failed
 (Seahorse::Client::NetworkingError)
        from C:/Ruby200-x64/lib/ruby/2.0.0/net/http.rb:921:in `block in connect'

        from C:/Ruby200-x64/lib/ruby/2.0.0/timeout.rb:66:in `timeout'
        from C:/Ruby200-x64/lib/ruby/2.0.0/net/http.rb:921:in `connect'
        from C:/Ruby200-x64/lib/ruby/2.0.0/net/http.rb:862:in `do_start'
        from C:/Ruby200-x64/lib/ruby/2.0.0/net/http.rb:857:in `start'
...
```

To fix this issue, add the following line to your Ruby source file, somewhere before your first AWS call.

```
Aws.use_bundled_cert!
```

If you're using only the `aws-sdk-s3` gem in your Ruby program and you want to use the bundled certificate, you also need to add the `aws-sdk-core` gem.

Next steps

To test out many other Amazon S3 operations, check out the AWS Code Examples Repository on GitHub.

Configuring service clients in the AWS SDK for Ruby

To programmatically access AWS services, the AWS SDK for Ruby uses a client class for each AWS service. For example, if your application needs to access Amazon EC2, your application creates an Amazon EC2 client object to interface with that service. You then use the service client to make requests to that AWS service.

To make a request to an AWS service, you must first create a service client. For each AWS service your code uses, it has its own gem and its own dedicated type for interacting with it. The client exposes one method for each API operation exposed by the service.

There are many alternative ways to configure SDK behavior, but ultimately everything has to do with the behavior of service clients. Any configuration has no effect until a service client that is created from them is used.

You must establish how your code authenticates with AWS when you develop with AWS services. You must also set the AWS Region you want to use.

The AWS SDKs and Tools Reference Guide also contains settings, features, and other foundational concepts common among many of the AWS SDKs.

Topics

- Precedence of settings
- Configuring AWS SDK for Ruby service clients externally
- Configuring AWS SDK for Ruby service clients in code
- Setting the AWS Region for the AWS SDK for Ruby
- Using AWS SDK for Ruby credential providers
- Configuring retries in the AWS SDK for Ruby
- Configuring observability features in the AWS SDK for Ruby
- Configuring HTTP-level settings within the AWS SDK for Ruby

The Shared `config` and `credentials` files can be used for configuration settings. For all AWS SDK settings, see the Settings reference in the *AWS SDKs and Tools Reference Guide*.

Different profiles can be used to store different configurations. To specify the active profile that the SDK loads, you can use the `AWS_PROFILE` environment variable or the `profile` option of `Aws.config`.

Precedence of settings

Global settings configure features, credential providers, and other functionality that are supported by most SDKs and have a broad impact across AWS services. All AWS SDKs have a series of places (or sources) that they check in order to find a value for global settings. Not all settings are available in all sources. The following is the setting lookup precedence:

1. Any explicit setting set in the code or on a service client itself takes precedence over anything else.
   a. Any parameters passed directly into a client constructor take highest precedence.
   b. `Aws.config` is checked for global or service-specific settings.
2. The environment variable is checked.
3. The shared AWS `credentials` file is checked.
4. The shared AWS `config` file is checked.
5. Any default value provided by the AWS SDK for Ruby source code itself is used last.

Configuring AWS SDK for Ruby service clients externally

Many configuration settings can be handled outside of your code. When configuration is handled externally, the configuration is applied across all of your applications. Most configuration settings can be set as either environment variables or in a separate shared AWS `config` file. The shared `config` file can maintain separate sets of settings, called profiles, to provide different configurations for different environments or tests.

Environment variables and shared `config` file settings are standardized and shared across AWS SDKs and tools to support consistent functionality across different programming languages and applications.

See the *AWS SDKs and Tools Reference Guide* to learn about configuring your application through these methods, plus details on each cross-sdk setting. To see all the all settings that the SDK can resolve from the environment variables or configuration files, see the Settings reference in the *AWS SDKs and Tools Reference Guide*.

To make a request to an AWS service, you first instantiate a client for that service. You can configure common settings for service clients such as timeouts, the HTTP client, and retry configuration.

Each service client requires an AWS Region and a credential provider. The SDK uses these values to send requests to the correct Region for your resources and to sign requests with the correct credentials. You can specify these values programmatically in code or have them automatically loaded from the environment.

The SDK has a series of places (or sources) that it checks in order to find a value for configuration settings.

1. Any explicit setting set in the code or on a service client itself takes precedence over anything else.
2. Environment variables
   - For details on setting environment variables, see environment variables in the *AWS SDKs and Tools Reference Guide*.
   - Note that you can configure environment variables for a shell at different levels of scope: system-wide, user-wide, and for a specific terminal session.
3. Shared `config` and `credentials` files
   - For details on setting up these files, see the Shared `config` and `credentials` files in the *AWS SDKs and Tools Reference Guide*.
4. Any default value provided by the SDK source code itself is used last.
   - Some properties, such as Region, don't have a default. You must specify them either explicitly in code, in an environment setting, or in the shared `config` file. If the SDK can't resolve required configuration, API requests can fail at runtime.

AWS SDK for Ruby environment variables

Beyond the cross-sdk environment variables supported across most AWS SDKs, the AWS SDK for Ruby supports some unique ones:

`AWS_SDK_CONFIG_OPT_OUT`

If the AWS SDK for Ruby environment variable `AWS_SDK_CONFIG_OPT_OUT` is set, the shared AWS `config` file, typically at `~/.aws/config`, won't be used for any configuration values.

`AMAZON_REGION`

An alternative environment variable to `AWS_REGION` for setting the AWS Region. This value is only checked if `AWS_REGION` is not used.

Configuring AWS SDK for Ruby service clients in code

When configuration is handled directly in code, the configuration scope is limited to the application that uses that code. Within that application, there are options for the global configuration of all service clients, the configuration to all clients of a certain AWS service type, or the configuration to a specific service client instance.

`Aws.config`

To provide global configuration within your code for all AWS classes, use `Aws.config` that is available in the `aws-sdk-core` gem.

`Aws.config` supports two syntaxes for different uses. Global settings can either be applied for all AWS services or for a specific service. For the complete list of supported settings, see the `Client Options` in the *AWS SDK for Ruby API Reference*.

Global settings through `Aws.config`

To set service-agnostic settings through `Aws.config`, use the following syntax:

```
Aws.config[:<global setting name>] = <value>
```

These settings are merged into any created service clients.

Example of a global setting:

```
Aws.config[:region] = 'us-west-2'
```

If you try to use a setting name that is not globally supported, an error is raised when you attempt to create an instance of a type of service that doesn't support it. If this happens, use service-specific syntax instead.

Service-specific settings through `Aws.config`

To set service-specific settings through `Aws.config`, use the following syntax:

```
Aws.config[:<service identifier>] = { <global setting name>: <value> }
```

These settings are merged into all created service clients of that service type.

Example of a setting that only applies to Amazon S3:

```
Aws.config[:s3] = { force_path_style: true }
```

The *<service identifier>* can be identified by looking at the name of the corresponding AWS SDK for Ruby gem name, and using the suffix that follows "aws-sdk-". For example:

- For aws-sdk-s3, the service identifier string is "s3".
- For aws-sdk-ecs, the service identifer string is "ecs".

Setting the AWS Region for the AWS SDK for Ruby

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

> **Important**
>
> Most resources reside in a specific AWS Region and you must supply the correct Region for the resource when using the SDK.

You must set a default AWS Region for the SDK for Ruby to use for AWS requests. This default is used for any SDK service method calls that aren't specified with a Region.

For more information on the region setting, see AWS Region in the *AWS SDKs and Tools Reference Guide*. This also includes examples on how to set the default region through the shared AWS config file or environment variables.

Region search order for resolution

You need to set a Region when using most AWS services. The AWS SDK for Ruby searches for a Region in the following order:

1. Setting the Region in a client or resource object
2. Setting the Region by using Aws.config
3. Setting the Region by using environment variables
4. Setting the Region by using the shared config file

How to set the Region

This section describes different ways to set a Region, starting with the most common approach.

Setting the Region using the shared `config` file

Set the region by setting the `region` variable in the shared AWS `config` file. For more information about the shared `config` file, see Shared config and credentials files in the *AWS SDKs and Tools Reference Guide*.

Example of setting this value in the `config` file:

```
[default]
region = us-west-2
```

The shared `config` file is not checked if the environment variable `AWS_SDK_CONFIG_OPT_OUT` is set.

Setting the Region using environment variables

Set the Region by setting the `AWS_REGION` environment variable.

Use the `export` command to set this variable on Unix-based systems, such as Linux or macOS. The following example sets the Region to `us-west-2`.

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

To set this variable on Windows, use the `set` command. The following example sets the Region to `us-west-2`.

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

Setting the Region with `Aws.config`

Set the Region by adding a `region` value to the `Aws.config` hash. The following example updates the `Aws.config` hash to use the `us-west-1` Region.

```
Aws.config.update({region: 'us-west-1'})
```

Any clients or resources that you create later are bound to this Region.

Setting the Region in a client or resource object

Set the Region when you create an AWS client or resource. The following example creates an Amazon S3 resource object in the `us-west-1` Region. Choose the correct Region for your AWS resources. A service client object is immutable, so you must create a new client for each service to which you make requests and for making requests to the same service using a different configuration.

```
s3 = Aws::S3::Resource.new(region: 'us-west-1')
```

Using AWS SDK for Ruby credential providers

All requests to AWS must be cryptographically signed by using credentials issued by AWS. At runtime, the SDK retrieves configuration values for credentials by checking several locations.

Authentication with AWS can be handled outside of your codebase. Many authentication methods can be automatically detected, used, and refreshed by the SDK using the credential provider chain.

For guided options for getting started on AWS authentication for your project, see Authentication and access in the *AWS SDKs and Tools Reference Guide*.

Credential provider chain

All SDKs have a series of places (or sources) that they check in order to get valid credentials to use to make a request to an AWS service. After valid credentials are found, the search is stopped. This systematic search is called the default credential provider chain.

> **Note**
>
> If you followed the recommended approach for new users to get started, you authenticated using login with console credentials during Authenticating with AWS using AWS SDK for Ruby. Other authentication methods are useful for different situations. To avoid security risks, we recommend always using short-term credentials. For other authentication method procedures, see Authentication and access in the *AWS SDKs and Tools Reference Guide*.

For each step in the chain, there are different ways to set the values. Setting values directly in code always takes precedence, followed by setting as environment variables, and then in the shared AWS `config` file.

The *AWS SDKs and Tools Reference Guide* has information on SDK configuration settings used by all AWS SDKs and the AWS CLI. To learn more about how to configure the SDK through the shared AWS `config` file, see Shared config and credentials files. To learn more about how to configure the SDK through setting environment variables, see Environment variables support.

To authenticate with AWS, the AWS SDK for Ruby checks the credential providers in the order listed in the following table.

Credential provider by precedence	***AWS SDKs and Tools Reference Guide***	***AWS SDK for Ruby API Reference***
AWS access keys (temporary and long-term credentials)	AWS access keys	`Aws::Credentials` `Aws::SharedCredentials`
Web identity token from AWS Security Token Service (AWS STS)	Assume role credential provider Using `role_arn`, `role_session_name` , and `web_identity_token_file`	`Aws::AssumeRoleWebIdentityCredentials`
AWS IAM Identity Center. In this guide, see Authenticating with AWS using AWS SDK for Ruby.	IAM Identity Center credential provider	`Aws::SSOCredentials`
Trusted entity provider (such as `AWS_ROLE_ARN`). In this guide, see Creating an AWS STS access token.	Assume role credential provider Using `role_arn` and `role_session_name`	`Aws::AssumeRoleCredentials`
Login credential provider	Login credential provider	`Aws::LoginCredentials`
Process credential provider	Process credential provider	`Aws::ProcessCredentials`

Credential provider by precedence	*AWS SDKs and Tools Reference Guide*	*AWS SDK for Ruby API Reference*
Amazon Elastic Container Service (Amazon ECS) credentials	Container credential provider	`Aws::ECSCredentials`
Amazon Elastic Compute Cloud (Amazon EC2) instance profile credentials (IMDS credential provider)	IMDS credential provider	`Aws::InstanceProfileCredentials`

If the AWS SDK for Ruby environment variable `AWS_SDK_CONFIG_OPT_OUT` is set, the shared AWS `config` file, typically at `~/.aws/config`, will not be parsed for credentials.

Creating an AWS STS access token

Assuming a role involves using a set of temporary security credentials that you can use to access AWS resources that you might not normally have access to. These temporary credentials consist of an access key ID, a secret access key, and a security token. You can use the `Aws::AssumeRoleCredentials` method to create an AWS Security Token Service (AWS STS) access token.

The following example uses an access token to create an Amazon S3 client object, where `linked::account::arn` is the Amazon Resource Name (ARN) of the role to assume and `session-name` is an identifier for the assumed role session.

```
role_credentials = Aws::AssumeRoleCredentials.new(
  client: Aws::STS::Client.new,
  role_arn: "linked::account::arn",
  role_session_name: "session-name"
)

s3 = Aws::S3::Client.new(credentials: role_credentials)
```

For more information about setting `role_arn` or `role_session_name`, or about setting these using the shared AWS `config` file instead, see Assume role credential provider in the *AWS SDKs and Tools Reference Guide*.

Configuring retries in the AWS SDK for Ruby

The AWS SDK for Ruby provides a default retry behavior for service requests and customizable configuration options. 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.

Retry behavior can be configured globally using environment variables or settings in the shared AWS `config` file. For information on this approach, see Retry behavior in the *AWS SDKs and Tools Reference Guide*. It also includes detailed information on retry strategy implementations and how to choose one over another.

Alternatively, these options can also be configured in your code, as shown in the following sections.

Specifying client retry behavior in code

By default, the AWS SDK for Ruby performs up to three retries, with 15 seconds between retries, for a total of up to four attempts. Therefore, an operation could take up to 60 seconds to time out.

The following example creates an Amazon S3 client in the region `us-west-2`, and specifies to wait five seconds between two retries on every client operation. Therefore, Amazon S3 client operations could take up to 15 seconds to time out.

```
s3 = Aws::S3::Client.new(
  region: region,
  retry_limit: 2,
  retry_backoff: lambda { |c| sleep(5) }
)
```

Any explicit setting set in the code or on a service client itself takes precedence over those set in environment variables or the shared `config` file.

Configuring observability features in the AWS SDK for Ruby

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 Ruby can provide the traces as a telemetry signal. You can wire up a `TelemetryProvider` to collect and send telemetry data to an observability backend. The SDK currently supports OpenTelemetry (OTel) as a telemetry provider and OpenTelemetry has many ways to export your telemetry data, including using AWS

X-Ray or Amazon CloudWatch. For more information on OpenTelemetry exporters for Ruby, see Exporters on the OpenTelemetry website.

By default, the SDK will not record or emit any telemetry data. This topic explains how to configure and emit telemetry output.

Telemetry can be configured either for a specific service or globally. The SDK for Ruby supplies an OpenTelemetry provider. You can also define a custom telemetry provider of your choice.

Configuring an `OTelProvider` for a service client

The SDK for Ruby provides an OpenTelemetry provider called `OTelProvider`. The following example configures telemetry export using OpenTelemetry for the Amazon Simple Storage Service service client. For this simple example, the `OTEL_TRACES_EXPORTER` environment variable from OpenTelemetry is used to export the traces to the console output when you run the code. To learn more about `OTEL_TRACES_EXPORTER`, see Exporter Selection in the OpenTelemetry documentation.

```
require 'aws-sdk-s3'
require 'opentelemetry-sdk'
require 'opentelemetry-exporter-otlp'

ENV['OTEL_TRACES_EXPORTER'] ||= 'console'

OpenTelemetry::SDK.configure

otel_provider = Aws::Telemetry::OTelProvider.new
client = Aws::S3::Client.new(telemetry_provider: otel_provider)
client.list_buckets
```

The previous code example shows the steps to configuring trace output for a service client:

1. Require OpenTelemetry dependencies.
   a. `opentelemetry-sdk` for using `Aws::Telemetry::OTelProvider`.
   b. `opentelemetry-exporter-otlp` for exporting telemetry data.
2. Call `OpenTelemetry::SDK.configure` to set up the OpenTelemetry SDK with their configuration defaults.
3. Using SDK for Ruby's OpenTelemetry provider, create an instance of the `OTelProvider` to pass as a configuration option to the service client that you want to trace.

```
otel_provider = Aws::Telemetry::OTelProvider.new
client = Aws::S3::Client.new(telemetry_provider: otel_provider)
```

Using these steps, any methods that are called on that service client will emit trace data.

An example of the trace output generated from the call to Amazon S3's `list_buckets` method is as follows:

Example OpenTelemetry trace output

```
#<struct OpenTelemetry::SDK::Trace::SpanData
 name="Handler.NetHttp",
 kind=:internal,
 status=#<OpenTelemetry::Trace::Status:0x000000011da17bd8 @code=1, @description="">,
 parent_span_id="\xBFb\xC9\xFD\xA6F!\xE1",
 total_recorded_attributes=7,
 total_recorded_events=0,
 total_recorded_links=0,
 start_timestamp=1736190567061767000,
 end_timestamp=1736190567317160000,
 attributes=
  {"http.method"=>"GET",
   "net.protocol.name"=>"http",
   "net.protocol.version"=>"1.1",
   "net.peer.name"=>"s3.amazonaws.com",
   "net.peer.port"=>"443",
   "http.status_code"=>"200",
   "aws.request_id"=>"22HSH7NQTYMB5NHQ"},
 links=nil,
 events=nil,
 resource=
  #<OpenTelemetry::SDK::Resources::Resource:0x000000011e0bf990
   @attributes=
    {"service.name"=>"unknown_service",
     "process.pid"=>37013,
     "process.command"=>"example.rb",
     "process.runtime.name"=>"ruby",
     "process.runtime.version"=>"3.3.0",
     "process.runtime.description"=>"ruby 3.3.0 (2023-12-25 revision 5124f9ac75)
 [arm64-darwin23]",
     "telemetry.sdk.name"=>"opentelemetry",
```

```
      "telemetry.sdk.language"=>"ruby",
      "telemetry.sdk.version"=>"1.6.0"},
  instrumentation_scope=#<struct OpenTelemetry::SDK::InstrumentationScope
  name="aws.s3.client", version="">,
  span_id="\xEF%\x9C\xB5\x8C\x04\xDB\x7F",
  trace_id=" \xE7\xF1\xF8\x9D\e\x16/\xAC\xE6\x1A\xAC%j\x81\xD8",
  trace_flags=#<OpenTelemetry::Trace::TraceFlags:0x000000011d994328 @flags=1>,
  tracestate=#<OpenTelemetry::Trace::Tracestate:0x000000011d990638 @hash={}>>
#<struct OpenTelemetry::SDK::Trace::SpanData
  name="S3.ListBuckets",
  kind=:client,
  status=#<OpenTelemetry::Trace::Status:0x000000011da17bd8 @code=1, @description="">,
  parent_span_id="\x00\x00\x00\x00\x00\x00\x00\x00",
  total_recorded_attributes=5,
  total_recorded_events=0,
  total_recorded_links=0,
  start_timestamp=1736190567054410000,
  end_timestamp=1736190567327916000,
  attributes={"rpc.system"=>"aws-api", "rpc.service"=>"S3", "rpc.method"=>"ListBuckets",
  "code.function"=>"list_buckets", "code.namespace"=>"Aws::Plugins::Telemetry"},
  links=nil,
  events=nil,
  resource=
   #<OpenTelemetry::SDK::Resources::Resource:0x000000011e0bf990
    @attributes=
     {"service.name"=>"unknown_service",
      "process.pid"=>37013,
      "process.command"=>"example.rb",
      "process.runtime.name"=>"ruby",
      "process.runtime.version"=>"3.3.0",
      "process.runtime.description"=>"ruby 3.3.0 (2023-12-25 revision 5124f9ac75)
  [arm64-darwin23]",
      "telemetry.sdk.name"=>"opentelemetry",
      "telemetry.sdk.language"=>"ruby",
      "telemetry.sdk.version"=>"1.6.0"},
  instrumentation_scope=#<struct OpenTelemetry::SDK::InstrumentationScope
  name="aws.s3.client", version="">,
  span_id="\xBFb\xC9\xFD\xA6F!\xE1",
  trace_id=" \xE7\xF1\xF8\x9D\e\x16/\xAC\xE6\x1A\xAC%j\x81\xD8",
  trace_flags=#<OpenTelemetry::Trace::TraceFlags:0x000000011d994328 @flags=1>,
  tracestate=#<OpenTelemetry::Trace::Tracestate:0x000000011d990638 @hash={}>>
```

The previous trace output has two spans of data. Each trace entry provides additional metadata about the event in one or more attributes.

Configuring an `OTelProvider` for all service clients

Instead of turning on telemetry for a specific service client like the previous section explained, you have the option to turn on telemetry globally.

To emit telemetry data for **all** AWS service clients, you can set the telemetry provider on the `Aws.config` prior to creating service clients.

```
otel_provider = Aws::Telemetry::OTelProvider.new
Aws.config[:telemetry_provider] = otel_provider
```

With this configuration, any service clients created afterwards will automatically emit telemetry. To learn more about using `Aws.config` to set global settings, see `Aws.config`.

Configuring a custom telemetry provider

If you don't want to use OpenTelemetry as your telemetry provider, the AWS SDK for Ruby does support you implementing a custom provider. It might be helpful to use the `OTelProvider` implementation that is available in the AWS SDK for Ruby GitHub repository as an example. For additional context, refer to the notes in `Module: Aws::Telemetry` in the *AWS SDK for Ruby API Reference*.

Span Attributes

Traces are the output of telemetry. Traces consist of one or more spans. Spans have attributes that include additional metadata that is automatically included when appropriate for the method call. The following is a list of the attributes supported by the SDK for Ruby, where:

- Attribute Name - the name used to label the data appearing in the trace.
- Type - the data type of the value.
- Description - a description of what the value represents.

Attribute Name	Type	Description

`error`	Boolean	True if the unit of work was unsuccessful. Otherwise, false.
`exception.message`	String	The exception or error message.
`exception.stacktrace`	String	A stacktrace as provided by the language runtime if available.
`exception.type`	String	The type (fully qualified name) of the exception or error.
`rpc.system`	String	The remote system identifier set to '`aws-api`'.
`rpc.method`	String	The name of the operation being invoked.
`rpc.service`	String	The name of the remote service.
`aws.request_id`	String	The AWS request ID returned in the response headers, per HTTP attempt. The latest request ID is used when possible.
`code.function`	String	The method or function name.
`code.namespace`	String	The namespace within which `code.function` is defined.
`http.status_code`	Long	The HTTP response status code.

`http.request_content_length`	Long	The size of the request payload body in bytes.
`http.response_content_length`	Long	The size of the response payload body in bytes.
`http.method`	String	The HTTP request method.
`net.protocol.name`	String	The name of the application layer protocol.
`net.protocol.version`	String	The version of the application layer protocol (e.g. 1.0, 1.1, 2.0).
`net.peer.name`	String	The logical remote hostname.
`net.peer.port`	String	The logical remote port number.

Tip

OpenTelemetry-Ruby has additional implementations that are integrated with SDK for Ruby's existing Telemetry support. For more information, see OpenTelemetry AWS-SDK Instrumentation in the `open-telemetry` GitHub repository.

Configuring HTTP-level settings within the AWS SDK for Ruby

Setting a nonstandard endpoint

The region is used to construct an SSL endpoint to use for AWS requests. If you need to use a nonstandard endpoint in the Region you've selected, add an `endpoint` entry to `Aws.config`. Alternatively, set the `endpoint:` when creating a service client or resource object. The following example creates an Amazon S3 resource object in the `other_endpoint` endpoint.

```
s3 = Aws::S3::Resource.new(endpoint: other_endpoint)
```

To use an endpoint of your choosing for API requests and to have that choice persist, see the Service-specific endpoints configuration option in the *AWS SDKs and Tools Reference Guide*.

Using the AWS SDK for Ruby

This section provides information about developing software with the AWS SDK for Ruby, including how to use some of the SDK's advanced features.

The AWS SDKs and Tools Reference Guide also contains settings, features, and other foundational concepts common among many of the AWS SDKs.

Topics

- Making AWS service requests using the AWS SDK for Ruby
- Using the AWS SDK for Ruby REPL utility
- Using the AWS SDK for Ruby with Ruby on Rails
- Debugging using wire trace information from an AWS SDK for Ruby client
- Adding testing with stubbing to your AWS SDK for Ruby application
- Using paginated results in the AWS SDK for Ruby
- Using waiters in the AWS SDK for Ruby

Making AWS service requests using the AWS SDK for Ruby

To programmatically access AWS services, SDKs use a client class for each AWS service. For example, if your application needs to access Amazon EC2, your application creates an Amazon EC2 client object to interface with that service. You then use the service client to make requests to that AWS service.

To make a request to an AWS service, you must first create and configure a service client. For each AWS service your code uses, it has its own gem and its own dedicated type for interacting with it. The client exposes one method for each API operation exposed by the service.

Each service client requires an AWS Region and a credential provider. The SDK uses these values to send requests to the correct Region for your resources and to sign requests with the correct credentials. You can specify these values programmatically in code or have them automatically loaded from the environment.

- When instantiating a client class, AWS credentials must be supplied. For the order that the SDK checks for authentication providers, see Credential provider chain.

- The SDK has a series of places (or sources) that it checks in order to find a value for configuration settings. For details, see Precedence of settings.

The SDK for Ruby includes client classes that provide interfaces to the AWS services. Each client class supports a particular AWS service and follows the convention `Aws::<service identifier>::Client`. For example, `Aws::S3::Client` provides an interface to the Amazon Simple Storage Service service, and `Aws::SQS::Client` provides an interface to the Amazon Simple Queue Service service.

All client classes for all AWS services are thread-safe.

You can pass configuration options directly to Client and Resource constructors. These options take precedence over the environment and `Aws.config` defaults.

```
# using a credentials object
ec2 = Aws::EC2::Client.new(region: 'us-west-2', credentials: credentials)
```

Using the AWS SDK for Ruby REPL utility

The `aws-sdk` gem includes a Read-Eval-Print-Loop (REPL) interactive command-line interface where you can test the SDK for Ruby and immediately see the results. SDK for Ruby gems are available at RubyGems.org.

Prerequisites

- Installing the AWS SDK for Ruby.
- The `aws-v3.rb` is located in the `aws-sdk-resources` gem. The `aws-sdk-resources` gem is also included by the main `aws-sdk` gem.
- You will need an xml library, such as the `rexml` gem.
- Although the program does work with the Interactive Ruby Shell (`irb`), we recommend that you install the `pry` gem, which provides a more powerful REPL environment.

Bundler setup

If you use Bundler, the following updates to your `Gemfile` will address the prerequisite gems:

1. Open your `Gemfile` that you created when you installed the AWS SDK for Ruby. Add the following lines to the file:

```
gem "aws-sdk"
gem "rexml"
gem "pry"
```

2. Save the Gemfile.
3. Install the dependencies specified in your `Gemfile`:

```
$ bundle install
```

Running REPL

You can access the REPL by running `aws-v3.rb` from the command line.

```
aws-v3.rb
```

Alternatively, you can enable HTTP wire logging by setting the verbose flag. HTTP wire logging provides information about the communication between the AWS SDK for Ruby and AWS. Note, the verbose flag also adds overhead that can make your code run slower.

```
aws-v3.rb -v
```

The SDK for Ruby includes client classes that provide interfaces to the AWS services. Each client class supports a particular AWS service. In the REPL, every service class has a helper that returns a new client object for interacting with that service. The name of the helper will be the name of the service converted to lower case. For example, the names of the Amazon S3 and Amazon EC2 helper objects are `s3` and `ec2`, respectively. To list the Amazon S3 buckets in your account, you can enter `s3.list_buckets` into the prompt.

You can type `quit` into the REPL prompt to exit.

Using the AWS SDK for Ruby with Ruby on Rails

Ruby on Rails provides a web development framework that makes it easy to create websites with Ruby.

AWS provides the `aws-sdk-rails` gem to enable easy integration with Rails. You can use AWS Elastic Beanstalk, AWS OpsWorks, AWS CodeDeploy, or the AWS Rails Provisioner to deploy and run your Rails applications in the AWS Cloud.

For information on installing and using the `aws-sdk-rails` gem, see the GitHub repository https://github.com/aws/aws-sdk-rails.

Debugging using wire trace information from an AWS SDK for Ruby client

You can get wire trace information from an AWS client by setting the `http_wire_trace` Boolean. Wire trace information helps differentiate client changes, service issues, and user errors. When `true`, the setting shows what is being sent on the wire. The following example creates an Amazon S3 client with wire tracing enabled at the time of client creation.

```
s3 = Aws::S3::Client.new(http_wire_trace: true)
```

Given the following code and the argument `bucket_name`, the output displays a message that says whether a bucket with that name exists.

```
require 'aws-sdk-s3'

s3 = Aws::S3::Resource.new(client: Aws::S3::Client.new(http_wire_trace: true))

if s3.bucket(ARGV[0]).exists?
  puts "Bucket #{ARGV[0]} exists"
else
  puts "Bucket #{ARGV[0]} does not exist"
end
```

If the bucket exists, the output is similar to the following. (Returns were added to the `HEAD` line for readability.)

```
opening connection to bucket_name.s3-us-west-1.amazonaws.com:443...
opened
starting SSL for bucket_name.s3-us-west-1.amazonaws.com:443...
SSL established, protocol: TLSv1.2, cipher: ECDHE-RSA-AES128-GCM-SHA256
-> "HEAD / HTTP/1.1
```

```
    Accept-Encoding:
    User-Agent: aws-sdk-ruby3/3.171.0 ruby/3.2.2 x86_64-linux aws-sdk-s3/1.120.0
    Host: bucket_name.s3-us-west-1.amazonaws.com
    X-Amz-Date: 20230427T143146Z
/* omitted */
Accept: */*\r\n\r\n"
-> "HTTP/1.1 200 OK\r\n"
-> "x-amz-id-2: XxB2J+kpHgTjmMUwpkUI1EjaFSPxAjWRgkn/+z7YwWc/
iAX5E3OXRBzJ37cfc8T4D7ELC1KFELM=\r\n"
-> "x-amz-request-id: 5MD4APQQS815QVBR\r\n"
-> "Date: Thu, 27 Apr 2023 14:31:47 GMT\r\n"
-> "x-amz-bucket-region: us-east-1\r\n"
-> "x-amz-access-point-alias: false\r\n"
-> "Content-Type: application/xml\r\n"
-> "Server: AmazonS3\r\n"
-> "\r\n"
Conn keep-alive
Bucket bucket_name exists
```

You can also turn on wire tracing after client creation.

```
s3 = Aws::S3::Client.new
s3.config.http_wire_trace = true
```

For more information on the fields in the wire trace information reported, see Transfer Family required request headers.

Adding testing with stubbing to your AWS SDK for Ruby application

Learn how to stub client responses and client errors in an AWS SDK for Ruby application.

Stubbing client responses

When you stub a response, the AWS SDK for Ruby disables network traffic and the client returns stubbed (or fake) data. If you don't supply stubbed data, the client returns:

- Lists as empty arrays
- Maps as empty hashes

- Numeric values as zero
- Dates as now

The following example returns stubbed names for the list of Amazon S3 buckets.

```
require 'aws-sdk'

s3 = Aws::S3::Client.new(stub_responses: true)

bucket_data = s3.stub_data(:list_buckets, :buckets => [{name:'aws-sdk'}, {name:'aws-
sdk2'}])
s3.stub_responses(:list_buckets, bucket_data)
bucket_names = s3.list_buckets.buckets.map(&:name)

# List each bucket by name
bucket_names.each do |name|
  puts name
end
```

Running this code displays the following.

```
aws-sdk
aws-sdk2
```

Note

After you supply any stubbed data, the default values no longer apply for any remaining instance attributes. This means that in the previous example, the remaining instance attribute, `creation_date`, is not now but `nil`.

The AWS SDK for Ruby validates your stubbed data. If you pass in data of the wrong type, it raises an `ArgumentError` exception. For example, if instead of the previous assignment to `bucket_data`, you used the following:

```
bucket_data = s3.stub_data(:list_buckets, buckets:['aws-sdk', 'aws-sdk2'])
```

The AWS SDK for Ruby raises two `ArgumentError` exceptions.

```
expected params[:buckets][0] to be a hash
expected params[:buckets][1] to be a hash
```

Stubbing client errors

You can also stub errors that the AWS SDK for Ruby raises for specific methods. The following example displays `Caught Timeout::Error error calling head_bucket on aws-sdk`.

```
require 'aws-sdk'

s3 = Aws::S3::Client.new(stub_responses: true)
s3.stub_responses(:head_bucket, Timeout::Error)

begin
  s3.head_bucket({bucket: 'aws-sdk'})
rescue Exception => ex
  puts "Caught #{ex.class} error calling 'head_bucket' on 'aws-sdk'"
end
```

Using paginated results in the AWS SDK for Ruby

Many AWS operations return truncated results when the payload is too large to return in a single response. Instead, the service returns a portion of the data and a token to retrieve the next set of items. This pattern is known as pagination.

Paged responses are enumerable

The simplest way to handle paged response data is to use the built-in enumerator in the response object, as shown in the following example.

```
s3 = Aws::S3::Client.new

s3.list_objects(bucket:'aws-sdk').each do |response|
  puts response.contents.map(&:key)
end
```

This yields one response object per API call made, and enumerates objects in the named bucket. The SDK retrieves additional pages of data to complete the request.

Handling paged responses manually

To handle paging yourself, use the response's `next_page?` method to verify there are more pages to retrieve, or use the `last_page?` method to verify there are no more pages to retrieve.

If there are more pages, use the `next_page` (notice there is no ?) method to retrieve the next page of results, as shown in the following example.

```
s3 = Aws::S3::Client.new

# Get the first page of data
response = s3.list_objects(bucket:'aws-sdk')

# Get additional pages
while response.next_page? do
  response = response.next_page
  # Use the response data here...
end
```

> **Note**
>
> If you call the `next_page` method and there are no more pages to retrieve, the SDK raises an Aws::PageableResponse::LastPageError exception.

Paged data classes

Paged data in the AWS SDK for Ruby is handled by the Aws::PageableResponse class, which is included with Seahorse::Client::Response to provide access to paged data.

Using waiters in the AWS SDK for Ruby

Waiters are utility methods that poll for a particular state to occur on a client. Waiters can fail after a number of attempts at a polling interval defined for the service client. For an example of how a waiter is used, see the create_table method of the Amazon DynamoDB Encryption Client in the AWS Code Examples Repository.

Invoking a waiter

To invoke a waiter, call `wait_until` on a service client. In the following example, a waiter waits until the instance `i-12345678` is running before continuing.

```
ec2 = Aws::EC2::Client.new

begin
  ec2.wait_until(:instance_running, instance_ids:['i-12345678'])
  puts "instance running"
rescue Aws::Waiters::Errors::WaiterFailed => error
  puts "failed waiting for instance running: #{error.message}"
end
```

The first parameter is the waiter name, which is specific to the service client and indicates which operation is being waited for. The second parameter is a hash of parameters that are passed to the client method called by the waiter, which varies according to the waiter name.

For a list of operations that can be waited for and the client methods called for each operation, see the `waiter_names` and `wait_until` field documentation for the client you are using.

Wait failures

Waiters can fail with any of the following exceptions.

Aws::Waiters::Errors::FailureStateError

A failure state was encountered while waiting.

Aws::Waiters::Errors::NoSuchWaiterError

The specified waiter name is not defined for the client being used.

Aws::Waiters::Errors::TooManyAttemptsError

The number of attempts exceeded the waiter's `max_attempts` value.

Aws::Waiters::Errors::UnexpectedError

An unexpected error occurred while waiting.

Aws::Waiters::Errors::WaiterFailed

One of the wait states was exceeded or another failure occurred while waiting.

All of these errors—except `NoSuchWaiterError`—are based on `WaiterFailed`. To catch errors in a waiter, use `WaiterFailed`, as shown in the following example.

```
rescue Aws::Waiters::Errors::WaiterFailed => error
  puts "failed waiting for instance running: #{error.message}"
end
```

Configuring a waiter

Each waiter has a default polling interval and a maximum number of attempts it will make before returning control to your program. To set these values, use the `max_attempts` and `delay:` parameters in your `wait_until` call. The following example waits for up to 25 seconds, polling every five seconds.

```
# Poll for ~25 seconds
client.wait_until(...) do |w|
  w.max_attempts = 5
  w.delay = 5
end
```

To disable wait failures, set the value of either of these parameters to `nil`.

Extending a waiter

To modify the behavior of waiters, you can register callbacks that are triggered before each polling attempt and before waiting.

The following example implements an exponential backoff in a waiter by doubling the amount of time to wait on every attempt.

```
ec2 = Aws::EC2::Client.new

ec2.wait_until(:instance_running, instance_ids:['i-12345678']) do |w|
  w.interval = 0 # disable normal sleep
  w.before_wait do |n, resp|
    sleep(n ** 2)
  end
end
```

The following example disables the maximum number of attempts, and instead waits for one hour (3600 seconds) before failing.

```
started_at = Time.now
client.wait_until(...) do |w|
  # Disable max attempts
  w.max_attempts = nil

  # Poll for one hour, instead of a number of attempts
  w.before_wait do |attempts, response|
    throw :failure if Time.now - started_at > 3600
  end
end
```

SDK for Ruby code examples

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

Some services contain additional example categories that show how to leverage libraries or functions specific to the service.

Services

- Aurora examples using SDK for Ruby
- Auto Scaling examples using SDK for Ruby
- CloudTrail examples using SDK for Ruby
- CloudWatch examples using SDK for Ruby
- Amazon Cognito Identity Provider examples using SDK for Ruby
- Amazon Comprehend examples using SDK for Ruby
- Amazon DocumentDB examples using SDK for Ruby
- DynamoDB examples using SDK for Ruby
- Amazon EC2 examples using SDK for Ruby
- Elastic Beanstalk examples using SDK for Ruby
- EventBridge examples using SDK for Ruby
- AWS Glue examples using SDK for Ruby
- IAM examples using SDK for Ruby
- Kinesis examples using SDK for Ruby
- AWS KMS examples using SDK for Ruby
- Lambda examples using SDK for Ruby
- Amazon MSK examples using SDK for Ruby
- Amazon Polly examples using SDK for Ruby

- Amazon RDS examples using SDK for Ruby
- Amazon S3 examples using SDK for Ruby
- Amazon SES examples using SDK for Ruby
- Amazon SES API v2 examples using SDK for Ruby
- Amazon SNS examples using SDK for Ruby
- Amazon SQS examples using SDK for Ruby
- AWS STS examples using SDK for Ruby
- Amazon Textract examples using SDK for Ruby
- Amazon Translate examples using SDK for Ruby

Aurora examples using SDK for Ruby

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

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

- Get started

Get started

Hello Aurora

The following code example shows how to get started using Aurora.

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
require 'aws-sdk-rds'
```

```
# Creates an Amazon RDS client for the AWS Region
rds = Aws::RDS::Client.new

puts 'Listing clusters in this AWS account...'

# Calls the describe_db_clusters method to get information about clusters
resp = rds.describe_db_clusters(max_records: 20)

# Checks if any clusters are found and prints the appropriate message
if resp.db_clusters.empty?
  puts 'No clusters found!'
else
  # Loops through the array of cluster objects and prints the cluster identifier
  resp.db_clusters.each do |cluster|
    puts "Cluster identifier: #{cluster.db_cluster_identifier}"
  end
end
```

- For API details, see DescribeDBClusters in *AWS SDK for Ruby API Reference*.

Auto Scaling examples using SDK for Ruby

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

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

- Get started

Get started

Hello Auto Scaling

The following code example shows how to get started using Auto Scaling.

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
require 'aws-sdk-autoscaling'
require 'logger'

# AutoScalingManager is a class responsible for managing AWS Auto Scaling operations
# such as listing all Auto Scaling groups in the current AWS account.
class AutoScalingManager
  def initialize(client)
    @client = client
    @logger = Logger.new($stdout)
  end

  # Gets and prints a list of Auto Scaling groups for the account.
  def list_auto_scaling_groups
    paginator = @client.describe_auto_scaling_groups
    auto_scaling_groups = []
    paginator.each_page do |page|
      auto_scaling_groups.concat(page.auto_scaling_groups)
    end

    if auto_scaling_groups.empty?
      @logger.info('No Auto Scaling groups found for this account.')
    else
      auto_scaling_groups.each do |group|
        @logger.info("Auto Scaling group name: #{group.auto_scaling_group_name}")
        @logger.info("  Group ARN:             #{group.auto_scaling_group_arn}")
        @logger.info("  Min/max/desired:       #{group.min_size}/#{group.max_size}/
#{group.desired_capacity}")
        @logger.info("\n")
      end
    end
  end
end
```

```
if $PROGRAM_NAME == __FILE__
  autoscaling_client = Aws::AutoScaling::Client.new
  manager = AutoScalingManager.new(autoscaling_client)
  manager.list_auto_scaling_groups
end
```

- For API details, see DescribeAutoScalingGroups in *AWS SDK for Ruby API Reference*.

CloudTrail examples using SDK for Ruby

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

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

`CreateTrail`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
require 'aws-sdk-cloudtrail' # v2: require 'aws-sdk'
```

```
require 'aws-sdk-s3'
require 'aws-sdk-sts'

def create_trail_example(s3_client, sts_client, cloudtrail_client, trail_name,
 bucket_name)
  resp = sts_client.get_caller_identity({})
  account_id = resp.account

  # Attach policy to an Amazon Simple Storage Service (S3) bucket.
  s3_client.create_bucket(bucket: bucket_name)
  begin
    policy = {
      'Version' => '2012-10-17',
      'Statement' => [
        {
          'Sid' => 'AWSCloudTrailAclCheck20150319',
          'Effect' => 'Allow',
          'Principal' => {
            'Service' => 'cloudtrail.amazonaws.com'
          },
          'Action' => 's3:GetBucketAcl',
          'Resource' => "arn:aws:s3:::#{bucket_name}"
        },
        {
          'Sid' => 'AWSCloudTrailWrite20150319',
          'Effect' => 'Allow',
          'Principal' => {
            'Service' => 'cloudtrail.amazonaws.com'
          },
          'Action' => 's3:PutObject',
          'Resource' => "arn:aws:s3:::#{bucket_name}/AWSLogs/#{account_id}/*",
          'Condition' => {
            'StringEquals' => {
              's3:x-amz-acl' => 'bucket-owner-full-control'
            }
          }
        }
      ]
    }.to_json

    s3_client.put_bucket_policy(
      bucket: bucket_name,
      policy: policy
    )
```

```
    puts "Successfully added policy to bucket #{bucket_name}"
  end

  begin
    cloudtrail_client.create_trail({
                                     name: trail_name, # required
                                     s3_bucket_name: bucket_name # required
                                   })

    puts "Successfully created trail: #{trail_name}."
  rescue StandardError => e
    puts "Got error trying to create trail #{trail_name}:\n #{e}"
    puts e
    exit 1
  end
```

- For API details, see CreateTrail in *AWS SDK for Ruby API Reference*.

`DeleteTrail`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
  client.delete_trail({
                        name: trail_name # required
                      })
  puts "Successfully deleted trail: #{trail_name}"
rescue StandardError => e
  puts "Got error trying to delete trail: #{trail_name}:"
  puts e
  exit 1
end
```

- For API details, see DeleteTrail in *AWS SDK for Ruby API Reference*.

`ListTrails`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
require 'aws-sdk-cloudtrail' # v2: require 'aws-sdk'

def describe_trails_example(client)
  resp = client.describe_trails({})
  puts "Found #{resp.trail_list.count} trail(s)."

  resp.trail_list.each do |trail|
    puts "Name:           #{trail.name}"
    puts "S3 bucket name: #{trail.s3_bucket_name}"
    puts
  end
```

- For API details, see ListTrails in *AWS SDK for Ruby API Reference*.

`LookupEvents`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
require 'aws-sdk-cloudtrail' # v2: require 'aws-sdk'

# @param [Object] client
def lookup_events_example(client)
  resp = client.lookup_events
  puts "Found #{resp.events.count} events:"
  resp.events.each do |e|
    puts "Event name:   #{e.event_name}"
    puts "Event ID:     #{e.event_id}"
    puts "Event time:   #{e.event_time}"
    puts 'Resources:'

    e.resources.each do |r|
      puts "  Name:       #{r.resource_name}"
      puts "  Type:       #{r.resource_type}"
      puts ''
    end
  end
end
```

- For API details, see LookupEvents in *AWS SDK for Ruby API Reference*.

CloudWatch examples using SDK for Ruby

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

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:

- List CloudWatch namespaces and metrics.
- Start OpenTelemetry enrichment so CloudWatch correlates incoming OTLP metrics with the resources that produced them.
- See how OTLP metrics reach the CloudWatch metrics endpoint. Metric ingestion over OTLP is not an AWS SDK operation.
- Create an alarm that evaluates a PromQL query.
- Inspect the alarm's contributors, the individual series that the query matched.
- Get statistics for a metric and chart it on a dashboard.
- Mute the alarm for a maintenance window, then clean up.

SDK for Ruby

> **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 the CloudWatch OpenTelemetry experience.

```
DASHES = ('-' * 80).freeze
DEFAULT_QUERY = 'avg by (host) (system_cpu_utilization) > 80'.freeze

# Valid evaluation intervals are 10, 20, 30, or any multiple of 60 up to 3600
 seconds.
EVALUATION_INTERVAL = 60
PENDING_PERIOD = 300
RECOVERY_PERIOD = 120
```

```
# Lists the metrics and namespaces already present in the account, to orient the
 reader
# before any configuration happens.
#
# @param cloudwatch_client [Aws::CloudWatch::Client] An initialized CloudWatch
 client.
# @return [Hash] A hash of namespace to the metrics found in it, most populated
 first.
def metrics_by_namespace(cloudwatch_client)
  by_namespace = {}
  metric_count = 0

  cloudwatch_client.list_metrics.each_page do |page|
    page.metrics.each do |metric|
      (by_namespace[metric.namespace] ||= []) << metric
      metric_count += 1
    end
    # This account may have a very large number of metrics, so stop once we have
 enough
    # to give the reader a sense of what is there.
    break if metric_count >= 500
  end

  puts "\tFound #{metric_count} metrics across #{by_namespace.size} namespaces:"
  by_namespace
    .sort_by { |_namespace, metrics| -metrics.size }
    .first(10)
    .each { |namespace, metrics| puts "\t  #{namespace} (#{metrics.size} metrics)" }

  if by_namespace.empty?
    puts "\tNo metrics found in this account. The statistics and dashboard steps
 later"
    puts "\ton need an existing metric, so they will be skipped."
  end

  by_namespace
rescue StandardError => e
  puts "Error listing metrics: #{e.message}"
  {}
end

# Turns on OTel enrichment, but only if it is not already running. Enrichment is an
# account-wide setting, so this scenario only turns it off again if it was the thing
 that
```

```
# turned it on.
#
# @param cloudwatch_client [Aws::CloudWatch::Client] An initialized CloudWatch
 client.
# @return [Boolean] true if this run started enrichment; otherwise, false.
def enrichment_started_by_example?(cloudwatch_client)
  # The Ruby SDK renders the OTel prefix as +o_tel+, so the methods are
  # +get_o_tel_enrichment+ and +start_o_tel_enrichment+.
  status = cloudwatch_client.get_o_tel_enrichment.status
  puts "\tEnrichment status: #{status}"

  if status == 'Running'
    puts
    puts "\tEnrichment was already running, so we will leave it alone. The cleanup
 step"
    puts "\twill not stop it, because other workloads in this account may depend on
 it."
    return false
  end

  cloudwatch_client.start_o_tel_enrichment
  puts "\tEnrichment status: #{cloudwatch_client.get_o_tel_enrichment.status}"
  puts
  puts "\tNote: this run started enrichment, so the cleanup step will stop it
 again."
  true
rescue StandardError => e
  puts "Error starting OTel enrichment: #{e.message}"
  false
end

# Creates an alarm whose evaluation is a PromQL query.
#
# @param cloudwatch_client [Aws::CloudWatch::Client] An initialized CloudWatch
 client.
# @param alarm_name [String] The name of the alarm to create.
# @param query [String] The PromQL query to evaluate.
# @return [Boolean] true if the alarm was created; otherwise, false.
def promql_alarm_created?(cloudwatch_client, alarm_name, query)
  # The comparison belongs in the query itself. A PromQL alarm has no separate
 threshold,
  # comparison operator, statistic, period, or evaluation periods. Note that the
 Ruby SDK
  # spells the criteria member +prom_ql_criteria+.
```

```
  cloudwatch_client.put_metric_alarm(
    alarm_name: alarm_name,
    alarm_description: 'A PromQL alarm created by the AWS SDK for Ruby Basics
 scenario.',
    evaluation_criteria: {
      prom_ql_criteria: {
        query: query,
        pending_period: PENDING_PERIOD,
        recovery_period: RECOVERY_PERIOD
      }
    },
    evaluation_interval: EVALUATION_INTERVAL
  )
  true
rescue StandardError => e
  puts "Error creating PromQL alarm: #{e.message}"
  false
end

# Prints the contributors to a PromQL alarm. Each contributor is one series the
 query
# matched, identified by its label set.
#
# @param cloudwatch_client [Aws::CloudWatch::Client] An initialized CloudWatch
 client.
# @param alarm_name [String] The name of the PromQL alarm.
# @return [void]
def report_alarm_contributors(cloudwatch_client, alarm_name)
  contributors = []
  next_token = nil

  loop do
    response = cloudwatch_client.describe_alarm_contributors(
      alarm_name: alarm_name,
      next_token: next_token
    )
    contributors.concat(response.alarm_contributors)
    next_token = response.next_token
    # A page can come back empty while still carrying a token, so keep going until
 the
    # token itself is gone rather than stopping at the first empty page.
    break if next_token.nil? || next_token.empty?
  end
```

```
  if contributors.empty?
    puts "\tNo contributors yet. The query matched no series, which usually means
 no"
    puts "\tOTel metrics with these labels have arrived. Once your collector is
 sending"
    puts "\tdata, each matching series appears here with its labels and why it
 breached."
    return
  end

  puts "\tFound #{contributors.size} contributors:"
  contributors.each do |contributor|
    labels = contributor.contributor_attributes.sort.map { |k, v|
 "#{k}=#{v}" }.join(', ')
    puts "\t  #{contributor.contributor_id}: #{labels}"
    puts "\t    reason: #{contributor.state_reason}"
  end
rescue StandardError => e
  puts "Error describing alarm contributors: #{e.message}"
end

# Builds a single-widget dashboard body that charts the given metric.
#
# @param metric [Aws::CloudWatch::Types::Metric] The metric to chart.
# @param region [String] The region the metric is in. A metric widget must name its
#   region, because a dashboard can chart metrics from several.
# @return [String] The dashboard body, as JSON.
def dashboard_body(metric, region)
  metric_spec = [metric.namespace, metric.metric_name]
  metric.dimensions.each { |dimension| metric_spec.push(dimension.name,
 dimension.value) }

  {
    widgets: [
      {
        type: 'text',
        x: 0, y: 0, width: 24, height: 2,
        properties: {
          markdown: 'This dashboard was created programmatically by an AWS SDK code
 example.'
        }
      },
      {
        type: 'metric',
```

```
        x: 0, y: 2, width: 12, height: 6,
        properties: {
          metrics: [metric_spec],
          view: 'timeSeries',
          stat: 'Average',
          period: 300,
          region: region,
          title: metric.metric_name
        }
      }
    ]
  }.to_json
end

# Gets statistics for an existing metric and charts it on a dashboard, so the reader
 can
# see what the alarm is evaluating.
#
# @param cloudwatch_client [Aws::CloudWatch::Client] An initialized CloudWatch
 client.
# @param dashboard_name [String] The name of the dashboard to create.
# @param by_namespace [Hash] The namespaces and metrics discovered in step 1.
# @return [Boolean] true if a dashboard was created; otherwise, false.
def chart_metric_on_dashboard(cloudwatch_client, dashboard_name, by_namespace)
  if by_namespace.empty?
    puts "\tSkipping statistics and dashboard because no metrics exist yet."
    return false
  end

  metric = by_namespace.max_by { |_namespace, metrics| metrics.size }.last.first

  stats = cloudwatch_client.get_metric_statistics(
    namespace: metric.namespace,
    metric_name: metric.metric_name,
    dimensions: metric.dimensions,
    start_time: Time.now - (60 * 60 * 24),
    end_time: Time.now,
    period: 3600,
    statistics: %w[Average Maximum]
  )
  puts "\tStatistics for #{metric.namespace} #{metric.metric_name} over the last
 day:"
  puts "\t  Datapoints: #{stats.datapoints.size}"
  stats.datapoints.first(3).each do |datapoint|
```

```
    puts "\t  #{datapoint.timestamp} average #{datapoint.average}, maximum
 #{datapoint.maximum}"
  end

  response = cloudwatch_client.put_dashboard(
    dashboard_name: dashboard_name,
    dashboard_body: dashboard_body(metric, cloudwatch_client.config.region)
  )
  response.dashboard_validation_messages.each do |message|
    puts "\tDashboard validation message: #{message.message}"
  end
  puts "\tCreated dashboard #{dashboard_name}."

  stored = cloudwatch_client.get_dashboard(dashboard_name: dashboard_name)
  puts "\tRead the dashboard back, #{stored.dashboard_body.length} characters of
 widget JSON."
  true
rescue StandardError => e
  puts "Error getting statistics or creating the dashboard: #{e.message}"
  false
end

# Creates a mute rule so the alarm's actions are suppressed during a maintenance
 window,
# then reads it back and finds it in the account's rules.
#
# @param cloudwatch_client [Aws::CloudWatch::Client] An initialized CloudWatch
 client.
# @param mute_rule_name [String] The name of the mute rule to create.
# @param alarm_name [String] The name of the alarm to mute.
# @return [void]
def mute_alarm_for_maintenance(cloudwatch_client, mute_rule_name, alarm_name)
  # The expression is a five-field cron expression,
  # cron(Minutes Hours Day-of-month Month Day-of-week). Note that this is five
 fields, not
  # the six that Amazon EventBridge uses. For a one-time window, use at(yyyy-MM-
ddThh:mm),
  # with no seconds. The duration is an ISO 8601 duration from PT1M to P15D, so PT2H
  # rather than 2h.
  expression = 'cron(0 2 * * SUN)'
  duration = 'PT2H'
  timezone = 'America/Los_Angeles'

  cloudwatch_client.put_alarm_mute_rule(
```

```
    name: mute_rule_name,
    description: 'A mute rule created by the AWS SDK for Ruby Basics scenario.',
    rule: {
      schedule: {
        expression: expression,
        duration: duration,
        timezone: timezone
      }
    },
    # Target up to 100 alarms. If mute_targets is omitted, the rule applies to every
 alarm
    # in the account.
    mute_targets: { alarm_names: [alarm_name] }
  )

  puts "\tCreated mute rule #{mute_rule_name}:"
  puts "\t  schedule: #{expression} for #{duration}"
  puts "\t  timezone: #{timezone}"
  puts "\t  targets:  #{alarm_name}"
  puts
  puts "\tNote the two formats here. The expression is a five-field cron expression,
 five"
  puts "\trather than the six Amazon EventBridge uses. The duration is an ISO 8601"
  puts "\tduration, so 'PT2H' and not '2h'."
  puts
  puts "\tAlso note that mute_targets is set explicitly. If you leave it out, the
 rule"
  puts "\tapplies to every alarm in the account."

  rule = cloudwatch_client.get_alarm_mute_rule(alarm_mute_rule_name: mute_rule_name)
  puts "\tRead the rule back: status #{rule.status}, mute type #{rule.mute_type}."

  summaries = cloudwatch_client.list_alarm_mute_rules(alarm_name: alarm_name)
                               .alarm_mute_rule_summaries
  puts "\tFound #{summaries.size} mute rules targeting this alarm."
  # Mute rule summaries carry no name field, only an ARN, so match on the ARN
 suffix.
  match = summaries.find do |summary|
    summary.alarm_mute_rule_arn.end_with?("/#{mute_rule_name}",
 ":#{mute_rule_name}")
  end
  puts "\t  matched by ARN: #{match.alarm_mute_rule_arn} (#{match.status})" if match
rescue StandardError => e
  puts "Error muting the alarm: #{e.message}"
```

```
end

# Deletes the resources the scenario created. Each deletion is attempted
 independently so
# that one failure does not leave the remaining resources behind.
#
# @param cloudwatch_client [Aws::CloudWatch::Client] An initialized CloudWatch
 client.
# @param names [Hash] The alarm, dashboard, and mute rule names to delete.
# @param started_here [Boolean] Whether this run turned OTel enrichment on.
# @return [void]
def clean_up(cloudwatch_client, names, started_here)
  begin
    cloudwatch_client.delete_alarm_mute_rule(alarm_mute_rule_name:
 names[:mute_rule])
    puts "\tDeleted mute rule #{names[:mute_rule]}."
  rescue StandardError => e
    puts "\tCould not delete the mute rule: #{e.message}"
  end

  begin
    cloudwatch_client.delete_alarms(alarm_names: [names[:alarm]])
    puts "\tDeleted alarm #{names[:alarm]}."
  rescue StandardError => e
    puts "\tCould not delete the alarm: #{e.message}"
  end

  if names[:dashboard]
    begin
      cloudwatch_client.delete_dashboards(dashboard_names: [names[:dashboard]])
      puts "\tDeleted dashboard #{names[:dashboard]}."
    rescue StandardError => e
      puts "\tCould not delete the dashboard: #{e.message}"
    end
  end

  unless started_here
    puts "\tLeft OTel enrichment running, because it was already on before this
 run."
    return
  end

  begin
    cloudwatch_client.stop_o_tel_enrichment
```

```
    puts "\tStopped OTel enrichment, because this run started it."
  rescue StandardError => e
    puts "\tCould not stop OTel enrichment: #{e.message}"
  end
end

# Prints the scenario's introduction.
#
# @return [void]
def print_intro
  puts DASHES
  puts 'Welcome to the Amazon CloudWatch Basics scenario.'
  puts
  puts 'CloudWatch now ingests OpenTelemetry metrics natively. This scenario walks
 through'
  puts 'that experience: it turns on OTel enrichment so CloudWatch can correlate
 incoming'
  puts 'OTLP metrics with the resources that produced them, alarms on those metrics
 with a'
  puts 'PromQL query, and shows you which individual series drove the alarm.'
  puts
  puts 'A PromQL alarm works differently from a classic metric alarm. Rather than
 watching'
  puts 'one metric and counting breaching periods, it evaluates a query that can
 match many'
  puts 'series at once, and tracks each one separately as a contributor.'
  puts DASHES
end

# Explains that OTLP metric ingestion is not an AWS SDK operation. This step makes
 no
# service call; naming the gap explicitly is the point.
#
# @return [void]
def explain_otlp_ingestion
  puts '3. Send OTLP metrics to CloudWatch'
  puts
  puts 'This step is not an AWS SDK operation, and that\'s worth being explicit
 about.'
  puts 'Metrics reach CloudWatch over the OTLP protocol, through the CloudWatch
 agent, an'
  puts 'OpenTelemetry Collector, or an ADOT SDK. There is no PutOTelMetrics API to
 call.'
  puts
```

```
  puts 'Point your collector at the CloudWatch metrics endpoint, which follows the
 pattern'
  puts "\thttps://monitoring.<region>.amazonaws.com/v1/metrics"
  puts
  puts 'The endpoint is HTTP/1.1 only and does not support gRPC, so use an otlphttp'
  puts 'exporter rather than otlp. The metrics endpoint signs as "monitoring".'
  puts DASHES
end

# Prompts for a PromQL query and creates an alarm that evaluates it.
#
# @param cloudwatch_client [Aws::CloudWatch::Client] An initialized CloudWatch
 client.
# @param alarm_name [String] The name of the alarm to create.
# @return [void]
def create_promql_alarm_step(cloudwatch_client, alarm_name)
  puts '4. Create a PromQL alarm'
  puts
  puts 'Now we alarm on those metrics. The comparison goes inside the query itself:
 a'
  puts 'PromQL alarm has no separate threshold, comparison operator, statistic, or
 period.'
  puts
  print "Enter a PromQL query, or press ENTER for [#{DEFAULT_QUERY}]: "
  input = $stdin.gets
  query = input.nil? || input.strip.empty? ? DEFAULT_QUERY : input.strip

  if promql_alarm_created?(cloudwatch_client, alarm_name, query)
    puts "\tCreated alarm #{alarm_name}:"
    puts "\t  query:              #{query}"
    puts "\t  evaluationInterval: #{EVALUATION_INTERVAL} seconds"
    puts "\t  pendingPeriod:      #{PENDING_PERIOD} seconds"
    puts "\t  recoveryPeriod:     #{RECOVERY_PERIOD} seconds"
    puts
    puts "\tA PromQL alarm starts in the OK state rather than INSUFFICIENT_DATA,
 which is"
    puts "\tanother way it differs from a classic alarm."
  end
  puts DASHES
end

# Runs the eight steps of the scenario in order.
def run_me
  region = 'us-east-1'
```

```
  cloudwatch_client = Aws::CloudWatch::Client.new(region: region)

  # Suffix the resource names so repeated runs do not collide.
  suffix = rand(1000..9999)
  alarm_name = "doc-example-promql-alarm-#{suffix}"
  dashboard_name = "doc-example-dashboard-#{suffix}"
  mute_rule_name = "doc-example-mute-rule-#{suffix}"

  print_intro

  puts '1. List metrics and namespaces'
  puts
  puts 'Before configuring anything, let\'s see what CloudWatch is already
collecting in'
  puts 'this account by calling ListMetrics.'
  puts
  by_namespace = metrics_by_namespace(cloudwatch_client)
  puts DASHES

  puts '2. Start OpenTelemetry enrichment'
  puts
  puts 'Enrichment is what lets CloudWatch attach AWS resource context to the OTLP
metrics'
  puts 'you send it. Without it, your metrics arrive as opaque series with no
connection to'
  puts 'the resources that emitted them.'
  puts
  puts 'We check the current state first, and only start enrichment if it isn\'t
already on.'
  puts
  started_here = enrichment_started_by_example?(cloudwatch_client)
  puts DASHES

  explain_otlp_ingestion
  create_promql_alarm_step(cloudwatch_client, alarm_name)

  puts '5. Inspect the alarm\'s contributors'
  puts
  puts 'Each contributor is one series the query matched, identified by its label
set. This'
  puts 'is how you find out which host is unhealthy rather than only that something
is.'
  puts 'Classic alarms have no equivalent.'
  puts
```

```
  report_alarm_contributors(cloudwatch_client, alarm_name)
  puts DASHES

  puts '6. Get statistics and chart the metric on a dashboard'
  puts
  puts 'Statistics and dashboards are how you see what the alarm is evaluating.'
  puts
  dashboard_created = chart_metric_on_dashboard(cloudwatch_client, dashboard_name,
 by_namespace)
  puts DASHES

  mute_alarm_step(cloudwatch_client, mute_rule_name, alarm_name)

  clean_up_step(
    cloudwatch_client,
    { alarm: alarm_name, dashboard: dashboard_created ? dashboard_name : nil,
      mute_rule: mute_rule_name },
    started_here
  )

  puts 'This concludes the Amazon CloudWatch Basics scenario.'
end

# Explains what a mute rule does, then creates one for the scenario's alarm.
#
# @param cloudwatch_client [Aws::CloudWatch::Client] An initialized CloudWatch
 client.
# @param mute_rule_name [String] The name of the mute rule to create.
# @param alarm_name [String] The name of the alarm to mute.
# @return [void]
def mute_alarm_step(cloudwatch_client, mute_rule_name, alarm_name)
  puts '7. Mute the alarm for a maintenance window'
  puts
  puts 'While a mute rule is active the targeted alarms keep evaluating and keep
 changing'
  puts 'state, but their actions do not fire. This is the supported way to suppress'
  puts 'notifications during planned maintenance, instead of disabling alarm actions
 and'
  puts 'hoping someone remembers to turn them back on.'
  puts
  mute_alarm_for_maintenance(cloudwatch_client, mute_rule_name, alarm_name)
  puts DASHES
end
```

```
# Asks whether to delete the resources the scenario created, and deletes them if so.
#
# @param cloudwatch_client [Aws::CloudWatch::Client] An initialized CloudWatch
 client.
# @param names [Hash] The alarm, dashboard, and mute rule names to delete.
# @param started_here [Boolean] Whether this run turned OTel enrichment on.
# @return [void]
def clean_up_step(cloudwatch_client, names, started_here)
  puts '8. Clean up'
  print 'Delete the resources this scenario created? (y/n) '
  answer = $stdin.gets
  if answer.nil? || answer.strip.downcase != 'y'
    puts "\tSkipping cleanup. Note that the alarm, dashboard, and mute rule are
 still in"
    puts "\tyour account, and enrichment may still be running."
  else
    clean_up(cloudwatch_client, names, started_here)
  end
  puts DASHES
end
```

- For API details, see the following topics in *AWS SDK for Ruby API Reference*.
  - DeleteAlarmMuteRule
  - DeleteAlarms
  - DeleteDashboards
  - DescribeAlarmContributors
  - GetAlarmMuteRule
  - GetDashboard
  - GetMetricStatistics
  - GetOTelEnrichment
  - ListAlarmMuteRules
  - ListDashboards
  - ListMetrics
  - PutAlarmMuteRule
  - PutDashboard
  - PutMetricAlarm

- StartOTelEnrichment
- StopOTelEnrichment

Actions

`DeleteAlarmMuteRule`

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

SDK for Ruby

> **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 alarm mute rule. The alarms it targeted resume firing their actions.
#
# @param cloudwatch_client [Aws::CloudWatch::Client] An initialized CloudWatch
 client.
# @param name [String] The name of the mute rule.
# @return [Boolean] true if the mute rule was deleted; otherwise, false.
def alarm_mute_rule_deleted?(cloudwatch_client, name)
  cloudwatch_client.delete_alarm_mute_rule(alarm_mute_rule_name: name)
  true
rescue StandardError => e
  puts "Error deleting alarm mute rule: #{e.message}"
  false
end
```

- For API details, see DeleteAlarmMuteRule in *AWS SDK for Ruby API Reference*.

`DescribeAlarmContributors`

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

SDK for Ruby

> **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 contributors for a PromQL alarm. Each contributor is one series that the
# alarm's query matched, identified by its label set. This is how you find out which
# hosts, services, or pods are breaching, rather than only that something is.
#
# @param cloudwatch_client [Aws::CloudWatch::Client] An initialized CloudWatch
 client.
# @param alarm_name [String] The name of the PromQL alarm.
# @return [Array] The contributors, as Aws::CloudWatch::Types::AlarmContributor.
def alarm_contributors(cloudwatch_client, alarm_name)
  contributors = []
  next_token = nil

  loop do
    response = cloudwatch_client.describe_alarm_contributors(
      alarm_name: alarm_name,
      next_token: next_token
    )
    contributors.concat(response.alarm_contributors)
    next_token = response.next_token
    break if next_token.nil? || next_token.empty?
  end

  contributors
rescue StandardError => e
  puts "Error getting alarm contributors: #{e.message}"
  []
end
```

- For API details, see DescribeAlarmContributors in *AWS SDK for Ruby API Reference*.

`DescribeAlarms`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
require 'aws-sdk-cloudwatch'

# Lists the names of available Amazon CloudWatch alarms.
#
# @param cloudwatch_client [Aws::CloudWatch::Client]
#   An initialized CloudWatch client.
# @example
#   list_alarms(Aws::CloudWatch::Client.new(region: 'us-east-1'))
def list_alarms(cloudwatch_client)
  response = cloudwatch_client.describe_alarms
  if response.metric_alarms.count.positive?
    response.metric_alarms.each do |alarm|
      puts alarm.alarm_name
    end
  else
    puts 'No alarms found.'
  end
rescue StandardError => e
  puts "Error getting information about alarms: #{e.message}"
end
```

- For API details, see DescribeAlarms in *AWS SDK for Ruby API Reference*.

`DescribeAlarmsForMetric`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
#
# @param cloudwatch_client [Aws::CloudWatch::Client]
#   An initialized CloudWatch client.
# @example
#   describe_metric_alarms(Aws::CloudWatch::Client.new(region: 'us-east-1'))
def describe_metric_alarms(cloudwatch_client)
  response = cloudwatch_client.describe_alarms

  if response.metric_alarms.count.positive?
    response.metric_alarms.each do |alarm|
      puts '-' * 16
      puts "Name:           #{alarm.alarm_name}"
      puts "State value:    #{alarm.state_value}"
      puts "State reason:   #{alarm.state_reason}"
      puts "Metric:         #{alarm.metric_name}"
      puts "Namespace:      #{alarm.namespace}"
      puts "Statistic:      #{alarm.statistic}"
      puts "Period:         #{alarm.period}"
      puts "Unit:           #{alarm.unit}"
      puts "Eval. periods:  #{alarm.evaluation_periods}"
      puts "Threshold:      #{alarm.threshold}"
      puts "Comp. operator: #{alarm.comparison_operator}"

      if alarm.key?(:ok_actions) && alarm.ok_actions.count.positive?
        puts 'OK actions:'
        alarm.ok_actions.each do |a|
          puts "  #{a}"
        end
      end

      if alarm.key?(:alarm_actions) && alarm.alarm_actions.count.positive?
        puts 'Alarm actions:'
        alarm.alarm_actions.each do |a|
```

```
          puts "  #{a}"
        end
      end

      if alarm.key?(:insufficient_data_actions) &&
         alarm.insufficient_data_actions.count.positive?
        puts 'Insufficient data actions:'
        alarm.insufficient_data_actions.each do |a|
          puts "  #{a}"
        end
      end

      puts 'Dimensions:'
      if alarm.key?(:dimensions) && alarm.dimensions.count.positive?
        alarm.dimensions.each do |d|
          puts "  Name: #{d.name}, Value: #{d.value}"
        end
      else
        puts '  None for this alarm.'
      end
    end
  else
    puts 'No alarms found.'
  end
rescue StandardError => e
  puts "Error getting information about alarms: #{e.message}"
end

# Example usage:
def run_me
  region = ''

  # Print usage information and then stop.
  if ARGV[0] == '--help' || ARGV[0] == '-h'
    puts 'Usage:   ruby cw-ruby-example-show-alarms.rb REGION'
    puts 'Example: ruby cw-ruby-example-show-alarms.rb us-east-1'
    exit 1
  # If no values are specified at the command prompt, use these default values.
  elsif ARGV.count.zero?
    region = 'us-east-1'
  # Otherwise, use the values as specified at the command prompt.
  else
    region = ARGV[0]
  end
```

```
  cloudwatch_client = Aws::CloudWatch::Client.new(region: region)
  puts 'Available alarms:'
  describe_metric_alarms(cloudwatch_client)
end

run_me if $PROGRAM_NAME == __FILE__
```

- For API details, see DescribeAlarmsForMetric in *AWS SDK for Ruby API Reference*.

`DisableAlarmActions`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
# Disables an alarm in Amazon CloudWatch.
#
# Prerequisites.
#
# - The alarm to disable.
#
# @param cloudwatch_client [Aws::CloudWatch::Client]
#   An initialized CloudWatch client.
# @param alarm_name [String] The name of the alarm to disable.
# @return [Boolean] true if the alarm was disabled; otherwise, false.
# @example
#   exit 1 unless alarm_actions_disabled?(
#     Aws::CloudWatch::Client.new(region: 'us-east-1'),
#     'ObjectsInBucket'
#   )
def alarm_actions_disabled?(cloudwatch_client, alarm_name)
  cloudwatch_client.disable_alarm_actions(alarm_names: [alarm_name])
  true
```

```
rescue StandardError => e
  puts "Error disabling alarm actions: #{e.message}"
  false
end

# Example usage:
def run_me
  alarm_name = 'ObjectsInBucket'
  alarm_description = 'Objects exist in this bucket for more than 1 day.'
  metric_name = 'NumberOfObjects'
  # Notify this Amazon Simple Notification Service (Amazon SNS) topic when
  # the alarm transitions to the ALARM state.
  alarm_actions = ['arn:aws:sns:us-
east-1:111111111111:Default_CloudWatch_Alarms_Topic']
  namespace = 'AWS/S3'
  statistic = 'Average'
  dimensions = [
    {
      name: "BucketName",
      value: "amzn-s3-demo-bucket"
    },
    {
      name: 'StorageType',
      value: 'AllStorageTypes'
    }
  ]
  period = 86_400 # Daily (24 hours * 60 minutes * 60 seconds = 86400 seconds).
  unit = 'Count'
  evaluation_periods = 1 # More than one day.
  threshold = 1 # One object.
  comparison_operator = 'GreaterThanThreshold' # More than one object.
  # Replace us-west-2 with the AWS Region you're using for Amazon CloudWatch.
  region = 'us-east-1'

  cloudwatch_client = Aws::CloudWatch::Client.new(region: region)

  if alarm_created_or_updated?(
    cloudwatch_client,
    alarm_name,
    alarm_description,
    metric_name,
    alarm_actions,
    namespace,
    statistic,
```

```
    dimensions,
    period,
    unit,
    evaluation_periods,
    threshold,
    comparison_operator
  )
    puts "Alarm '#{alarm_name}' created or updated."
  else
    puts "Could not create or update alarm '#{alarm_name}'."
  end

  if alarm_actions_disabled?(cloudwatch_client, alarm_name)
    puts "Alarm '#{alarm_name}' disabled."
  else
    puts "Could not disable alarm '#{alarm_name}'."
  end
end

run_me if $PROGRAM_NAME == __FILE__
```

- For API details, see DisableAlarmActions in *AWS SDK for Ruby API Reference*.

`GetAlarmMuteRule`

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

SDK for Ruby

> **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 full configuration of an alarm mute rule, including its schedule, the
 alarms
# it targets, and whether it is currently SCHEDULED, ACTIVE, or EXPIRED.
#
# @param cloudwatch_client [Aws::CloudWatch::Client] An initialized CloudWatch
 client.
```

```
# @param name [String] The name of the mute rule.
# @return [Aws::CloudWatch::Types::GetAlarmMuteRuleOutput, nil] The mute rule, or
 nil on
#   error.
def alarm_mute_rule(cloudwatch_client, name)
  cloudwatch_client.get_alarm_mute_rule(alarm_mute_rule_name: name)
rescue StandardError => e
  puts "Error getting alarm mute rule: #{e.message}"
  nil
end
```

- For API details, see GetAlarmMuteRule in *AWS SDK for Ruby API Reference*.

`GetOTelEnrichment`

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

SDK for Ruby

> **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 current OTel enrichment status for the account.
#
# @param cloudwatch_client [Aws::CloudWatch::Client] An initialized CloudWatch
 client.
# @return [String, nil] 'Running' or 'Stopped', or nil if the status could not be
 read.
def otel_enrichment_status(cloudwatch_client)
  cloudwatch_client.get_o_tel_enrichment.status
rescue StandardError => e
  puts "Error getting OTel enrichment status: #{e.message}"
  nil
end
```

- For API details, see GetOTelEnrichment in *AWS SDK for Ruby API Reference*.

`ListAlarmMuteRules`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
# Lists the alarm mute rules in the account, optionally filtered to the rules that
# target one alarm.
#
# @param cloudwatch_client [Aws::CloudWatch::Client] An initialized CloudWatch
 client.
# @param alarm_name [String, nil] When given, only rules that target this alarm are
#   returned.
# @return [Array] The mute rule summaries, as
#   Aws::CloudWatch::Types::AlarmMuteRuleSummary.
def alarm_mute_rules(cloudwatch_client, alarm_name = nil)
  summaries = []
  next_token = nil

  loop do
    response = cloudwatch_client.list_alarm_mute_rules(
      alarm_name: alarm_name,
      next_token: next_token
    )
    summaries.concat(response.alarm_mute_rule_summaries)
    next_token = response.next_token
    break if next_token.nil? || next_token.empty?
  end

  summaries
rescue StandardError => e
  puts "Error listing alarm mute rules: #{e.message}"
  []
end
```

- For API details, see ListAlarmMuteRules in *AWS SDK for Ruby API Reference*.

`ListMetrics`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
# Lists available metrics for a metric namespace in Amazon CloudWatch.
#
# @param cloudwatch_client [Aws::CloudWatch::Client]
#   An initialized CloudWatch client.
# @param metric_namespace [String] The namespace of the metric.
# @example
#   list_metrics_for_namespace(
#     Aws::CloudWatch::Client.new(region: 'us-east-1'),
#     'SITE/TRAFFIC'
#   )
def list_metrics_for_namespace(cloudwatch_client, metric_namespace)
  response = cloudwatch_client.list_metrics(namespace: metric_namespace)

  if response.metrics.count.positive?
    response.metrics.each do |metric|
      puts "  Metric name: #{metric.metric_name}"
      if metric.dimensions.count.positive?
        puts '    Dimensions:'
        metric.dimensions.each do |dimension|
          puts "      Name: #{dimension.name}, Value: #{dimension.value}"
        end
      else
        puts 'No dimensions found.'
      end
    end
  else
    puts "No metrics found for namespace '#{metric_namespace}'. " \
      'Note that it could take up to 15 minutes for recently-added metrics ' \
```

```
      'to become available.'
  end
end

# Example usage:
def run_me
  metric_namespace = 'SITE/TRAFFIC'
  # Replace us-west-2 with the AWS Region you're using for Amazon CloudWatch.
  region = 'us-east-1'

  cloudwatch_client = Aws::CloudWatch::Client.new(region: region)

  # Add three datapoints.
  puts 'Continuing...' unless datapoint_added_to_metric?(
    cloudwatch_client,
    metric_namespace,
    'UniqueVisitors',
    'SiteName',
    'example.com',
    5_885.0,
    'Count'
  )

  puts 'Continuing...' unless datapoint_added_to_metric?(
    cloudwatch_client,
    metric_namespace,
    'UniqueVisits',
    'SiteName',
    'example.com',
    8_628.0,
    'Count'
  )

  puts 'Continuing...' unless datapoint_added_to_metric?(
    cloudwatch_client,
    metric_namespace,
    'PageViews',
    'PageURL',
    'example.html',
    18_057.0,
    'Count'
  )

  puts "Metrics for namespace '#{metric_namespace}':"
```

```
  list_metrics_for_namespace(cloudwatch_client, metric_namespace)
end

run_me if $PROGRAM_NAME == __FILE__
```

- For API details, see ListMetrics in *AWS SDK for Ruby API Reference*.

`PutAlarmMuteRule`

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

SDK for Ruby

> **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 or updates an alarm mute rule. While a mute rule is active the targeted
 alarms
# keep evaluating and keep transitioning between states, but their configured
 actions do
# not fire. This is the supported way to suppress notifications during a known
# maintenance window, instead of disabling alarm actions and relying on someone to
 turn
# them back on.
#
# @param cloudwatch_client [Aws::CloudWatch::Client] An initialized CloudWatch
 client.
# @param name [String] The name of the mute rule.
# @param schedule [Hash] The mute window, mirroring the +rule.schedule+ shape:
#   * +:expression+ [String] When the rule activates. For a recurring window, use a
#     five-field cron expression,
#     'cron(Minutes Hours Day-of-month Month Day-of-week)', such as
#     'cron(0 2 * * SUN)' for every Sunday at 2:00 AM. Note that this is five
 fields,
#     not the six that Amazon EventBridge uses. For a one-time window, use
#     'at(yyyy-MM-ddThh:mm)', such as 'at(2026-09-05T02:00)'.
#   * +:duration+ [String] How long the mute window lasts once it activates, in ISO
 8601
```

```
#     duration format, from 'PT1M' (one minute) to 'P15D' (15 days). For example,
#     'PT2H' is two hours and 'P2DT12H' is two days and 12 hours.
#   * +:timezone+ [String] The time zone the expression is evaluated in, such as
#     'America/Los_Angeles'.
# @param alarm_names [Array] The names of up to 100 alarms to mute. If empty, the
 rule
#   applies to all alarms in the account.
# @param description [String] A description of the mute rule.
# @return [Boolean] true if the mute rule was created or updated; otherwise, false.
def alarm_mute_rule_created_or_updated?(
  cloudwatch_client,
  name,
  schedule,
  alarm_names,
  description
)
  params = {
    name: name,
    description: description,
    rule: {
      schedule: {
        expression: schedule[:expression],
        duration: schedule[:duration],
        timezone: schedule[:timezone]
      }
    }
  }
  params[:mute_targets] = { alarm_names: alarm_names } unless alarm_names.empty?

  cloudwatch_client.put_alarm_mute_rule(params)
  true
rescue StandardError => e
  puts "Error putting alarm mute rule: #{e.message}"
  false
end
```

- For API details, see PutAlarmMuteRule in *AWS SDK for Ruby API Reference*.

`PutMetricAlarm`

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

SDK for Ruby

> **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 an alarm that evaluates a PromQL query against OpenTelemetry metrics.

```
# Creates or updates an alarm that evaluates a PromQL query.
#
# A PromQL alarm differs from a classic metric alarm in a few ways. The query can
 match
# many series at once, and each matching series is tracked separately as a
 contributor.
# Instead of counting breaching periods, you specify durations: a contributor moves
 to
# ALARM after it breaches continuously for the pending period, and back to OK after
 it
# stops breaching for the recovery period. A PromQL alarm starts in the OK state
 rather
# than INSUFFICIENT_DATA.
#
# The +evaluation_criteria+ union is mutually exclusive with the classic
 +metric_name+
# and +metrics+ parameters. When you use it you must also set +evaluation_interval+,
 and
# you must not set +period+, +statistic+, +threshold+, +comparison_operator+,
# +evaluation_periods+, +datapoints_to_alarm+, or +treat_missing_data+.
#
# @param cloudwatch_client [Aws::CloudWatch::Client] An initialized CloudWatch
 client.
# @param alarm_name [String] The name of the alarm, unique within the Region.
# @param criteria [Hash] The PromQL criteria, mirroring the +prom_ql_criteria+
 shape:
#   * +:query+ [String] The PromQL query to evaluate, such as
#     'avg(cpu_utilization_percent) > 80'. The comparison belongs in the query
 itself;
#     there is no separate threshold parameter.
#   * +:pending_period+ [Integer] How long, in seconds, a contributor must breach
#     continuously before it moves to ALARM.
#   * +:recovery_period+ [Integer] How long, in seconds, a contributor must stop
```

```
#     breaching before it moves back to OK.
# @param evaluation_interval [Integer] How often, in seconds, to run the query.
 Valid
#   values are 10, 20, 30, and any multiple of 60, up to 3600.
# @param alarm_description [String] A description of the alarm.
# @return [Boolean] true if the alarm was created or updated; otherwise, false.
def promql_alarm_created_or_updated?(
  cloudwatch_client,
  alarm_name,
  criteria,
  evaluation_interval,
  alarm_description
)
  cloudwatch_client.put_metric_alarm(
    alarm_name: alarm_name,
    alarm_description: alarm_description,
    evaluation_criteria: {
      prom_ql_criteria: {
        query: criteria[:query],
        pending_period: criteria[:pending_period],
        recovery_period: criteria[:recovery_period]
      }
    },
    evaluation_interval: evaluation_interval
  )
  true
rescue StandardError => e
  puts "Error creating PromQL alarm: #{e.message}"
  false
end
```

Create an alarm that evaluates a single CloudWatch metric.

```
# Creates or updates an alarm in Amazon CloudWatch.
#
# @param cloudwatch_client [Aws::CloudWatch::Client]
#   An initialized CloudWatch client.
# @param alarm_name [String] The name of the alarm.
# @param alarm_description [String] A description about the alarm.
# @param metric_name [String] The name of the metric associated with the alarm.
# @param alarm_actions [Array] A list of Strings representing the
#   Amazon Resource Names (ARNs) to execute when the alarm transitions to the
```

```
#   ALARM state.
# @param namespace [String] The namespace for the metric to alarm on.
# @param statistic [String] The statistic for the metric.
# @param dimensions [Array] A list of dimensions for the metric, specified as
#   Aws::CloudWatch::Types::Dimension.
# @param period [Integer] The number of seconds before re-evaluating the metric.
# @param unit [String] The unit of measure for the statistic.
# @param evaluation_periods [Integer] The number of periods over which data is
#   compared to the specified threshold.
# @param theshold [Float] The value against which the specified statistic is
 compared.
# @param comparison_operator [String] The arithmetic operation to use when
#   comparing the specified statistic and threshold.
# @return [Boolean] true if the alarm was created or updated; otherwise, false.
# @example
#   exit 1 unless alarm_created_or_updated?(
#     Aws::CloudWatch::Client.new(region: 'us-east-1'),
#     'ObjectsInBucket',
#     'Objects exist in this bucket for more than 1 day.',
#     'NumberOfObjects',
#     ['arn:aws:sns:us-east-1:111111111111:Default_CloudWatch_Alarms_Topic'],
#     'AWS/S3',
#     'Average',
#     [
#       {
#         name: 'BucketName',
#         value: 'amzn-s3-demo-bucket'
#       },
#       {
#         name: 'StorageType',
#         value: 'AllStorageTypes'
#       }
#     ],
#     86_400,
#     'Count',
#     1,
#     1,
#     'GreaterThanThreshold'
#   )
def alarm_created_or_updated?(
  cloudwatch_client,
  alarm_name,
  alarm_description,
  metric_name,
```

```
  alarm_actions,
  namespace,
  statistic,
  dimensions,
  period,
  unit,
  evaluation_periods,
  threshold,
  comparison_operator
)
  cloudwatch_client.put_metric_alarm(
    alarm_name: alarm_name,
    alarm_description: alarm_description,
    metric_name: metric_name,
    alarm_actions: alarm_actions,
    namespace: namespace,
    statistic: statistic,
    dimensions: dimensions,
    period: period,
    unit: unit,
    evaluation_periods: evaluation_periods,
    threshold: threshold,
    comparison_operator: comparison_operator
  )
  true
rescue StandardError => e
  puts "Error creating alarm: #{e.message}"
  false
end
```

- For API details, see PutMetricAlarm in *AWS SDK for Ruby API Reference*.

`PutMetricData`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
require 'aws-sdk-cloudwatch'

# Adds a datapoint to a metric in Amazon CloudWatch.
#
# @param cloudwatch_client [Aws::CloudWatch::Client]
#   An initialized CloudWatch client.
# @param metric_namespace [String] The namespace of the metric to add the
#   datapoint to.
# @param metric_name [String] The name of the metric to add the datapoint to.
# @param dimension_name [String] The name of the dimension to add the
#   datapoint to.
# @param dimension_value [String] The value of the dimension to add the
#   datapoint to.
# @param metric_value [Float] The value of the datapoint.
# @param metric_unit [String] The unit of measurement for the datapoint.
# @return [Boolean]
# @example
#   exit 1 unless datapoint_added_to_metric?(
#     Aws::CloudWatch::Client.new(region: 'us-east-1'),
#     'SITE/TRAFFIC',
#     'UniqueVisitors',
#     'SiteName',
#     'example.com',
#     5_885.0,
#     'Count'
#   )
def datapoint_added_to_metric?(
  cloudwatch_client,
  metric_namespace,
  metric_name,
  dimension_name,
  dimension_value,
  metric_value,
  metric_unit
```

```
)
  cloudwatch_client.put_metric_data(
    namespace: metric_namespace,
    metric_data: [
      {
        metric_name: metric_name,
        dimensions: [
          {
            name: dimension_name,
            value: dimension_value
          }
        ],
        value: metric_value,
        unit: metric_unit
      }
    ]
  )
  puts "Added data about '#{metric_name}' to namespace " \
    "'#{metric_namespace}'."
  true
rescue StandardError => e
  puts "Error adding data about '#{metric_name}' to namespace " \
    "'#{metric_namespace}': #{e.message}"
  false
end
```

- For API details, see PutMetricData in *AWS SDK for Ruby API Reference*.

`StartOTelEnrichment`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
# Turns on OTel enrichment for the account. Once enrichment is running, CloudWatch
 vended
# metrics that carry a resource identifier dimension, such as the Amazon EC2
# CPUUtilization metric with its InstanceId dimension, are decorated with resource
 ARN
# and resource tag labels and become queryable with PromQL.
#
# Resource tags on telemetry must already be enabled for the account before you call
# this operation.
#
# Note that the Ruby SDK renders the OTel prefix as +o_tel+, so the method is
# +start_o_tel_enrichment+ rather than +start_otel_enrichment+.
#
# @param cloudwatch_client [Aws::CloudWatch::Client] An initialized CloudWatch
 client.
# @return [Boolean] true if enrichment was started; otherwise, false.
def otel_enrichment_started?(cloudwatch_client)
  cloudwatch_client.start_o_tel_enrichment
  true
rescue StandardError => e
  puts "Error starting OTel enrichment: #{e.message}"
  false
end
```

- For API details, see StartOTelEnrichment in *AWS SDK for Ruby API Reference*.

`StopOTelEnrichment`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
# Turns off OTel enrichment for the account. Existing PromQL alarms are not deleted,
 but
```

```
# vended metrics stop being enriched with resource ARN and tag labels, so queries
 that
# select on those labels stop matching.
#
# @param cloudwatch_client [Aws::CloudWatch::Client] An initialized CloudWatch
 client.
# @return [Boolean] true if enrichment was stopped; otherwise, false.
def otel_enrichment_stopped?(cloudwatch_client)
  cloudwatch_client.stop_o_tel_enrichment
  true
rescue StandardError => e
  puts "Error stopping OTel enrichment: #{e.message}"
  false
end
```

- For API details, see StopOTelEnrichment in *AWS SDK for Ruby API Reference*.

Scenarios

Send OpenTelemetry metrics and alarm on them with PromQL

The following code example shows how to:

- Send OTLP metrics to the CloudWatch metrics endpoint with an OpenTelemetry Collector.
- Start OpenTelemetry enrichment so CloudWatch correlates those metrics with your resources.
- Create an alarm that evaluates a PromQL query across every series the query returns.
- Inspect the individual series, called contributors, that put the alarm in ALARM state.
- Mute the alarm for a maintenance window, then clean up.

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

Define wrapper code that calls the CloudWatch OpenTelemetry operations.

```
# Turns on OTel enrichment for the account. Once enrichment is running, CloudWatch
 vended
# metrics that carry a resource identifier dimension, such as the Amazon EC2
# CPUUtilization metric with its InstanceId dimension, are decorated with resource
 ARN
# and resource tag labels and become queryable with PromQL.
#
# Resource tags on telemetry must already be enabled for the account before you call
# this operation.
#
# Note that the Ruby SDK renders the OTel prefix as +o_tel+, so the method is
# +start_o_tel_enrichment+ rather than +start_otel_enrichment+.
#
# @param cloudwatch_client [Aws::CloudWatch::Client] An initialized CloudWatch
 client.
# @return [Boolean] true if enrichment was started; otherwise, false.
def otel_enrichment_started?(cloudwatch_client)
  cloudwatch_client.start_o_tel_enrichment
  true
rescue StandardError => e
  puts "Error starting OTel enrichment: #{e.message}"
  false
end

# Gets the current OTel enrichment status for the account.
#
# @param cloudwatch_client [Aws::CloudWatch::Client] An initialized CloudWatch
 client.
# @return [String, nil] 'Running' or 'Stopped', or nil if the status could not be
 read.
def otel_enrichment_status(cloudwatch_client)
  cloudwatch_client.get_o_tel_enrichment.status
rescue StandardError => e
  puts "Error getting OTel enrichment status: #{e.message}"
  nil
end

# Creates or updates an alarm that evaluates a PromQL query.
#
# A PromQL alarm differs from a classic metric alarm in a few ways. The query can
 match
# many series at once, and each matching series is tracked separately as a
 contributor.
```

```
# Instead of counting breaching periods, you specify durations: a contributor moves
 to
# ALARM after it breaches continuously for the pending period, and back to OK after
 it
# stops breaching for the recovery period. A PromQL alarm starts in the OK state
 rather
# than INSUFFICIENT_DATA.
#
# The +evaluation_criteria+ union is mutually exclusive with the classic
 +metric_name+
# and +metrics+ parameters. When you use it you must also set +evaluation_interval+,
 and
# you must not set +period+, +statistic+, +threshold+, +comparison_operator+,
# +evaluation_periods+, +datapoints_to_alarm+, or +treat_missing_data+.
#
# @param cloudwatch_client [Aws::CloudWatch::Client] An initialized CloudWatch
 client.
# @param alarm_name [String] The name of the alarm, unique within the Region.
# @param criteria [Hash] The PromQL criteria, mirroring the +prom_ql_criteria+
 shape:
#   * +:query+ [String] The PromQL query to evaluate, such as
#     'avg(cpu_utilization_percent) > 80'. The comparison belongs in the query
 itself;
#     there is no separate threshold parameter.
#   * +:pending_period+ [Integer] How long, in seconds, a contributor must breach
#     continuously before it moves to ALARM.
#   * +:recovery_period+ [Integer] How long, in seconds, a contributor must stop
#     breaching before it moves back to OK.
# @param evaluation_interval [Integer] How often, in seconds, to run the query.
 Valid
#   values are 10, 20, 30, and any multiple of 60, up to 3600.
# @param alarm_description [String] A description of the alarm.
# @return [Boolean] true if the alarm was created or updated; otherwise, false.
def promql_alarm_created_or_updated?(
  cloudwatch_client,
  alarm_name,
  criteria,
  evaluation_interval,
  alarm_description
)
  cloudwatch_client.put_metric_alarm(
    alarm_name: alarm_name,
    alarm_description: alarm_description,
    evaluation_criteria: {
```

```
      prom_ql_criteria: {
        query: criteria[:query],
        pending_period: criteria[:pending_period],
        recovery_period: criteria[:recovery_period]
      }
    },
    evaluation_interval: evaluation_interval
  )
  true
rescue StandardError => e
  puts "Error creating PromQL alarm: #{e.message}"
  false
end

# Gets the contributors for a PromQL alarm. Each contributor is one series that the
# alarm's query matched, identified by its label set. This is how you find out which
# hosts, services, or pods are breaching, rather than only that something is.
#
# @param cloudwatch_client [Aws::CloudWatch::Client] An initialized CloudWatch
 client.
# @param alarm_name [String] The name of the PromQL alarm.
# @return [Array] The contributors, as Aws::CloudWatch::Types::AlarmContributor.
def alarm_contributors(cloudwatch_client, alarm_name)
  contributors = []
  next_token = nil

  loop do
    response = cloudwatch_client.describe_alarm_contributors(
      alarm_name: alarm_name,
      next_token: next_token
    )
    contributors.concat(response.alarm_contributors)
    next_token = response.next_token
    break if next_token.nil? || next_token.empty?
  end

  contributors
rescue StandardError => e
  puts "Error getting alarm contributors: #{e.message}"
  []
end

# Creates or updates an alarm mute rule. While a mute rule is active the targeted
 alarms
```

```
# keep evaluating and keep transitioning between states, but their configured
 actions do
# not fire. This is the supported way to suppress notifications during a known
# maintenance window, instead of disabling alarm actions and relying on someone to
 turn
# them back on.
#
# @param cloudwatch_client [Aws::CloudWatch::Client] An initialized CloudWatch
 client.
# @param name [String] The name of the mute rule.
# @param schedule [Hash] The mute window, mirroring the +rule.schedule+ shape:
#   * +:expression+ [String] When the rule activates. For a recurring window, use a
#     five-field cron expression,
#     'cron(Minutes Hours Day-of-month Month Day-of-week)', such as
#     'cron(0 2 * * SUN)' for every Sunday at 2:00 AM. Note that this is five
 fields,
#     not the six that Amazon EventBridge uses. For a one-time window, use
#     'at(yyyy-MM-ddThh:mm)', such as 'at(2026-09-05T02:00)'.
#   * +:duration+ [String] How long the mute window lasts once it activates, in ISO
 8601
#     duration format, from 'PT1M' (one minute) to 'P15D' (15 days). For example,
#     'PT2H' is two hours and 'P2DT12H' is two days and 12 hours.
#   * +:timezone+ [String] The time zone the expression is evaluated in, such as
#     'America/Los_Angeles'.
# @param alarm_names [Array] The names of up to 100 alarms to mute. If empty, the
 rule
#   applies to all alarms in the account.
# @param description [String] A description of the mute rule.
# @return [Boolean] true if the mute rule was created or updated; otherwise, false.
def alarm_mute_rule_created_or_updated?(
  cloudwatch_client,
  name,
  schedule,
  alarm_names,
  description
)
  params = {
    name: name,
    description: description,
    rule: {
      schedule: {
        expression: schedule[:expression],
        duration: schedule[:duration],
        timezone: schedule[:timezone]
```

```
      }
    }
  }
  params[:mute_targets] = { alarm_names: alarm_names } unless alarm_names.empty?

  cloudwatch_client.put_alarm_mute_rule(params)
  true
rescue StandardError => e
  puts "Error putting alarm mute rule: #{e.message}"
  false
end

# Gets the full configuration of an alarm mute rule, including its schedule, the
 alarms
# it targets, and whether it is currently SCHEDULED, ACTIVE, or EXPIRED.
#
# @param cloudwatch_client [Aws::CloudWatch::Client] An initialized CloudWatch
 client.
# @param name [String] The name of the mute rule.
# @return [Aws::CloudWatch::Types::GetAlarmMuteRuleOutput, nil] The mute rule, or
 nil on
#   error.
def alarm_mute_rule(cloudwatch_client, name)
  cloudwatch_client.get_alarm_mute_rule(alarm_mute_rule_name: name)
rescue StandardError => e
  puts "Error getting alarm mute rule: #{e.message}"
  nil
end

# Lists the alarm mute rules in the account, optionally filtered to the rules that
# target one alarm.
#
# @param cloudwatch_client [Aws::CloudWatch::Client] An initialized CloudWatch
 client.
# @param alarm_name [String, nil] When given, only rules that target this alarm are
#   returned.
# @return [Array] The mute rule summaries, as
#   Aws::CloudWatch::Types::AlarmMuteRuleSummary.
def alarm_mute_rules(cloudwatch_client, alarm_name = nil)
  summaries = []
  next_token = nil

  loop do
    response = cloudwatch_client.list_alarm_mute_rules(
```

```
      alarm_name: alarm_name,
      next_token: next_token
    )
    summaries.concat(response.alarm_mute_rule_summaries)
    next_token = response.next_token
    break if next_token.nil? || next_token.empty?
  end

  summaries
rescue StandardError => e
  puts "Error listing alarm mute rules: #{e.message}"
  []
end

# Deletes an alarm mute rule. The alarms it targeted resume firing their actions.
#
# @param cloudwatch_client [Aws::CloudWatch::Client] An initialized CloudWatch
 client.
# @param name [String] The name of the mute rule.
# @return [Boolean] true if the mute rule was deleted; otherwise, false.
def alarm_mute_rule_deleted?(cloudwatch_client, name)
  cloudwatch_client.delete_alarm_mute_rule(alarm_mute_rule_name: name)
  true
rescue StandardError => e
  puts "Error deleting alarm mute rule: #{e.message}"
  false
end

# Turns off OTel enrichment for the account. Existing PromQL alarms are not deleted,
 but
# vended metrics stop being enriched with resource ARN and tag labels, so queries
 that
# select on those labels stop matching.
#
# @param cloudwatch_client [Aws::CloudWatch::Client] An initialized CloudWatch
 client.
# @return [Boolean] true if enrichment was stopped; otherwise, false.
def otel_enrichment_stopped?(cloudwatch_client)
  cloudwatch_client.stop_o_tel_enrichment
  true
rescue StandardError => e
  puts "Error stopping OTel enrichment: #{e.message}"
  false
end
```

Alarm on OpenTelemetry metrics with a PromQL query, inspect the contributors to the alarm, and mute it.

```
# Turns on OpenTelemetry enrichment if the account doesn't already have it on.
 Enrichment
# is an account-wide setting, so an example should only turn it off again if it was
 the
# one that turned it on.
#
# @param cloudwatch_client [Aws::CloudWatch::Client] An initialized CloudWatch
 client.
# @return [Boolean] true if this call started enrichment; otherwise, false.
def enrichment_started_by_example?(cloudwatch_client)
  puts 'Checking whether OTel enrichment is on for this account.'
  status = otel_enrichment_status(cloudwatch_client)
  if status == 'Stopped'
    puts 'Enrichment is stopped. Starting it so vended metrics accept PromQL.'
    return otel_enrichment_started?(cloudwatch_client)
  end

  puts "Enrichment status is '#{status}'. Leaving it alone."
  false
end

# Prints the contributors to a PromQL alarm, one line per matched series.
#
# @param cloudwatch_client [Aws::CloudWatch::Client] An initialized CloudWatch
 client.
# @param alarm_name [String] The name of the PromQL alarm.
def report_alarm_contributors(cloudwatch_client, alarm_name)
  puts "\nContributors for '#{alarm_name}':"
  contributors = alarm_contributors(cloudwatch_client, alarm_name)
  if contributors.empty?
    puts '  None yet. The query matched no series, which usually means no OTel
 metrics ' \
         'with these labels have arrived.'
    return
  end

  contributors.each do |contributor|
```

```
    labels = contributor.contributor_attributes.sort.map { |k, v|
 "#{k}=#{v}" }.join(', ')
    puts "  #{contributor.contributor_id}: #{labels}"
    puts "    reason: #{contributor.state_reason}"
  end
end

# Mutes an alarm for a recurring weekly maintenance window.
#
# @param cloudwatch_client [Aws::CloudWatch::Client] An initialized CloudWatch
 client.
# @param mute_rule_name [String] The name of the mute rule to create.
# @param alarm_name [String] The name of the alarm to mute.
def mute_alarm_for_maintenance(cloudwatch_client, mute_rule_name, alarm_name)
  puts "\nMuting '#{alarm_name}' for a weekly two-hour maintenance window."
  schedule = {
    expression: 'cron(0 2 * * SUN)',
    duration: 'PT2H',
    timezone: 'America/Los_Angeles'
  }
  return unless alarm_mute_rule_created_or_updated?(
    cloudwatch_client,
    mute_rule_name,
    schedule,
    [alarm_name],
    'Suppress checkout CPU pages during Sunday patching.'
  )

  rule = alarm_mute_rule(cloudwatch_client, mute_rule_name)
  puts "Mute rule status is #{rule.status}." unless rule.nil?
  puts 'While the window is active the alarm keeps evaluating and still changes ' \
       'state; only its actions are suppressed.'
end

# Removes the mute rule and the alarm, and stops enrichment if this example started
 it.
#
# @param cloudwatch_client [Aws::CloudWatch::Client] An initialized CloudWatch
 client.
# @param alarm_name [String] The name of the alarm to delete.
# @param mute_rule_name [String] The name of the mute rule to delete.
# @param started_here [Boolean] Whether this example started OTel enrichment.
def clean_up(cloudwatch_client, alarm_name, mute_rule_name, started_here)
  puts "\nCleaning up."
```

```
  alarm_mute_rule_deleted?(cloudwatch_client, mute_rule_name)
  cloudwatch_client.delete_alarms(alarm_names: [alarm_name])
  return unless started_here

  puts 'Stopping OTel enrichment, since this example started it.'
  otel_enrichment_stopped?(cloudwatch_client)
end

# Walks through the OpenTelemetry metrics workflow in CloudWatch: turn on
 enrichment,
# alarm on a PromQL query, inspect the contributors that matched, mute the alarm for
 a
# maintenance window, then clean up.
#
# This scenario assumes OpenTelemetry metrics are already flowing into the account,
# either from an OpenTelemetry collector, the CloudWatch agent, or the ADOT SDK.
def run_me
  alarm_name = 'doc-example-promql-high-cpu'
  mute_rule_name = 'doc-example-maintenance-window'
  query = 'avg by (host_name) (cpu_utilization_percent{service_name="checkout"}) >
 80'
  # Replace us-east-1 with the AWS Region you're using for Amazon CloudWatch.
  region = 'us-east-1'

  cloudwatch_client = Aws::CloudWatch::Client.new(region: region)
  started_here = enrichment_started_by_example?(cloudwatch_client)

  puts "\nCreating a PromQL alarm on: #{query}"
  criteria = { query: query, pending_period: 300, recovery_period: 120 }
  unless promql_alarm_created_or_updated?(
    cloudwatch_client,
    alarm_name,
    criteria,
    30,
    'Average CPU over 80% per host for the checkout service.'
  )
    puts "Could not create alarm '#{alarm_name}'. Stopping."
    return
  end
  puts 'The alarm evaluates every 30 seconds. A host moves to ALARM after breaching
 ' \
       'for 300 seconds straight, and back to OK after 120 seconds clean.'

  report_alarm_contributors(cloudwatch_client, alarm_name)
```

```
  mute_alarm_for_maintenance(cloudwatch_client, mute_rule_name, alarm_name)

  puts "\nMute rules targeting '#{alarm_name}':"
  alarm_mute_rules(cloudwatch_client, alarm_name).each do |summary|
    puts "  #{summary.alarm_mute_rule_arn} (#{summary.status})"
  end

  clean_up(cloudwatch_client, alarm_name, mute_rule_name, started_here)
end
```

- For API details, see the following topics in *AWS SDK for Ruby API Reference*.
  - DeleteAlarmMuteRule
  - DeleteAlarms
  - DescribeAlarmContributors
  - GetAlarmMuteRule
  - GetOTelEnrichment
  - ListAlarmMuteRules
  - PutAlarmMuteRule
  - PutMetricAlarm
  - StartOTelEnrichment
  - StopOTelEnrichment

Amazon Cognito Identity Provider examples using SDK for Ruby

The following code examples show you how to perform actions and implement common scenarios by using the AWS SDK for Ruby with Amazon Cognito Identity Provider.

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

- Get started

Get started

Hello Amazon Cognito

The following code example shows how to get started using Amazon Cognito.

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
require 'aws-sdk-cognitoidentityprovider'
require 'logger'

# CognitoManager is a class responsible for managing AWS Cognito operations
# such as listing all user pools in the current AWS account.
class CognitoManager
  def initialize(client)
    @client = client
    @logger = Logger.new($stdout)
  end

  # Lists and prints all user pools associated with the AWS account.
  def list_user_pools
    paginator = @client.list_user_pools(max_results: 10)
    user_pools = []
    paginator.each_page do |page|
      user_pools.concat(page.user_pools)
    end

    if user_pools.empty?
      @logger.info('No Cognito user pools found.')
    else
      user_pools.each do |user_pool|
        @logger.info("User pool ID: #{user_pool.id}")
        @logger.info("User pool name: #{user_pool.name}")
        @logger.info("User pool status: #{user_pool.status}")
        @logger.info('---')
```

```
      end
    end
  end
end

if $PROGRAM_NAME == __FILE__
  cognito_client = Aws::CognitoIdentityProvider::Client.new
  manager = CognitoManager.new(cognito_client)
  manager.list_user_pools
end
```

- For API details, see ListUserPools in *AWS SDK for Ruby API Reference*.

Amazon Comprehend examples using SDK for Ruby

The following code examples show you how to perform actions and implement common scenarios by using the AWS SDK for Ruby 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 an application to analyze customer feedback

The following code example shows how to create an application that analyzes customer comment cards, translates them from their original language, determines their sentiment, and generates an audio file from the translated text.

SDK for Ruby

This example application analyzes and stores customer feedback cards. Specifically, it fulfills the need of a fictitious hotel in New York City. The hotel receives feedback from guests in various languages in the form of physical comment cards. That feedback is uploaded into the app through a web client. After an image of a comment card is uploaded, the following steps occur:

- Text is extracted from the image using Amazon Textract.
- Amazon Comprehend determines the sentiment of the extracted text and its language.
- The extracted text is translated to English using Amazon Translate.
- Amazon Polly synthesizes an audio file from the extracted text.

The full app can be deployed with the AWS CDK. For source code and deployment instructions, see the project in GitHub.

Services used in this example

- Amazon Comprehend
- Lambda
- Amazon Polly
- Amazon Textract
- Amazon Translate

Amazon DocumentDB examples using SDK for Ruby

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

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

- Serverless examples

Serverless examples

Invoke a Lambda function from a Amazon DocumentDB trigger

The following code example shows how to implement a Lambda function that receives an event triggered by receiving records from a DocumentDB change stream. The function retrieves the DocumentDB payload and logs the record contents.

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the Serverless examples repository.

Consuming a Amazon DocumentDB event with Lambda using Ruby.

```
require 'json'

def lambda_handler(event:, context:)
  event['events'].each do |record|
    log_document_db_event(record)
  end
  'OK'
end

def log_document_db_event(record)
  event_data = record['event'] || {}
  operation_type = event_data['operationType'] || 'Unknown'
  db = event_data.dig('ns', 'db') || 'Unknown'
  collection = event_data.dig('ns', 'coll') || 'Unknown'
  full_document = event_data['fullDocument'] || {}

  puts "Operation type: #{operation_type}"
  puts "db: #{db}"
  puts "collection: #{collection}"
  puts "Full document: #{JSON.pretty_generate(full_document)}"
end
```

DynamoDB examples using SDK for Ruby

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

- Get started
- Basics
- Actions
- Scenarios
- Serverless examples

Get started

Hello DynamoDB

The following code example shows how to get started using DynamoDB.

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
require 'aws-sdk-dynamodb'
require 'logger'

# DynamoDBManager is a class responsible for managing DynamoDB operations
# such as listing all tables in the current AWS account.
class DynamoDBManager
  def initialize(client)
    @client = client
    @logger = Logger.new($stdout)
  end

  # Lists and prints all DynamoDB tables in the current AWS account.
  def list_tables
    @logger.info('Here are the DynamoDB tables in your account:')

    paginator = @client.list_tables(limit: 10)
    table_names = []

    paginator.each_page do |page|
      page.table_names.each do |table_name|
        @logger.info("- #{table_name}")
        table_names << table_name
      end
    end

    if table_names.empty?
      @logger.info("You don't have any DynamoDB tables in your account.")
    else
      @logger.info("\nFound #{table_names.length} tables.")
    end
  end
end

if $PROGRAM_NAME == __FILE__
  dynamodb_client = Aws::DynamoDB::Client.new
  manager = DynamoDBManager.new(dynamodb_client)
  manager.list_tables
end
```

- For API details, see ListTables in *AWS SDK for Ruby API Reference*.

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 Ruby

> **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 class that encapsulates a DynamoDB table.

```
# Creates an Amazon DynamoDB table that can be used to store movie data.
# The table uses the release year of the movie as the partition key and the
# title as the sort key.
#
# @param table_name [String] The name of the table to create.
# @return [Aws::DynamoDB::Table] The newly created table.
def create_table(table_name)
  @table = @dynamo_resource.create_table(
    table_name: table_name,
    key_schema: [
      { attribute_name: 'year', key_type: 'HASH' }, # Partition key
      { attribute_name: 'title', key_type: 'RANGE' } # Sort key
    ],
    attribute_definitions: [
      { attribute_name: 'year', attribute_type: 'N' },
      { attribute_name: 'title', attribute_type: 'S' }
```

```
      ],
      billing_mode: 'PAY_PER_REQUEST'
    )
    @dynamo_resource.client.wait_until(:table_exists, table_name: table_name)
    @table
  rescue Aws::DynamoDB::Errors::ServiceError => e
    @logger.error("Failed create table #{table_name}:\n#{e.code}: #{e.message}")
    raise
  end
```

Create a helper function to download and extract the sample JSON file.

```
  # Gets sample movie data, either from a local file or by first downloading it from
  # the Amazon DynamoDB Developer Guide.
  #
  # @param movie_file_name [String] The local file name where the movie data is
 stored in JSON format.
  # @return [Hash] The movie data as a Hash.
  def fetch_movie_data(movie_file_name)
    if !File.file?(movie_file_name)
      @logger.debug("Downloading #{movie_file_name}...")
      movie_content = URI.open(
        'https://docs.aws.amazon.com/amazondynamodb/latest/developerguide/samples/
moviedata.zip'
      )
      movie_json = ''
      Zip::File.open_buffer(movie_content) do |zip|
        zip.each do |entry|
          movie_json = entry.get_input_stream.read
        end
      end
    else
      movie_json = File.read(movie_file_name)
    end
    movie_data = JSON.parse(movie_json)
    # The sample file lists over 4000 movies. This returns only the first 250.
    movie_data.slice(0, 250)
  rescue StandardError => e
    puts("Failure downloading movie data:\n#{e}")
    raise
  end
```

Run an interactive scenario to create the table and perform actions on it.

```
 table_name = "doc-example-table-movies-#{rand(10**4)}"
 scaffold = Scaffold.new(table_name)
 dynamodb_wrapper = DynamoDBBasics.new(table_name)

 new_step(1, 'Create a new DynamoDB table if none already exists.')
 unless scaffold.exists?(table_name)
   puts("\nNo such table: #{table_name}. Creating it...")
   scaffold.create_table(table_name)
   print "Done!\n".green
 end

 new_step(2, 'Add a new record to the DynamoDB table.')
 my_movie = {}
 my_movie[:title] = CLI::UI::Prompt.ask('Enter the title of a movie to add to the
table. E.g. The Matrix')
 my_movie[:year] = CLI::UI::Prompt.ask('What year was it released? E.g. 1989').to_i
 my_movie[:rating] = CLI::UI::Prompt.ask('On a scale of 1 - 10, how do you rate it?
E.g. 7').to_i
 my_movie[:plot] = CLI::UI::Prompt.ask('Enter a brief summary of the plot. E.g. A
man awakens to a new reality.')
 dynamodb_wrapper.add_item(my_movie)
 puts("\nNew record added:")
 puts JSON.pretty_generate(my_movie).green
 print "Done!\n".green

 new_step(3, 'Update a record in the DynamoDB table.')
 my_movie[:rating] = CLI::UI::Prompt.ask("Let's update the movie you added with a
new rating, e.g. 3:").to_i
 response = dynamodb_wrapper.update_item(my_movie)
 puts("Updated '#{my_movie[:title]}' with new attributes:")
 puts JSON.pretty_generate(response).green
 print "Done!\n".green

 new_step(4, 'Get a record from the DynamoDB table.')
 puts("Searching for #{my_movie[:title]} (#{my_movie[:year]})...")
 response = dynamodb_wrapper.get_item(my_movie[:title], my_movie[:year])
 puts JSON.pretty_generate(response).green
 print "Done!\n".green

 new_step(5, 'Write a batch of items into the DynamoDB table.')
 download_file = 'moviedata.json'
 puts("Downloading movie database to #{download_file}...")
```

```
 movie_data = scaffold.fetch_movie_data(download_file)
 puts("Writing movie data from #{download_file} into your table...")
 scaffold.write_batch(movie_data)
 puts("Records added: #{movie_data.length}.")
 print "Done!\n".green

 new_step(5, 'Query for a batch of items by key.')
 loop do
   release_year = CLI::UI::Prompt.ask('Enter a year between 1972 and 2018, e.g.
1999:').to_i
   results = dynamodb_wrapper.query_items(release_year)
   if results.any?
     puts("There were #{results.length} movies released in #{release_year}:")
     results.each do |movie|
       print "\t #{movie['title']}".green
     end
     break
   else
     continue = CLI::UI::Prompt.ask("Found no movies released in #{release_year}!
Try another year? (y/n)")
     break unless continue.eql?('y')
   end
 end
 print "\nDone!\n".green

 new_step(6, 'Scan for a batch of items using a filter expression.')
 years = {}
 years[:start] = CLI::UI::Prompt.ask('Enter a starting year between 1972 and
2018:')
 years[:end] = CLI::UI::Prompt.ask('Enter an ending year between 1972 and 2018:')
 releases = dynamodb_wrapper.scan_items(years)
 if !releases.empty?
   puts("Found #{releases.length} movies.")
   count = Question.ask(
     'How many do you want to see? ', method(:is_int), in_range(1, releases.length)
   )
   puts("Here are your #{count} movies:")
   releases.take(count).each do |release|
     puts("\t#{release['title']}")
   end
 else
   puts("I don't know about any movies released between #{years[:start]} "\
        "and #{years[:end]}.")
 end
```

```
  print "\nDone!\n".green

  new_step(7, 'Delete an item from the DynamoDB table.')
  answer = CLI::UI::Prompt.ask("Do you want to remove '#{my_movie[:title]}'? (y/n)
")
  if answer.eql?('y')
    dynamodb_wrapper.delete_item(my_movie[:title], my_movie[:year])
    puts("Removed '#{my_movie[:title]}' from the table.")
    print "\nDone!\n".green
  end

  new_step(8, 'Delete the DynamoDB table.')
  answer = CLI::UI::Prompt.ask('Delete the table? (y/n)')
  if answer.eql?('y')
    scaffold.delete_table
    puts("Deleted #{table_name}.")
  else
    puts("Don't forget to delete the table when you're done!")
  end
  print "\nThanks for watching!\n".green
rescue Aws::Errors::ServiceError
  puts('Something went wrong with the demo.')
rescue Errno::ENOENT
  true
end
```

- For API details, see the following topics in *AWS SDK for Ruby API Reference*.
  - BatchWriteItem
  - CreateTable
  - DeleteItem
  - DeleteTable
  - DescribeTable
  - GetItem
  - PutItem
  - Query
  - Scan
  - UpdateItem

Actions

`BatchExecuteStatement`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

Read a batch of items using PartiQL.

```
class DynamoDBPartiQLBatch
  attr_reader :dynamo_resource, :table

  def initialize(table_name)
    client = Aws::DynamoDB::Client.new(region: 'us-east-1')
    @dynamodb = Aws::DynamoDB::Resource.new(client: client)
    @table = @dynamodb.table(table_name)
  end

  # Selects a batch of items from a table using PartiQL
  #
  # @param batch_titles [Array] Collection of movie titles
  # @return [Aws::DynamoDB::Types::BatchExecuteStatementOutput]
  def batch_execute_select(batch_titles)
    request_items = batch_titles.map do |title, year|
      {
        statement: "SELECT * FROM \"#{@table.name}\" WHERE title=? and year=?",
        parameters: [title, year]
      }
    end
    @dynamodb.client.batch_execute_statement({ statements: request_items })
  end
```

Delete a batch of items using PartiQL.

```
class DynamoDBPartiQLBatch
  attr_reader :dynamo_resource, :table

  def initialize(table_name)
    client = Aws::DynamoDB::Client.new(region: 'us-east-1')
    @dynamodb = Aws::DynamoDB::Resource.new(client: client)
    @table = @dynamodb.table(table_name)
  end

  # Deletes a batch of items from a table using PartiQL
  #
  # @param batch_titles [Array] Collection of movie titles
  # @return [Aws::DynamoDB::Types::BatchExecuteStatementOutput]
  def batch_execute_write(batch_titles)
    request_items = batch_titles.map do |title, year|
      {
        statement: "DELETE FROM \"#{@table.name}\" WHERE title=? and year=?",
        parameters: [title, year]
      }
    end
    @dynamodb.client.batch_execute_statement({ statements: request_items })
  end
```

- For API details, see BatchExecuteStatement in *AWS SDK for Ruby API Reference*.

`BatchWriteItem`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
class DynamoDBBasics
  attr_reader :dynamo_resource, :table
```

```
 def initialize(table_name)
   client = Aws::DynamoDB::Client.new(region: 'us-east-1')
   @dynamo_resource = Aws::DynamoDB::Resource.new(client: client)
   @table = @dynamo_resource.table(table_name)
 end

 # Fills an Amazon DynamoDB table with the specified data. Items are sent in
 # batches of 25 until all items are written.
 #
 # @param movies [Enumerable] The data to put in the table. Each item must contain
at least
 #                            the keys required by the schema that was specified
when the
 #                            table was created.
 def write_batch(movies)
   index = 0
   slice_size = 25
   while index < movies.length
     movie_items = []
     movies[index, slice_size].each do |movie|
       movie_items.append({ put_request: { item: movie } })
     end
     @dynamo_resource.client.batch_write_item({ request_items: { @table.name =>
movie_items } })
     index += slice_size
   end
 rescue Aws::DynamoDB::Errors::ServiceError => e
   puts(
     "Couldn't load data into table #{@table.name}. Here's why:"
   )
   puts("\t#{e.code}: #{e.message}")
   raise
 end
```

- For API details, see BatchWriteItem in *AWS SDK for Ruby API Reference*.

`CreateTable`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
# Encapsulates an Amazon DynamoDB table of movie data.
class Scaffold
  attr_reader :dynamo_resource, :table_name, :table

  def initialize(table_name)
    client = Aws::DynamoDB::Client.new(region: 'us-east-1')
    @dynamo_resource = Aws::DynamoDB::Resource.new(client: client)
    @table_name = table_name
    @table = nil
    @logger = Logger.new($stdout)
    @logger.level = Logger::DEBUG
  end

  # Creates an Amazon DynamoDB table that can be used to store movie data.
  # The table uses the release year of the movie as the partition key and the
  # title as the sort key.
  #
  # @param table_name [String] The name of the table to create.
  # @return [Aws::DynamoDB::Table] The newly created table.
  def create_table(table_name)
    @table = @dynamo_resource.create_table(
      table_name: table_name,
      key_schema: [
        { attribute_name: 'year', key_type: 'HASH' }, # Partition key
        { attribute_name: 'title', key_type: 'RANGE' } # Sort key
      ],
      attribute_definitions: [
        { attribute_name: 'year', attribute_type: 'N' },
        { attribute_name: 'title', attribute_type: 'S' }
      ],
      billing_mode: 'PAY_PER_REQUEST'
    )
    @dynamo_resource.client.wait_until(:table_exists, table_name: table_name)
    @table
```

```
  rescue Aws::DynamoDB::Errors::ServiceError => e
    @logger.error("Failed create table #{table_name}:\n#{e.code}: #{e.message}")
    raise
  end
```

- For API details, see CreateTable in *AWS SDK for Ruby API Reference*.

`DeleteItem`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
class DynamoDBBasics
  attr_reader :dynamo_resource, :table

  def initialize(table_name)
    client = Aws::DynamoDB::Client.new(region: 'us-east-1')
    @dynamo_resource = Aws::DynamoDB::Resource.new(client: client)
    @table = @dynamo_resource.table(table_name)
  end

  # Deletes a movie from the table.
  #
  # @param title [String] The title of the movie to delete.
  # @param year [Integer] The release year of the movie to delete.
  def delete_item(title, year)
    @table.delete_item(key: { 'year' => year, 'title' => title })
  rescue Aws::DynamoDB::Errors::ServiceError => e
    puts("Couldn't delete movie #{title}. Here's why:")
    puts("\t#{e.code}: #{e.message}")
    raise
  end
```

- For API details, see DeleteItem in *AWS SDK for Ruby API Reference*.

`DeleteTable`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
# Encapsulates an Amazon DynamoDB table of movie data.
class Scaffold
  attr_reader :dynamo_resource, :table_name, :table

  def initialize(table_name)
    client = Aws::DynamoDB::Client.new(region: 'us-east-1')
    @dynamo_resource = Aws::DynamoDB::Resource.new(client: client)
    @table_name = table_name
    @table = nil
    @logger = Logger.new($stdout)
    @logger.level = Logger::DEBUG
  end

  # Deletes the table.
  def delete_table
    @table.delete
    @table = nil
  rescue Aws::DynamoDB::Errors::ServiceError => e
    puts("Couldn't delete table. Here's why:")
    puts("\t#{e.code}: #{e.message}")
    raise
  end
```

- For API details, see DeleteTable in *AWS SDK for Ruby API Reference*.

`DescribeTable`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
# Encapsulates an Amazon DynamoDB table of movie data.
class Scaffold
  attr_reader :dynamo_resource, :table_name, :table

  def initialize(table_name)
    client = Aws::DynamoDB::Client.new(region: 'us-east-1')
    @dynamo_resource = Aws::DynamoDB::Resource.new(client: client)
    @table_name = table_name
    @table = nil
    @logger = Logger.new($stdout)
    @logger.level = Logger::DEBUG
  end

  # Determines whether a table exists. As a side effect, stores the table in
  # a member variable.
  #
  # @param table_name [String] The name of the table to check.
  # @return [Boolean] True when the table exists; otherwise, False.
  def exists?(table_name)
    @dynamo_resource.client.describe_table(table_name: table_name)
    @logger.debug("Table #{table_name} exists")
  rescue Aws::DynamoDB::Errors::ResourceNotFoundException
    @logger.debug("Table #{table_name} doesn't exist")
    false
  rescue Aws::DynamoDB::Errors::ServiceError => e
    puts("Couldn't check for existence of #{table_name}:\n")
    puts("\t#{e.code}: #{e.message}")
    raise
  end
```

- For API details, see DescribeTable in *AWS SDK for Ruby API Reference*.

`ExecuteStatement`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

Select a single item using PartiQL.

```
class DynamoDBPartiQLSingle
  attr_reader :dynamo_resource, :table

  def initialize(table_name)
    client = Aws::DynamoDB::Client.new(region: 'us-east-1')
    @dynamodb = Aws::DynamoDB::Resource.new(client: client)
    @table = @dynamodb.table(table_name)
  end

  # Gets a single record from a table using PartiQL.
  # Note: To perform more fine-grained selects,
  # use the Client.query instance method instead.
  #
  # @param title [String] The title of the movie to search.
  # @return [Aws::DynamoDB::Types::ExecuteStatementOutput]
  def select_item_by_title(title)
    request = {
      statement: "SELECT * FROM \"#{@table.name}\" WHERE title=?",
      parameters: [title]
    }
    @dynamodb.client.execute_statement(request)
  end
```

Update a single item using PartiQL.

```
class DynamoDBPartiQLSingle
  attr_reader :dynamo_resource, :table

  def initialize(table_name)
    client = Aws::DynamoDB::Client.new(region: 'us-east-1')
    @dynamodb = Aws::DynamoDB::Resource.new(client: client)
    @table = @dynamodb.table(table_name)
  end

  # Updates a single record from a table using PartiQL.
  #
  # @param title [String] The title of the movie to update.
  # @param year [Integer] The year the movie was released.
  # @param rating [Float] The new rating to assign the title.
  # @return [Aws::DynamoDB::Types::ExecuteStatementOutput]
  def update_rating_by_title(title, year, rating)
    request = {
      statement: "UPDATE \"#{@table.name}\" SET info.rating=? WHERE title=? and
 year=?",
      parameters: [{ "N": rating }, title, year]
    }
    @dynamodb.client.execute_statement(request)
  end
```

Add a single item using PartiQL.

```
class DynamoDBPartiQLSingle
  attr_reader :dynamo_resource, :table

  def initialize(table_name)
    client = Aws::DynamoDB::Client.new(region: 'us-east-1')
    @dynamodb = Aws::DynamoDB::Resource.new(client: client)
    @table = @dynamodb.table(table_name)
  end

  # Adds a single record to a table using PartiQL.
  #
  # @param title [String] The title of the movie to update.
  # @param year [Integer] The year the movie was released.
  # @param plot [String] The plot of the movie.
  # @param rating [Float] The new rating to assign the title.
  # @return [Aws::DynamoDB::Types::ExecuteStatementOutput]
```

```
  def insert_item(title, year, plot, rating)
    request = {
      statement: "INSERT INTO \"#{@table.name}\" VALUE {'title': ?, 'year': ?,
 'info': ?}",
      parameters: [title, year, { 'plot': plot, 'rating': rating }]
    }
    @dynamodb.client.execute_statement(request)
  end
```

Delete a single item using PartiQL.

```
class DynamoDBPartiQLSingle
  attr_reader :dynamo_resource, :table

  def initialize(table_name)
    client = Aws::DynamoDB::Client.new(region: 'us-east-1')
    @dynamodb = Aws::DynamoDB::Resource.new(client: client)
    @table = @dynamodb.table(table_name)
  end

  # Deletes a single record from a table using PartiQL.
  #
  # @param title [String] The title of the movie to update.
  # @param year [Integer] The year the movie was released.
  # @return [Aws::DynamoDB::Types::ExecuteStatementOutput]
  def delete_item_by_title(title, year)
    request = {
      statement: "DELETE FROM \"#{@table.name}\" WHERE title=? and year=?",
      parameters: [title, year]
    }
    @dynamodb.client.execute_statement(request)
  end
```

- For API details, see ExecuteStatement in *AWS SDK for Ruby API Reference*.

`GetItem`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
class DynamoDBBasics
  attr_reader :dynamo_resource, :table

  def initialize(table_name)
    client = Aws::DynamoDB::Client.new(region: 'us-east-1')
    @dynamo_resource = Aws::DynamoDB::Resource.new(client: client)
    @table = @dynamo_resource.table(table_name)
  end

  # Gets movie data from the table for a specific movie.
  #
  # @param title [String] The title of the movie.
  # @param year [Integer] The release year of the movie.
  # @return [Hash] The data about the requested movie.
  def get_item(title, year)
    @table.get_item(key: { 'year' => year, 'title' => title })
  rescue Aws::DynamoDB::Errors::ServiceError => e
    puts("Couldn't get movie #{title} (#{year}) from table #{@table.name}:\n")
    puts("\t#{e.code}: #{e.message}")
    raise
  end
```

- For API details, see GetItem in *AWS SDK for Ruby API Reference*.

`ListTables`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

Determine whether a table exists.

```
# Encapsulates an Amazon DynamoDB table of movie data.
class Scaffold
  attr_reader :dynamo_resource, :table_name, :table

  def initialize(table_name)
    client = Aws::DynamoDB::Client.new(region: 'us-east-1')
    @dynamo_resource = Aws::DynamoDB::Resource.new(client: client)
    @table_name = table_name
    @table = nil
    @logger = Logger.new($stdout)
    @logger.level = Logger::DEBUG
  end

  # Determines whether a table exists. As a side effect, stores the table in
  # a member variable.
  #
  # @param table_name [String] The name of the table to check.
  # @return [Boolean] True when the table exists; otherwise, False.
  def exists?(table_name)
    @dynamo_resource.client.describe_table(table_name: table_name)
    @logger.debug("Table #{table_name} exists")
  rescue Aws::DynamoDB::Errors::ResourceNotFoundException
    @logger.debug("Table #{table_name} doesn't exist")
    false
  rescue Aws::DynamoDB::Errors::ServiceError => e
    puts("Couldn't check for existence of #{table_name}:\n")
    puts("\t#{e.code}: #{e.message}")
    raise
  end
```

- For API details, see ListTables in *AWS SDK for Ruby API Reference*.

`PutItem`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
class DynamoDBBasics
  attr_reader :dynamo_resource, :table

  def initialize(table_name)
    client = Aws::DynamoDB::Client.new(region: 'us-east-1')
    @dynamo_resource = Aws::DynamoDB::Resource.new(client: client)
    @table = @dynamo_resource.table(table_name)
  end

  # Adds a movie to the table.
  #
  # @param movie [Hash] The title, year, plot, and rating of the movie.
  def add_item(movie)
    @table.put_item(
      item: {
        'year' => movie[:year],
        'title' => movie[:title],
        'info' => { 'plot' => movie[:plot], 'rating' => movie[:rating] }
      }
    )
  rescue Aws::DynamoDB::Errors::ServiceError => e
    puts("Couldn't add movie #{title} to table #{@table.name}. Here's why:")
    puts("\t#{e.code}: #{e.message}")
    raise
  end
```

- For API details, see PutItem in *AWS SDK for Ruby API Reference*.

`Query`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
class DynamoDBBasics
  attr_reader :dynamo_resource, :table

  def initialize(table_name)
    client = Aws::DynamoDB::Client.new(region: 'us-east-1')
    @dynamo_resource = Aws::DynamoDB::Resource.new(client: client)
    @table = @dynamo_resource.table(table_name)
  end

  # Queries for movies that were released in the specified year.
  #
  # @param year [Integer] The year to query.
  # @return [Array] The list of movies that were released in the specified year.
  def query_items(year)
    response = @table.query(
      key_condition_expression: '#yr = :year',
      expression_attribute_names: { '#yr' => 'year' },
      expression_attribute_values: { ':year' => year }
    )
  rescue Aws::DynamoDB::Errors::ServiceError => e
    puts("Couldn't query for movies released in #{year}. Here's why:")
    puts("\t#{e.code}: #{e.message}")
    raise
  else
    response.items
  end
```

- For API details, see Query in *AWS SDK for Ruby API Reference*.

Scan

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
class DynamoDBBasics
  attr_reader :dynamo_resource, :table

  def initialize(table_name)
    client = Aws::DynamoDB::Client.new(region: 'us-east-1')
    @dynamo_resource = Aws::DynamoDB::Resource.new(client: client)
    @table = @dynamo_resource.table(table_name)
  end

  # Scans for movies that were released in a range of years.
  # Uses a projection expression to return a subset of data for each movie.
  #
  # @param year_range [Hash] The range of years to retrieve.
  # @return [Array] The list of movies released in the specified years.
  def scan_items(year_range)
    movies = []
    scan_hash = {
      filter_expression: '#yr between :start_yr and :end_yr',
      projection_expression: '#yr, title, info.rating',
      expression_attribute_names: { '#yr' => 'year' },
      expression_attribute_values: {
        ':start_yr' => year_range[:start], ':end_yr' => year_range[:end]
      }
    }
    done = false
    start_key = nil
    until done
      scan_hash[:exclusive_start_key] = start_key unless start_key.nil?
      response = @table.scan(scan_hash)
      movies.concat(response.items) unless response.items.empty?
      start_key = response.last_evaluated_key
```

```
      done = start_key.nil?
    end
  rescue Aws::DynamoDB::Errors::ServiceError => e
    puts("Couldn't scan for movies. Here's why:")
    puts("\t#{e.code}: #{e.message}")
    raise
  else
    movies
  end
```

- For API details, see Scan in *AWS SDK for Ruby API Reference*.

`UpdateItem`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
class DynamoDBBasics
  attr_reader :dynamo_resource, :table

  def initialize(table_name)
    client = Aws::DynamoDB::Client.new(region: 'us-east-1')
    @dynamo_resource = Aws::DynamoDB::Resource.new(client: client)
    @table = @dynamo_resource.table(table_name)
  end

  # Updates rating and plot data for a movie in the table.
  #
  # @param movie [Hash] The title, year, plot, rating of the movie.
  def update_item(movie)
    response = @table.update_item(
      key: { 'year' => movie[:year], 'title' => movie[:title] },
      update_expression: 'set info.rating=:r',
      expression_attribute_values: { ':r' => movie[:rating] },
```

```
      return_values: 'UPDATED_NEW'
    )
  rescue Aws::DynamoDB::Errors::ServiceError => e
    puts("Couldn't update movie #{movie[:title]} (#{movie[:year]}) in table
#{@table.name}\n")
    puts("\t#{e.code}: #{e.message}")
    raise
  else
    response.attributes
  end
```

- For API details, see UpdateItem in *AWS SDK for Ruby API Reference*.

Scenarios

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 Ruby

> **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 a scenario that creates a table and runs batch PartiQL queries.

```
table_name = "doc-example-table-movies-partiql-#{rand(10**4)}"
scaffold = Scaffold.new(table_name)
sdk = DynamoDBPartiQLBatch.new(table_name)
```

```
  new_step(1, 'Create a new DynamoDB table if none already exists.')
  unless scaffold.exists?(table_name)
    puts("\nNo such table: #{table_name}. Creating it...")
    scaffold.create_table(table_name)
    print "Done!\n".green
  end

  new_step(2, 'Populate DynamoDB table with movie data.')
  download_file = 'moviedata.json'
  puts("Downloading movie database to #{download_file}...")
  movie_data = scaffold.fetch_movie_data(download_file)
  puts("Writing movie data from #{download_file} into your table...")
  scaffold.write_batch(movie_data)
  puts("Records added: #{movie_data.length}.")
  print "Done!\n".green

  new_step(3, 'Select a batch of items from the movies table.')
  puts "Let's select some popular movies for side-by-side comparison."
  response = sdk.batch_execute_select([['Mean Girls', 2004], ['Goodfellas', 1977],
 ['The Prancing of the Lambs', 2005]])
  puts("Items selected: #{response['responses'].length}\n")
  print "\nDone!\n".green

  new_step(4, 'Delete a batch of items from the movies table.')
  sdk.batch_execute_write([['Mean Girls', 2004], ['Goodfellas', 1977], ['The
 Prancing of the Lambs', 2005]])
  print "\nDone!\n".green

  new_step(5, 'Delete the table.')
  return unless scaffold.exists?(table_name)

  scaffold.delete_table
end
```

- For API details, see BatchExecuteStatement in *AWS SDK for Ruby 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 Ruby

> **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 a scenario that creates a table and runs PartiQL queries.

```
table_name = "doc-example-table-movies-partiql-#{rand(10**8)}"
scaffold = Scaffold.new(table_name)
sdk = DynamoDBPartiQLSingle.new(table_name)

new_step(1, 'Create a new DynamoDB table if none already exists.')
unless scaffold.exists?(table_name)
  puts("\nNo such table: #{table_name}. Creating it...")
  scaffold.create_table(table_name)
  print "Done!\n".green
end

new_step(2, 'Populate DynamoDB table with movie data.')
download_file = 'moviedata.json'
puts("Downloading movie database to #{download_file}...")
movie_data = scaffold.fetch_movie_data(download_file)
puts("Writing movie data from #{download_file} into your table...")
scaffold.write_batch(movie_data)
puts("Records added: #{movie_data.length}.")
print "Done!\n".green

new_step(3, 'Select a single item from the movies table.')
response = sdk.select_item_by_title('Star Wars')
puts("Items selected for title 'Star Wars': #{response.items.length}\n")
print response.items.first.to_s.yellow
print "\n\nDone!\n".green

new_step(4, 'Update a single item from the movies table.')
```

```
  puts "Let's correct the rating on The Big Lebowski to 10.0."
  sdk.update_rating_by_title('The Big Lebowski', 1998, 10.0)
  print "\nDone!\n".green

  new_step(5, 'Delete a single item from the movies table.')
  puts "Let's delete The Silence of the Lambs because it's just too scary."
  sdk.delete_item_by_title('The Silence of the Lambs', 1991)
  print "\nDone!\n".green

  new_step(6, 'Insert a new item into the movies table.')
  puts "Let's create a less-scary movie called The Prancing of the Lambs."
  sdk.insert_item('The Prancing of the Lambs', 2005, 'A movie about happy
 livestock.', 5.0)
  print "\nDone!\n".green

  new_step(7, 'Delete the table.')
  return unless scaffold.exists?(table_name)

  scaffold.delete_table
end
```

- For API details, see ExecuteStatement in *AWS SDK for Ruby API Reference*.

Serverless examples

Invoke a Lambda function from a DynamoDB trigger

The following code example shows how to implement a Lambda function that receives an event triggered by receiving records from a DynamoDB stream. The function retrieves the DynamoDB payload and logs the record contents.

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the Serverless examples repository.

Consuming a DynamoDB event with Lambda using Ruby.

```
def lambda_handler(event:, context:)
    return 'received empty event' if event['Records'].empty?

    event['Records'].each do |record|
      log_dynamodb_record(record)
    end

    "Records processed: #{event['Records'].length}"
  end

  def log_dynamodb_record(record)
    puts record['eventID']
    puts record['eventName']
    puts "DynamoDB Record: #{JSON.generate(record['dynamodb'])}"
  end
```

Reporting batch item failures for Lambda functions with a DynamoDB trigger

The following code example shows how to implement partial batch response for Lambda functions that receive events from a DynamoDB stream. The function reports the batch item failures in the response, signaling to Lambda to retry those messages later.

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the Serverless examples repository.

Reporting DynamoDB batch item failures with Lambda using Ruby.

```
def lambda_handler(event:, context:)
    records = event["Records"]
    cur_record_sequence_number = ""

    records.each do |record|
      begin
        # Process your record
```

```
        cur_record_sequence_number = record["dynamodb"]["SequenceNumber"]
      rescue StandardError => e
        # Return failed record's sequence number
        return {"batchItemFailures" => [{"itemIdentifier" =>
cur_record_sequence_number}]}
      end
    end

    {"batchItemFailures" => []}
  end
```

Amazon EC2 examples using SDK for Ruby

The following code examples show you how to perform actions and implement common scenarios by using the AWS SDK for Ruby with Amazon EC2.

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

- Get started
- Actions

Get started

Hello Amazon EC2

The following code example shows how to get started using Amazon EC2.

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
require 'aws-sdk-ec2'
require 'logger'

# EC2Manager is a class responsible for managing EC2 operations
# such as listing all EC2 instances in the current AWS account.
class EC2Manager
  def initialize(client)
    @client = client
    @logger = Logger.new($stdout)
  end

  # Lists and prints all EC2 instances in the current AWS account.
  def list_instances
    @logger.info('Listing instances')

    instances = fetch_instances

    if instances.empty?
      @logger.info('You have no instances')
    else
      print_instances(instances)
    end
  end

  private

  # Fetches all EC2 instances using pagination.
  #
  # @return [Array<Aws::EC2::Types::Instance>] List of EC2 instances.
  def fetch_instances
    paginator = @client.describe_instances
    instances = []

    paginator.each_page do |page|
      page.reservations.each do |reservation|
        reservation.instances.each do |instance|
          instances << instance
        end
      end
    end

    instances
```

```
  end

  # Prints details of the given EC2 instances.
  #
  # @param instances [Array<Aws::EC2::Types::Instance>] List of EC2 instances to
 print.
  def print_instances(instances)
    instances.each do |instance|
      @logger.info("Instance ID: #{instance.instance_id}")
      @logger.info("Instance Type: #{instance.instance_type}")
      @logger.info("Public IP: #{instance.public_ip_address}")
      @logger.info("Public DNS Name: #{instance.public_dns_name}")
      @logger.info("\n")
    end
  end
end

if $PROGRAM_NAME == __FILE__
  ec2_client = Aws::EC2::Client.new(region: 'us-west-2')
  manager = EC2Manager.new(ec2_client)
  manager.list_instances
end
```

- For API details, see DescribeSecurityGroups in *AWS SDK for Ruby API Reference*.

Actions

`AllocateAddress`

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

SDK for Ruby

> **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 Elastic IP address in Amazon Virtual Private Cloud (Amazon VPC).
#
# @param ec2_client [Aws::EC2::Client] An initialized EC2 client.
# @return [String] The allocation ID corresponding to the Elastic IP address.
# @example
#   puts allocate_elastic_ip_address(Aws::EC2::Client.new(region: 'us-west-2'))
def allocate_elastic_ip_address(ec2_client)
  response = ec2_client.allocate_address(domain: 'vpc')
  response.allocation_id
rescue StandardError => e
  puts "Error allocating Elastic IP address: #{e.message}"
  'Error'
end
```

- For API details, see AllocateAddress in *AWS SDK for Ruby API Reference*.

`AssociateAddress`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
# Associates an Elastic IP address with an Amazon Elastic Compute Cloud
# (Amazon EC2) instance.
#
# Prerequisites:
#
# - The allocation ID corresponding to the Elastic IP address.
# - The Amazon EC2 instance.
#
# @param ec2_client [Aws::EC2::Client] An initialized EC2 client.
# @param allocation_id [String] The ID of the allocation corresponding to
#   the Elastic IP address.
# @param instance_id [String] The ID of the instance.
```

```
# @return [String] The assocation ID corresponding to the association of the
#   Elastic IP address to the instance.
# @example
#   puts allocate_elastic_ip_address(
#     Aws::EC2::Client.new(region: 'us-west-2'),
#     'eipalloc-04452e528a66279EX',
#     'i-033c48ef067af3dEX')
def associate_elastic_ip_address_with_instance(
  ec2_client,
  allocation_id,
  instance_id
)
  response = ec2_client.associate_address(
    allocation_id: allocation_id,
    instance_id: instance_id
  )
  response.association_id
rescue StandardError => e
  puts "Error associating Elastic IP address with instance: #{e.message}"
  'Error'
end
```

- For API details, see AssociateAddress in *AWS SDK for Ruby API Reference*.

`CreateKeyPair`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
# This code example does the following:
# 1. Creates a key pair in Amazon Elastic Compute Cloud (Amazon EC2).
# 2. Displays information about available key pairs.
```

```
# 3. Deletes the key pair.

require 'aws-sdk-ec2'

# @param ec2_client [Aws::EC2::Client] An initialized EC2 client.
# @param key_pair_name [String] The name for the key pair and private
#   key file.
# @return [Boolean] true if the key pair and private key file were
#   created; otherwise, false.
# @example
#   exit 1 unless key_pair_created?(
#     Aws::EC2::Client.new(region: 'us-west-2'),
#     'my-key-pair'
#   )
def key_pair_created?(ec2_client, key_pair_name)
  key_pair = ec2_client.create_key_pair(key_name: key_pair_name)
  puts "Created key pair '#{key_pair.key_name}' with fingerprint " \
    "'#{key_pair.key_fingerprint}' and ID '#{key_pair.key_pair_id}'."
  filename = File.join(Dir.home, "#{key_pair_name}.pem")
  File.open(filename, 'w') { |file| file.write(key_pair.key_material) }
  puts "Private key file saved locally as '#{filename}'."
  true
rescue Aws::EC2::Errors::InvalidKeyPairDuplicate
  puts "Error creating key pair: a key pair named '#{key_pair_name}' " \
    'already exists.'
  false
rescue StandardError => e
  puts "Error creating key pair or saving private key file: #{e.message}"
  false
end

# Displays information about available key pairs in
# Amazon Elastic Compute Cloud (Amazon EC2).
#
# @param ec2_client [Aws::EC2::Client] An initialized EC2 client.
# @example
#   describe_key_pairs(Aws::EC2::Client.new(region: 'us-west-2'))
def describe_key_pairs(ec2_client)
  result = ec2_client.describe_key_pairs
  if result.key_pairs.count.zero?
    puts 'No key pairs found.'
  else
    puts 'Key pair names:'
    result.key_pairs.each do |key_pair|
```

```
      puts key_pair.key_name
    end
  end
rescue StandardError => e
  puts "Error getting information about key pairs: #{e.message}"
end

# Deletes a key pair in Amazon Elastic Compute Cloud (Amazon EC2).
#
# Prerequisites:
#
# - The key pair to delete.
#
# @param ec2_client [Aws::EC2::Client] An initialized EC2 client.
# @param key_pair_name [String] The name of the key pair to delete.
# @return [Boolean] true if the key pair was deleted; otherwise, false.
# @example
#   exit 1 unless key_pair_deleted?(
#     Aws::EC2::Client.new(region: 'us-west-2'),
#     'my-key-pair'
#   )
def key_pair_deleted?(ec2_client, key_pair_name)
  ec2_client.delete_key_pair(key_name: key_pair_name)
  true
rescue StandardError => e
  puts "Error deleting key pair: #{e.message}"
  false
end

# Example usage:
def run_me
  key_pair_name = ''
  region = ''
  # Print usage information and then stop.
  if ARGV[0] == '--help' || ARGV[0] == '-h'
    puts 'Usage:   ruby ec2-ruby-example-key-pairs.rb KEY_PAIR_NAME REGION'
    puts 'Example: ruby ec2-ruby-example-key-pairs.rb my-key-pair us-west-2'
    exit 1
  # If no values are specified at the command prompt, use these default values.
  # Replace us-west-2 with the AWS Region you're using for Amazon EC2.
  elsif ARGV.count.zero?
    key_pair_name = 'my-key-pair'
    region = 'us-west-2'
  # Otherwise, use the values as specified at the command prompt.
```

```
  else
    key_pair_name = ARGV[0]
    region = ARGV[1]
  end

  ec2_client = Aws::EC2::Client.new(region: region)

  puts 'Displaying existing key pair names before creating this key pair...'
  describe_key_pairs(ec2_client)

  puts '-' * 10
  puts 'Creating key pair...'
  unless key_pair_created?(ec2_client, key_pair_name)
    puts 'Stopping program.'
    exit 1
  end

  puts '-' * 10
  puts 'Displaying existing key pair names after creating this key pair...'
  describe_key_pairs(ec2_client)

  puts '-' * 10
  puts 'Deleting key pair...'
  unless key_pair_deleted?(ec2_client, key_pair_name)
    puts 'Stopping program. You must delete the key pair yourself.'
    exit 1
  end
  puts 'Key pair deleted.'

  puts '-' * 10
  puts 'Now that the key pair is deleted, ' \
    'also deleting the related private key pair file...'
  filename = File.join(Dir.home, "#{key_pair_name}.pem")
  File.delete(filename)
  if File.exist?(filename)
    puts "Could not delete file at '#{filename}'. You must delete it yourself."
  else
    puts 'File deleted.'
  end

  puts '-' * 10
  puts 'Displaying existing key pair names after deleting this key pair...'
  describe_key_pairs(ec2_client)
end
```

```
run_me if $PROGRAM_NAME == __FILE__
```

- For API details, see CreateKeyPair in *AWS SDK for Ruby API Reference*.

`CreateRouteTable`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
require 'aws-sdk-ec2'

# Prerequisites:
#
# - A VPC in Amazon VPC.
# - A subnet in that VPC.
# - A gateway attached to that subnet.
#
# @param ec2_resource [Aws::EC2::Resource] An initialized
#   Amazon Elastic Compute Cloud (Amazon EC2) resource object.
# @param vpc_id [String] The ID of the VPC for the route table.
# @param subnet_id [String] The ID of the subnet for the route table.
# @param gateway_id [String] The ID of the gateway for the route.
# @param destination_cidr_block [String] The destination CIDR block
#   for the route.
# @param tag_key [String] The key portion of the tag for the route table.
# @param tag_value [String] The value portion of the tag for the route table.
# @return [Boolean] true if the route table was created and associated;
#   otherwise, false.
# @example
#   exit 1 unless route_table_created_and_associated?(
#     Aws::EC2::Resource.new(region: 'us-west-2'),
#     'vpc-0b6f769731EXAMPLE',
#     'subnet-03d9303b57EXAMPLE',
```

```
#     'igw-06ca90c011EXAMPLE',
#     '0.0.0.0/0',
#     'my-key',
#     'my-value'
#   )
def route_table_created_and_associated?(
  ec2_resource,
  vpc_id,
  subnet_id,
  gateway_id,
  destination_cidr_block,
  tag_key,
  tag_value
)
  route_table = ec2_resource.create_route_table(vpc_id: vpc_id)
  puts "Created route table with ID '#{route_table.id}'."
  route_table.create_tags(
    tags: [
      {
        key: tag_key,
        value: tag_value
      }
    ]
  )
  puts 'Added tags to route table.'
  route_table.create_route(
    destination_cidr_block: destination_cidr_block,
    gateway_id: gateway_id
  )
  puts 'Created route with destination CIDR block ' \
    "'#{destination_cidr_block}' and associated with gateway " \
    "with ID '#{gateway_id}'."
  route_table.associate_with_subnet(subnet_id: subnet_id)
  puts "Associated route table with subnet with ID '#{subnet_id}'."
  true
rescue StandardError => e
  puts "Error creating or associating route table: #{e.message}"
  puts 'If the route table was created but not associated, you should ' \
    'clean up by deleting the route table.'
  false
end

# Example usage:
def run_me
```

```
vpc_id = ''
subnet_id = ''
gateway_id = ''
destination_cidr_block = ''
tag_key = ''
tag_value = ''
region = ''
# Print usage information and then stop.
if ARGV[0] == '--help' || ARGV[0] == '-h'
  puts 'Usage: ruby ec2-ruby-example-create-route-table.rb ' \
    'VPC_ID SUBNET_ID GATEWAY_ID DESTINATION_CIDR_BLOCK ' \
    'TAG_KEY TAG_VALUE REGION'
  # Replace us-west-2 with the AWS Region you're using for Amazon EC2.
  puts 'Example: ruby ec2-ruby-example-create-route-table.rb ' \
    'vpc-0b6f769731EXAMPLE subnet-03d9303b57EXAMPLE igw-06ca90c011EXAMPLE ' \
    "'0.0.0.0/0' my-key my-value us-west-2"
  exit 1
# If no values are specified at the command prompt, use these default values.
elsif ARGV.count.zero?
  vpc_id = 'vpc-0b6f769731EXAMPLE'
  subnet_id = 'subnet-03d9303b57EXAMPLE'
  gateway_id = 'igw-06ca90c011EXAMPLE'
  destination_cidr_block = '0.0.0.0/0'
  tag_key = 'my-key'
  tag_value = 'my-value'
  # Replace us-west-2 with the AWS Region you're using for Amazon EC2.
  region = 'us-west-2'
# Otherwise, use the values as specified at the command prompt.
else
  vpc_id = ARGV[0]
  subnet_id = ARGV[1]
  gateway_id = ARGV[2]
  destination_cidr_block = ARGV[3]
  tag_key = ARGV[4]
  tag_value = ARGV[5]
  region = ARGV[6]
end

ec2_resource = Aws::EC2::Resource.new(region: region)

if route_table_created_and_associated?(
  ec2_resource,
  vpc_id,
  subnet_id,
```

```
    gateway_id,
    destination_cidr_block,
    tag_key,
    tag_value
  )
    puts 'Route table created and associated.'
  else
    puts 'Route table not created or not associated.'
  end
end

run_me if $PROGRAM_NAME == __FILE__
```

- For API details, see CreateRouteTable in *AWS SDK for Ruby API Reference*.

`CreateSecurityGroup`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
# This code example does the following:
# 1. Creates an Amazon Elastic Compute Cloud (Amazon EC2) security group.
# 2. Adds inbound rules to the security group.
# 3. Displays information about available security groups.
# 4. Deletes the security group.

require 'aws-sdk-ec2'

# Creates an Amazon Elastic Compute Cloud (Amazon EC2) security group.
#
# Prerequisites:
#
```

```
# - A VPC in Amazon Virtual Private Cloud (Amazon VPC).
#
# @param ec2_client [Aws::EC2::Client] An initialized
#   Amazon EC2 client.
# @param group_name [String] A name for the security group.
# @param description [String] A description for the security group.
# @param vpc_id [String] The ID of the VPC for the security group.
# @return [String] The ID of security group that was created.
# @example
#   puts create_security_group(
#     Aws::EC2::Client.new(region: 'us-west-2'),
#     'my-security-group',
#     'This is my security group.',
#     'vpc-6713dfEX'
#   )
def create_security_group(ec2_client, group_name, description, vpc_id)
  security_group = ec2_client.create_security_group(
    group_name: group_name,
    description: description,
    vpc_id: vpc_id
  )
  puts "Created security group '#{group_name}' with ID " \
    "'#{security_group.group_id}' in VPC with ID '#{vpc_id}'."
  security_group.group_id
rescue StandardError => e
  puts "Error creating security group: #{e.message}"
  'Error'
end

# Adds an inbound rule to an Amazon Elastic Compute Cloud (Amazon EC2)
# security group.
#
# Prerequisites:
#
# - The security group.
#
# @param ec2_client [Aws::EC2::Client] An initialized Amazon EC2 client.
# @param security_group_id [String] The ID of the security group.
# @param ip_protocol [String] The network protocol for the inbound rule.
# @param from_port [String] The originating port for the inbound rule.
# @param to_port [String] The destination port for the inbound rule.
# @param cidr_ip_range [String] The CIDR IP range for the inbound rule.
# @return
# @example
```

```
#   exit 1 unless security_group_ingress_authorized?(
#     Aws::EC2::Client.new(region: 'us-west-2'),
#     'sg-030a858e078f1b9EX',
#     'tcp',
#     '80',
#     '80',
#     '0.0.0.0/0'
#   )
def security_group_ingress_authorized?(
  ec2_client, security_group_id, ip_protocol, from_port, to_port, cidr_ip_range
)
  ec2_client.authorize_security_group_ingress(
    group_id: security_group_id,
    ip_permissions: [
      {
        ip_protocol: ip_protocol,
        from_port: from_port,
        to_port: to_port,
        ip_ranges: [
          {
            cidr_ip: cidr_ip_range
          }
        ]
      }
    ]
  )
  puts "Added inbound rule to security group '#{security_group_id}' for protocol " \
    "'#{ip_protocol}' from port '#{from_port}' to port '#{to_port}' " \
    "with CIDR IP range '#{cidr_ip_range}'."
  true
rescue StandardError => e
  puts "Error adding inbound rule to security group: #{e.message}"
  false
end

# Refactored method to simplify complexity for describing security group permissions
def format_port_information(perm)
  from_port_str = perm.from_port == '-1' || perm.from_port == -1 ? 'All' :
 perm.from_port.to_s
  to_port_str = perm.to_port == '-1' || perm.to_port == -1 ? 'All' :
 perm.to_port.to_s
  { from_port: from_port_str, to_port: to_port_str }
end
```

```
# Displays information about a security group's IP permissions set in
# Amazon Elastic Compute Cloud (Amazon EC2).
def describe_security_group_permissions(perm)
  ports = format_port_information(perm)

  print "  Protocol: #{perm.ip_protocol == '-1' ? 'All' : perm.ip_protocol}"
  print ", From: #{ports[:from_port]}, To: #{ports[:to_port]}"

  print ", CIDR IPv6: #{perm.ipv_6_ranges[0].cidr_ipv_6}" if perm.key?
(:ipv_6_ranges) && perm.ipv_6_ranges.count.positive?

  print ", CIDR IPv4: #{perm.ip_ranges[0].cidr_ip}" if perm.key?(:ip_ranges) &&
 perm.ip_ranges.count.positive?
  print "\n"
end

# Displays information about available security groups in
# Amazon Elastic Compute Cloud (Amazon EC2).
def describe_security_groups(ec2_client)
  response = ec2_client.describe_security_groups

  if response.security_groups.count.positive?
    response.security_groups.each do |sg|
      display_group_details(sg)
    end
  else
    puts 'No security groups found.'
  end
rescue StandardError => e
  puts "Error getting information about security groups: #{e.message}"
end

# Helper method to display the details of security groups
def display_group_details(sg)
  puts '-' * (sg.group_name.length + 13)
  puts "Name:        #{sg.group_name}"
  puts "Description: #{sg.description}"
  puts "Group ID:    #{sg.group_id}"
  puts "Owner ID:    #{sg.owner_id}"
  puts "VPC ID:      #{sg.vpc_id}"

  display_group_tags(sg.tags) if sg.tags.count.positive?
  display_group_permissions(sg)
end
```

```
def display_group_tags(tags)
  puts 'Tags:'
  tags.each do |tag|
    puts "  Key: #{tag.key}, Value: #{tag.value}"
  end
end

def display_group_permissions(sg)
  if sg.ip_permissions.count.positive?
    puts 'Inbound rules:'
    sg.ip_permissions.each do |p|
      describe_security_group_permissions(p)
    end
  end

  return if sg.ip_permissions_egress.empty?

  puts 'Outbound rules:'
  sg.ip_permissions_egress.each do |p|
    describe_security_group_permissions(p)
  end
end

# Deletes an Amazon Elastic Compute Cloud (Amazon EC2)
# security group.
def security_group_deleted?(ec2_client, security_group_id)
  ec2_client.delete_security_group(group_id: security_group_id)
  puts "Deleted security group '#{security_group_id}'."
  true
rescue StandardError => e
  puts "Error deleting security group: #{e.message}"
  false
end

# Example usage with refactored run_me to reduce complexity
def run_me
  group_name, description, vpc_id, ip_protocol_http, from_port_http, to_port_http, \
  cidr_ip_range_http, ip_protocol_ssh, from_port_ssh, to_port_ssh, \
  cidr_ip_range_ssh, region = process_arguments
  ec2_client = Aws::EC2::Client.new(region: region)

  security_group_id = attempt_create_security_group(ec2_client, group_name,
 description, vpc_id)
```

```
  security_group_exists = security_group_id != 'Error'

  if security_group_exists
    add_inbound_rules(ec2_client, security_group_id, ip_protocol_http,
 from_port_http, to_port_http, cidr_ip_range_http)
    add_inbound_rules(ec2_client, security_group_id, ip_protocol_ssh, from_port_ssh,
 to_port_ssh, cidr_ip_range_ssh)
  end

  describe_security_groups(ec2_client)
  attempt_delete_security_group(ec2_client, security_group_id) if
 security_group_exists
end

def process_arguments
  if ARGV[0] == '--help' || ARGV[0] == '-h'
    display_help
    exit 1
  elsif ARGV.count.zero?
    default_values
  else
    ARGV
  end
end

def attempt_create_security_group(ec2_client, group_name, description, vpc_id)
  puts 'Attempting to create security group...'
  security_group_id = create_security_group(ec2_client, group_name, description,
 vpc_id)
  puts 'Could not create security group. Skipping this step.' if security_group_id
 == 'Error'
  security_group_id
end

def add_inbound_rules(ec2_client, security_group_id, ip_protocol, from_port,
 to_port, cidr_ip_range)
  puts 'Attempting to add inbound rules to security group...'
  return if security_group_ingress_authorized?(ec2_client, security_group_id,
 ip_protocol, from_port, to_port,
                                               cidr_ip_range)

  puts 'Could not add inbound rule to security group. Skipping this step.'
end
```

```
def attempt_delete_security_group(ec2_client, security_group_id)
  puts "\nAttempting to delete security group..."
  return if security_group_deleted?(ec2_client, security_group_id)

  puts 'Could not delete security group. You must delete it yourself.'
end

def display_help
  puts 'Usage:   ruby ec2-ruby-example-security-group.rb ' \
    'GROUP_NAME DESCRIPTION VPC_ID IP_PROTOCOL_1 FROM_PORT_1 TO_PORT_1 ' \
    'CIDR_IP_RANGE_1 IP_PROTOCOL_2 FROM_PORT_2 TO_PORT_2 ' \
    'CIDR_IP_RANGE_2 REGION'
  puts 'Example: ruby ec2-ruby-example-security-group.rb ' \
    "my-security-group 'This is my security group.' vpc-6713dfEX " \
    "tcp 80 80 '0.0.0.0/0' tcp 22 22 '0.0.0.0/0' us-west-2"
end

def default_values
  [
    'my-security-group', 'This is my security group.', 'vpc-6713dfEX', 'tcp', '80',
 '80',
    '0.0.0.0/0', 'tcp', '22', '22', '0.0.0.0/0', 'us-west-2'
  ]
end

run_me if $PROGRAM_NAME == __FILE__
```

- For API details, see CreateSecurityGroup in *AWS SDK for Ruby API Reference*.

`CreateSubnet`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
require 'aws-sdk-ec2'

# Creates a subnet within a virtual private cloud (VPC) in
# Amazon Virtual Private Cloud (Amazon VPC) and then tags
# the subnet.
#
# Prerequisites:
#
# - A VPC in Amazon VPC.
#
# @param ec2_resource [Aws::EC2::Resource] An initialized
#   Amazon Elastic Compute Cloud (Amazon EC2) resource object.
# @param vpc_id [String] The ID of the VPC for the subnet.
# @param cidr_block [String] The IPv4 CIDR block for the subnet.
# @param availability_zone [String] The ID of the Availability Zone
#   for the subnet.
# @param tag_key [String] The key portion of the tag for the subnet.
# @param tag_vlue [String] The value portion of the tag for the subnet.
# @return [Boolean] true if the subnet was created and tagged;
#   otherwise, false.
# @example
#   exit 1 unless subnet_created_and_tagged?(
#     Aws::EC2::Resource.new(region: 'us-west-2'),
#     'vpc-6713dfEX',
#     '10.0.0.0/24',
#     'us-west-2a',
#     'my-key',
#     'my-value'
#   )
def subnet_created_and_tagged?(
  ec2_resource,
  vpc_id,
  cidr_block,
  availability_zone,
  tag_key,
  tag_value
)
  subnet = ec2_resource.create_subnet(
    vpc_id: vpc_id,
    cidr_block: cidr_block,
    availability_zone: availability_zone
  )
```

```
  subnet.create_tags(
    tags: [
      {
        key: tag_key,
        value: tag_value
      }
    ]
  )
  puts "Subnet created with ID '#{subnet.id}' in VPC with ID '#{vpc_id}' " \
    "and CIDR block '#{cidr_block}' in availability zone " \
    "'#{availability_zone}' and tagged with key '#{tag_key}' and " \
    "value '#{tag_value}'."
  true
rescue StandardError => e
  puts "Error creating or tagging subnet: #{e.message}"
  false
end

# Example usage:
def run_me
  vpc_id = ''
  cidr_block = ''
  availability_zone = ''
  tag_key = ''
  tag_value = ''
  region = ''
  # Print usage information and then stop.
  if ARGV[0] == '--help' || ARGV[0] == '-h'
    puts 'Usage:   ruby ec2-ruby-example-create-subnet.rb ' \
      'VPC_ID CIDR_BLOCK AVAILABILITY_ZONE TAG_KEY TAG_VALUE REGION'
    # Replace us-west-2 with the AWS Region you're using for Amazon EC2.
    puts 'Example: ruby ec2-ruby-example-create-subnet.rb ' \
      'vpc-6713dfEX 10.0.0.0/24 us-west-2a my-key my-value us-west-2'
    exit 1
  # If no values are specified at the command prompt, use these default values.
  elsif ARGV.count.zero?
    vpc_id = 'vpc-6713dfEX'
    cidr_block = '10.0.0.0/24'
    availability_zone = 'us-west-2a'
    tag_key = 'my-key'
    tag_value = 'my-value'
    # Replace us-west-2 with the AWS Region you're using for Amazon EC2.
    region = 'us-west-2'
  # Otherwise, use the values as specified at the command prompt.
```

```
  else
    vpc_id = ARGV[0]
    cidr_block = ARGV[1]
    availability_zone = ARGV[2]
    tag_key = ARGV[3]
    tag_value = ARGV[4]
    region = ARGV[5]
  end

  ec2_resource = Aws::EC2::Resource.new(region: region)

  if subnet_created_and_tagged?(
    ec2_resource,
    vpc_id,
    cidr_block,
    availability_zone,
    tag_key,
    tag_value
  )
    puts 'Subnet created and tagged.'
  else
    puts 'Subnet not created or not tagged.'
  end
end

run_me if $PROGRAM_NAME == __FILE__
```

- For API details, see CreateSubnet in *AWS SDK for Ruby API Reference*.

`CreateVpc`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
require 'aws-sdk-ec2'

# Creates a virtual private cloud (VPC) in
# Amazon Virtual Private Cloud (Amazon VPC) and then tags
# the VPC.
#
# @param ec2_resource [Aws::EC2::Resource] An initialized
#   Amazon Elastic Compute Cloud (Amazon EC2) resource object.
# @param cidr_block [String] The IPv4 CIDR block for the subnet.
# @param tag_key [String] The key portion of the tag for the VPC.
# @param tag_value [String] The value portion of the tag for the VPC.
# @return [Boolean] true if the VPC was created and tagged;
#   otherwise, false.
# @example
#   exit 1 unless vpc_created_and_tagged?(
#     Aws::EC2::Resource.new(region: 'us-west-2'),
#     '10.0.0.0/24',
#     'my-key',
#     'my-value'
#   )
def vpc_created_and_tagged?(
  ec2_resource,
  cidr_block,
  tag_key,
  tag_value
)
  vpc = ec2_resource.create_vpc(cidr_block: cidr_block)

  # Create a public DNS by enabling DNS support and DNS hostnames.
  vpc.modify_attribute(enable_dns_support: { value: true })
  vpc.modify_attribute(enable_dns_hostnames: { value: true })

  vpc.create_tags(tags: [{ key: tag_key, value: tag_value }])

  puts "Created VPC with ID '#{vpc.id}' and tagged with key " \
    "'#{tag_key}' and value '#{tag_value}'."
  true
rescue StandardError => e
  puts e.message
  false
end
```

```
# Example usage:
def run_me
  cidr_block = ''
  tag_key = ''
  tag_value = ''
  region = ''
  # Print usage information and then stop.
  if ARGV[0] == '--help' || ARGV[0] == '-h'
    puts 'Usage:   ruby ec2-ruby-example-create-vpc.rb ' \
      'CIDR_BLOCK TAG_KEY TAG_VALUE REGION'
    # Replace us-west-2 with the AWS Region you're using for Amazon EC2.
    puts 'Example: ruby ec2-ruby-example-create-vpc.rb ' \
      '10.0.0.0/24 my-key my-value us-west-2'
    exit 1
  # If no values are specified at the command prompt, use these default values.
  elsif ARGV.count.zero?
    cidr_block = '10.0.0.0/24'
    tag_key = 'my-key'
    tag_value = 'my-value'
    # Replace us-west-2 with the AWS Region you're using for Amazon EC2.
    region = 'us-west-2'
  # Otherwise, use the values as specified at the command prompt.
  else
    cidr_block = ARGV[0]
    tag_key = ARGV[1]
    tag_value = ARGV[2]
    region = ARGV[3]
  end

  ec2_resource = Aws::EC2::Resource.new(region: region)

  if vpc_created_and_tagged?(
    ec2_resource,
    cidr_block,
    tag_key,
    tag_value
  )
    puts 'VPC created and tagged.'
  else
    puts 'VPC not created or not tagged.'
  end
end

run_me if $PROGRAM_NAME == __FILE__
```

- For API details, see CreateVpc in *AWS SDK for Ruby API Reference*.

`DescribeInstances`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
require 'aws-sdk-ec2'

# @param ec2_resource [Aws::EC2::Resource] An initialized EC2 resource object.
# @example
#   list_instance_ids_states(Aws::EC2::Resource.new(region: 'us-west-2'))
def list_instance_ids_states(ec2_resource)
  response = ec2_resource.instances
  if response.count.zero?
    puts 'No instances found.'
  else
    puts 'Instances -- ID, state:'
    response.each do |instance|
      puts "#{instance.id}, #{instance.state.name}"
    end
  end
rescue StandardError => e
  puts "Error getting information about instances: #{e.message}"
end

# Example usage:
def run_me
  region = ''
  # Print usage information and then stop.
  if ARGV[0] == '--help' || ARGV[0] == '-h'
    puts 'Usage:   ruby ec2-ruby-example-get-all-instance-info.rb REGION'
```

```
    # Replace us-west-2 with the AWS Region you're using for Amazon EC2.
    puts 'Example: ruby ec2-ruby-example-get-all-instance-info.rb us-west-2'
    exit 1
  # If no values are specified at the command prompt, use these default values.
  # Replace us-west-2 with the AWS Region you're using for Amazon EC2.
  elsif ARGV.count.zero?
    region = 'us-west-2'
  # Otherwise, use the values as specified at the command prompt.
  else
    region = ARGV[0]
  end
  ec2_resource = Aws::EC2::Resource.new(region: region)
  list_instance_ids_states(ec2_resource)
end

run_me if $PROGRAM_NAME == __FILE__
```

- For API details, see DescribeInstances in *AWS SDK for Ruby API Reference*.

`DescribeRegions`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
require 'aws-sdk-ec2'

# @param ec2_client [Aws::EC2::Client] An initialized EC2 client.
# @example
#   list_regions_endpoints(Aws::EC2::Client.new(region: 'us-west-2'))
def list_regions_endpoints(ec2_client)
  result = ec2_client.describe_regions
  # Enable pretty printing.
  max_region_string_length = 16
```

```
  max_endpoint_string_length = 33
  # Print header.
  print 'Region'
  print ' ' * (max_region_string_length - 'Region'.length)
  print "  Endpoint\n"
  print '-' * max_region_string_length
  print '  '
  print '-' * max_endpoint_string_length
  print "\n"
  # Print Regions and their endpoints.
  result.regions.each do |region|
    print region.region_name
    print ' ' * (max_region_string_length - region.region_name.length)
    print '  '
    print region.endpoint
    print "\n"
  end
end

# Displays a list of Amazon Elastic Compute Cloud (Amazon EC2)
# Availability Zones available to you depending on the AWS Region
# of the Amazon EC2 client.
#
# @param ec2_client [Aws::EC2::Client] An initialized EC2 client.
# @example
#   list_availability_zones(Aws::EC2::Client.new(region: 'us-west-2'))
def list_availability_zones(ec2_client)
  result = ec2_client.describe_availability_zones
  # Enable pretty printing.
  max_region_string_length = 16
  max_zone_string_length = 18
  max_state_string_length = 9
  # Print header.
  print 'Region'
  print ' ' * (max_region_string_length - 'Region'.length)
  print '  Zone'
  print ' ' * (max_zone_string_length - 'Zone'.length)
  print "  State\n"
  print '-' * max_region_string_length
  print '  '
  print '-' * max_zone_string_length
  print '  '
  print '-' * max_state_string_length
  print "\n"
```

```
  # Print Regions, Availability Zones, and their states.
  result.availability_zones.each do |zone|
    print zone.region_name
    print ' ' * (max_region_string_length - zone.region_name.length)
    print '  '
    print zone.zone_name
    print ' ' * (max_zone_string_length - zone.zone_name.length)
    print '  '
    print zone.state
    # Print any messages for this Availability Zone.
    if zone.messages.count.positive?
      print "\n"
      puts '  Messages for this zone:'
      zone.messages.each do |message|
        print "    #{message.message}\n"
      end
    end
    print "\n"
  end
end

# Example usage:
def run_me
  region = ''
  # Print usage information and then stop.
  if ARGV[0] == '--help' || ARGV[0] == '-h'
    puts 'Usage:   ruby ec2-ruby-example-regions-availability-zones.rb REGION'
    # Replace us-west-2 with the AWS Region you're using for Amazon EC2.
    puts 'Example: ruby ec2-ruby-example-regions-availability-zones.rb us-west-2'
    exit 1
  # If no values are specified at the command prompt, use these default values.
  # Replace us-west-2 with the AWS Region you're using for Amazon EC2.
  elsif ARGV.count.zero?
    region = 'us-west-2'
  # Otherwise, use the values as specified at the command prompt.
  else
    region = ARGV[0]
  end

  ec2_client = Aws::EC2::Client.new(region: region)

  puts 'AWS Regions for Amazon EC2 that are available to you:'
  list_regions_endpoints(ec2_client)
```

```
  puts "\n\nAmazon EC2 Availability Zones that are available to you for AWS Region
 '#{region}':"
  list_availability_zones(ec2_client)
end

run_me if $PROGRAM_NAME == __FILE__
```

- For API details, see DescribeRegions in *AWS SDK for Ruby API Reference*.

`ReleaseAddress`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
# Releases an Elastic IP address from an
# Amazon Elastic Compute Cloud (Amazon EC2) instance.
#
# Prerequisites:
#
# - An Amazon EC2 instance with an associated Elastic IP address.
#
# @param ec2_client [Aws::EC2::Client] An initialized EC2 client.
# @param allocation_id [String] The ID of the allocation corresponding to
#   the Elastic IP address.
# @return [Boolean] true if the Elastic IP address was released;
#   otherwise, false.
# @example
#   exit 1 unless elastic_ip_address_released?(
#     Aws::EC2::Client.new(region: 'us-west-2'),
#     'eipalloc-04452e528a66279EX'
#   )
def elastic_ip_address_released?(ec2_client, allocation_id)
  ec2_client.release_address(allocation_id: allocation_id)
  true
```

```
rescue StandardError => e
  puts("Error releasing Elastic IP address: #{e.message}")
  false
end
```

- For API details, see ReleaseAddress in *AWS SDK for Ruby API Reference*.

`StartInstances`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
require 'aws-sdk-ec2'

# Attempts to start an Amazon Elastic Compute Cloud (Amazon EC2) instance.
#
# Prerequisites:
#
# - The Amazon EC2 instance.
#
# @param ec2_client [Aws::EC2::Client] An initialized EC2 client.
# @param instance_id [String] The ID of the instance.
# @return [Boolean] true if the instance was started; otherwise, false.
# @example
#   exit 1 unless instance_started?(
#     Aws::EC2::Client.new(region: 'us-west-2'),
#     'i-123abc'
#   )
def instance_started?(ec2_client, instance_id)
  response = ec2_client.describe_instance_status(instance_ids: [instance_id])

  if response.instance_statuses.count.positive?
    state = response.instance_statuses[0].instance_state.name
```

```
    case state
    when 'pending'
      puts 'Error starting instance: the instance is pending. Try again later.'
      return false
    when 'running'
      puts 'The instance is already running.'
      return true
    when 'terminated'
      puts 'Error starting instance: ' \
        'the instance is terminated, so you cannot start it.'
      return false
    end
  end

  ec2_client.start_instances(instance_ids: [instance_id])
  ec2_client.wait_until(:instance_running, instance_ids: [instance_id])
  puts 'Instance started.'
  true
rescue StandardError => e
  puts "Error starting instance: #{e.message}"
  false
end

# Example usage:
def run_me
  instance_id = ''
  region = ''
  # Print usage information and then stop.
  if ARGV[0] == '--help' || ARGV[0] == '-h'
    puts 'Usage:   ruby ec2-ruby-example-start-instance-i-123abc.rb ' \
      'INSTANCE_ID REGION '
    # Replace us-west-2 with the AWS Region you're using for Amazon EC2.
    puts 'Example: ruby ec2-ruby-example-start-instance-i-123abc.rb ' \
      'i-123abc us-west-2'
    exit 1
  # If no values are specified at the command prompt, use these default values.
  # Replace us-west-2 with the AWS Region you're using for Amazon EC2.
  elsif ARGV.count.zero?
    instance_id = 'i-123abc'
    region = 'us-west-2'
  # Otherwise, use the values as specified at the command prompt.
  else
    instance_id = ARGV[0]
    region = ARGV[1]
```

```
  end

  ec2_client = Aws::EC2::Client.new(region: region)

  puts "Attempting to start instance '#{instance_id}' " \
    '(this might take a few minutes)...'
  return if instance_started?(ec2_client, instance_id)

  puts 'Could not start instance.'
end

run_me if $PROGRAM_NAME == __FILE__
```

- For API details, see StartInstances in *AWS SDK for Ruby API Reference*.

`StopInstances`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
require 'aws-sdk-ec2'

# Prerequisites:
#
# - The Amazon EC2 instance.
#
# @param ec2_client [Aws::EC2::Client] An initialized EC2 client.
# @param instance_id [String] The ID of the instance.
# @return [Boolean] true if the instance was stopped; otherwise, false.
# @example
#   exit 1 unless instance_stopped?(
#     Aws::EC2::Client.new(region: 'us-west-2'),
#     'i-123abc'
```

```
#   )
def instance_stopped?(ec2_client, instance_id)
  response = ec2_client.describe_instance_status(instance_ids: [instance_id])

  if response.instance_statuses.count.positive?
    state = response.instance_statuses[0].instance_state.name
    case state
    when 'stopping'
      puts 'The instance is already stopping.'
      return true
    when 'stopped'
      puts 'The instance is already stopped.'
      return true
    when 'terminated'
      puts 'Error stopping instance: ' \
        'the instance is terminated, so you cannot stop it.'
      return false
    end
  end

  ec2_client.stop_instances(instance_ids: [instance_id])
  ec2_client.wait_until(:instance_stopped, instance_ids: [instance_id])
  puts 'Instance stopped.'
  true
rescue StandardError => e
  puts "Error stopping instance: #{e.message}"
  false
end

# Example usage:
def run_me
  instance_id = ''
  region = ''
  # Print usage information and then stop.
  if ARGV[0] == '--help' || ARGV[0] == '-h'
    puts 'Usage:   ruby ec2-ruby-example-stop-instance-i-123abc.rb ' \
      'INSTANCE_ID REGION '
    # Replace us-west-2 with the AWS Region you're using for Amazon EC2.
    puts 'Example: ruby ec2-ruby-example-start-instance-i-123abc.rb ' \
      'i-123abc us-west-2'
    exit 1
  # If no values are specified at the command prompt, use these default values.
  # Replace us-west-2 with the AWS Region you're using for Amazon EC2.
  elsif ARGV.count.zero?
```

```
    instance_id = 'i-123abc'
    region = 'us-west-2'
  # Otherwise, use the values as specified at the command prompt.
  else
    instance_id = ARGV[0]
    region = ARGV[1]
  end

  ec2_client = Aws::EC2::Client.new(region: region)

  puts "Attempting to stop instance '#{instance_id}' " \
    '(this might take a few minutes)...'
  return if instance_stopped?(ec2_client, instance_id)

  puts 'Could not stop instance.'
end

run_me if $PROGRAM_NAME == __FILE__
```

- For API details, see StopInstances in *AWS SDK for Ruby API Reference*.

`TerminateInstances`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
require 'aws-sdk-ec2'

# Prerequisites:
#
# - The Amazon EC2 instance.
#
# @param ec2_client [Aws::EC2::Client] An initialized EC2 client.
```

```
# @param instance_id [String] The ID of the instance.
# @return [Boolean] true if the instance was terminated; otherwise, false.
# @example
#   exit 1 unless instance_terminated?(
#     Aws::EC2::Client.new(region: 'us-west-2'),
#     'i-123abc'
#   )
def instance_terminated?(ec2_client, instance_id)
  response = ec2_client.describe_instance_status(instance_ids: [instance_id])

  if response.instance_statuses.count.positive? &&
     response.instance_statuses[0].instance_state.name == 'terminated'

    puts 'The instance is already terminated.'
    return true
  end

  ec2_client.terminate_instances(instance_ids: [instance_id])
  ec2_client.wait_until(:instance_terminated, instance_ids: [instance_id])
  puts 'Instance terminated.'
  true
rescue StandardError => e
  puts "Error terminating instance: #{e.message}"
  false
end

# Example usage:
def run_me
  instance_id = ''
  region = ''
  # Print usage information and then stop.
  if ARGV[0] == '--help' || ARGV[0] == '-h'
    puts 'Usage:   ruby ec2-ruby-example-terminate-instance-i-123abc.rb ' \
      'INSTANCE_ID REGION '
    # Replace us-west-2 with the AWS Region you're using for Amazon EC2.
    puts 'Example: ruby ec2-ruby-example-terminate-instance-i-123abc.rb ' \
      'i-123abc us-west-2'
    exit 1
  # If no values are specified at the command prompt, use these default values.
  # Replace us-west-2 with the AWS Region you're using for Amazon EC2.
  elsif ARGV.count.zero?
    instance_id = 'i-123abc'
    region = 'us-west-2'
  # Otherwise, use the values as specified at the command prompt.
```

```
  else
    instance_id = ARGV[0]
    region = ARGV[1]
  end

  ec2_client = Aws::EC2::Client.new(region: region)

  puts "Attempting to terminate instance '#{instance_id}' " \
    '(this might take a few minutes)...'
  return if instance_terminated?(ec2_client, instance_id)

  puts 'Could not terminate instance.'
end

run_me if $PROGRAM_NAME == __FILE__
```

- For API details, see TerminateInstances in *AWS SDK for Ruby API Reference*.

Elastic Beanstalk examples using SDK for Ruby

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

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

`DescribeApplications`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
# Class to manage Elastic Beanstalk applications
class ElasticBeanstalkManager
  def initialize(eb_client, logger: Logger.new($stdout))
    @eb_client = eb_client
    @logger = logger
  end

  # Lists applications and their environments
  def list_applications
    @eb_client.describe_applications.applications.each do |application|
      log_application_details(application)
      list_environments(application.application_name)
    end
  rescue Aws::ElasticBeanstalk::Errors::ServiceError => e
    @logger.error("Elastic Beanstalk Service Error: #{e.message}")
  end

  private

  # Logs application details
  def log_application_details(application)
    @logger.info("Name:        #{application.application_name}")
    @logger.info("Description: #{application.description}")
  end

  # Lists and logs details of environments for a given application
  def list_environments(application_name)
    @eb_client.describe_environments(application_name:
 application_name).environments.each do |env|
      @logger.info("  Environment:  #{env.environment_name}")
      @logger.info("    URL:        #{env.cname}")
      @logger.info("    Health:     #{env.health}")
    end
  rescue Aws::ElasticBeanstalk::Errors::ServiceError => e
```

```
    @logger.error("Error listing environments for application #{application_name}:
 #{e.message}")
  end
end
```

- For API details, see DescribeApplications in *AWS SDK for Ruby API Reference*.

`ListAvailableSolutionStacks`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
# Manages listing of AWS Elastic Beanstalk solution stacks
# @param [Aws::ElasticBeanstalk::Client] eb_client
# @param [String] filter - Returns subset of results based on match
# @param [Logger] logger
class StackLister
  # Initialize with AWS Elastic Beanstalk client
  def initialize(eb_client, filter, logger: Logger.new($stdout))
    @eb_client = eb_client
    @filter = filter.downcase
    @logger = logger
  end

  # Lists and logs Elastic Beanstalk solution stacks
  def list_stacks
    stacks = @eb_client.list_available_solution_stacks.solution_stacks
    orig_length = stacks.length
    filtered_length = 0

    stacks.each do |stack|
      if @filter.empty? || stack.downcase.include?(@filter)
        @logger.info(stack)
        filtered_length += 1
```

```
      end
    end

    log_summary(filtered_length, orig_length)
  rescue Aws::Errors::ServiceError => e
    @logger.error("Error listing solution stacks: #{e.message}")
  end

  private

  # Logs summary of listed stacks
  def log_summary(filtered_length, orig_length)
    if @filter.empty?
      @logger.info("Showed #{orig_length} stack(s)")
    else
      @logger.info("Showed #{filtered_length} stack(s) of #{orig_length}")
    end
  end
end
```

- For API details, see ListAvailableSolutionStacks in *AWS SDK for Ruby API Reference*.

`UpdateApplication`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
# Manages deployment of Rails applications to AWS Elastic Beanstalk
class RailsAppDeployer
  def initialize(eb_client, s3_client, app_name, logger: Logger.new($stdout))
    @eb_client = eb_client
    @s3_client = s3_client
    @app_name = app_name
    @logger = logger
```

```
  end

  # Deploys the latest application version to Elastic Beanstalk
  def deploy
    create_storage_location
    zip_file_name = create_zip_file
    upload_zip_to_s3(zip_file_name)
    create_and_deploy_new_application_version(zip_file_name)
  end

  private

  # Creates a new S3 storage location for the application
  def create_storage_location
    resp = @eb_client.create_storage_location
    @logger.info("Created storage location in bucket #{resp.s3_bucket}")
  rescue Aws::Errors::ServiceError => e
    @logger.error("Failed to create storage location: #{e.message}")
  end

  # Creates a ZIP file of the application using git
  def create_zip_file
    zip_file_basename = SecureRandom.urlsafe_base64
    zip_file_name = "#{zip_file_basename}.zip"
    `git archive --format=zip -o #{zip_file_name} HEAD`
    zip_file_name
  end

  # Uploads the ZIP file to the S3 bucket
  def upload_zip_to_s3(zip_file_name)
    zip_contents = File.read(zip_file_name)
    key = "#{@app_name}/#{zip_file_name}"
    @s3_client.put_object(body: zip_contents, bucket: fetch_bucket_name, key: key)
  rescue Aws::Errors::ServiceError => e
    @logger.error("Failed to upload ZIP file to S3: #{e.message}")
  end

  # Fetches the S3 bucket name from Elastic Beanstalk application versions
  def fetch_bucket_name
    app_versions = @eb_client.describe_application_versions(application_name:
@app_name)
    av = app_versions.application_versions.first
    av.source_bundle.s3_bucket
  rescue Aws::Errors::ServiceError => e
```

```
    @logger.error("Failed to fetch bucket name: #{e.message}")
    raise
  end

  # Creates a new application version and deploys it
  def create_and_deploy_new_application_version(zip_file_name)
    version_label = File.basename(zip_file_name, '.zip')
    @eb_client.create_application_version(
      process: false,
      application_name: @app_name,
      version_label: version_label,
      source_bundle: {
        s3_bucket: fetch_bucket_name,
        s3_key: "#{@app_name}/#{zip_file_name}"
      },
      description: "Updated #{Time.now.strftime('%d/%m/%Y')}"
    )
    update_environment(version_label)
  rescue Aws::Errors::ServiceError => e
    @logger.error("Failed to create or deploy application version: #{e.message}")
  end

  # Updates the environment to the new application version
  def update_environment(version_label)
    env_name = fetch_environment_name
    @eb_client.update_environment(
      environment_name: env_name,
      version_label: version_label
    )
  rescue Aws::Errors::ServiceError => e
    @logger.error("Failed to update environment: #{e.message}")
  end

  # Fetches the environment name of the application
  def fetch_environment_name
    envs = @eb_client.describe_environments(application_name: @app_name)
    envs.environments.first.environment_name
  rescue Aws::Errors::ServiceError => e
    @logger.error("Failed to fetch environment name: #{e.message}")
    raise
  end
end
```

- For API details, see UpdateApplication in *AWS SDK for Ruby API Reference*.

EventBridge examples using SDK for Ruby

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

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 and trigger a rule

The following code example shows how to create and trigger a rule in Amazon EventBridge.

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

Call the functions in the correct order.

```
require 'aws-sdk-sns'
require 'aws-sdk-iam'
require 'aws-sdk-cloudwatchevents'
require 'aws-sdk-ec2'
require 'aws-sdk-cloudwatch'
require 'aws-sdk-cloudwatchlogs'
require 'securerandom'
```

Checks whether the specified Amazon Simple Notification Service (Amazon SNS) topic exists among those provided to this function.

```
# Checks whether the specified Amazon SNS
# topic exists among those provided to this function.
# This is a helper function that is called by the topic_exists? function.
#
# @param topics [Array] An array of Aws::SNS::Types::Topic objects.
# @param topic_arn [String] The ARN of the topic to find.
# @return [Boolean] true if the topic ARN was found; otherwise, false.
# @example
#   sns_client = Aws::SNS::Client.new(region: 'us-east-1')
#   response = sns_client.list_topics
#   if topic_found?(
#     response.topics,
#     'arn:aws:sns:us-east-1:111111111111:aws-doc-sdk-examples-topic'
#   )
#     puts 'Topic found.'
#   end
def topic_found?(topics, topic_arn)
  topics.each do |topic|
    return true if topic.topic_arn == topic_arn
  end
  false
end
```

Checks whether the specified topic exists among those available to the caller in Amazon SNS.

```
# Checks whether the specified topic exists among those available to the
# caller in Amazon SNS.
#
# @param sns_client [Aws::SNS::Client] An initialized Amazon SNS client.
# @param topic_arn [String] The ARN of the topic to find.
# @return [Boolean] true if the topic ARN was found; otherwise, false.
# @example
#   exit 1 unless topic_exists?(
#     Aws::SNS::Client.new(region: 'us-east-1'),
#     'arn:aws:sns:us-east-1:111111111111:aws-doc-sdk-examples-topic'
#   )
def topic_exists?(sns_client, topic_arn)
```

```
  puts "Searching for topic with ARN '#{topic_arn}'..."
  response = sns_client.list_topics
  if response.topics.count.positive?
    if topic_found?(response.topics, topic_arn)
      puts 'Topic found.'
      return true
    end
    while response.next_page?
      response = response.next_page
      next unless response.topics.count.positive?

      if topic_found?(response.topics, topic_arn)
        puts 'Topic found.'
        return true
      end
    end
  end
  puts 'Topic not found.'
  false
rescue StandardError => e
  puts "Topic not found: #{e.message}"
  false
end
```

Create a topic in Amazon SNS and then subscribe an email address to receive notifications to that topic.

```
# Creates a topic in Amazon SNS
# and then subscribes an email address to receive notifications to that topic.
#
# @param sns_client [Aws::SNS::Client] An initialized Amazon SNS client.
# @param topic_name [String] The name of the topic to create.
# @param email_address [String] The email address of the recipient to notify.
# @return [String] The ARN of the topic that was created.
# @example
#   puts create_topic(
#     Aws::SNS::Client.new(region: 'us-east-1'),
#     'aws-doc-sdk-examples-topic',
#     'mary@example.com'
#   )
def create_topic(sns_client, topic_name, email_address)
  puts "Creating the topic named '#{topic_name}'..."
```

```
  topic_response = sns_client.create_topic(name: topic_name)
  puts "Topic created with ARN '#{topic_response.topic_arn}'."
  subscription_response = sns_client.subscribe(
    topic_arn: topic_response.topic_arn,
    protocol: 'email',
    endpoint: email_address,
    return_subscription_arn: true
  )
  puts 'Subscription created with ARN ' \
    "'#{subscription_response.subscription_arn}'. Have the owner of the " \
    "email address '#{email_address}' check their inbox in a few minutes " \
    'and confirm the subscription to start receiving notification emails.'
  topic_response.topic_arn
rescue StandardError => e
  puts "Error creating or subscribing to topic: #{e.message}"
  'Error'
end
```

Check whether the specified AWS Identity and Access Management (IAM) role exists among those provided to this function.

```
# Checks whether the specified AWS Identity and Access Management (IAM)
# role exists among those provided to this function.
# This is a helper function that is called by the role_exists? function.
#
# @param roles [Array] An array of Aws::IAM::Role objects.
# @param role_arn [String] The ARN of the role to find.
# @return [Boolean] true if the role ARN was found; otherwise, false.
# @example
#   iam_client = Aws::IAM::Client.new(region: 'us-east-1')
#   response = iam_client.list_roles
#   if role_found?(
#     response.roles,
#     'arn:aws:iam::111111111111:role/aws-doc-sdk-examples-ec2-state-change'
#   )
#     puts 'Role found.'
#   end
def role_found?(roles, role_arn)
  roles.each do |role|
    return true if role.arn == role_arn
  end
  false
```

```
end
```

Check whether the specified role exists among those available to the caller in IAM.

```
# Checks whether the specified role exists among those available to the
# caller in AWS Identity and Access Management (IAM).
#
# @param iam_client [Aws::IAM::Client] An initialized IAM client.
# @param role_arn [String] The ARN of the role to find.
# @return [Boolean] true if the role ARN was found; otherwise, false.
# @example
#   exit 1 unless role_exists?(
#     Aws::IAM::Client.new(region: 'us-east-1'),
#     'arn:aws:iam::111111111111:role/aws-doc-sdk-examples-ec2-state-change'
#   )
def role_exists?(iam_client, role_arn)
  puts "Searching for role with ARN '#{role_arn}'..."
  response = iam_client.list_roles
  if response.roles.count.positive?
    if role_found?(response.roles, role_arn)
      puts 'Role found.'
      return true
    end
    while response.next_page?
      response = response.next_page
      next unless response.roles.count.positive?

      if role_found?(response.roles, role_arn)
        puts 'Role found.'
        return true
      end
    end
  end
  puts 'Role not found.'
  false
rescue StandardError => e
  puts "Role not found: #{e.message}"
  false
end
```

Create a role in IAM.

```
# Creates a role in AWS Identity and Access Management (IAM).
# This role is used by a rule in Amazon EventBridge to allow
# that rule to operate within the caller's account.
# This role is designed to be used specifically by this code example.
#
# @param iam_client [Aws::IAM::Client] An initialized IAM client.
# @param role_name [String] The name of the role to create.
# @return [String] The ARN of the role that was created.
# @example
#   puts create_role(
#     Aws::IAM::Client.new(region: 'us-east-1'),
#     'aws-doc-sdk-examples-ec2-state-change'
#   )
def create_role(iam_client, role_name)
  puts "Creating the role named '#{role_name}'..."
  response = iam_client.create_role(
    assume_role_policy_document: {
      'Version': '2012-10-17',
      'Statement': [
        {
          'Sid': '',
          'Effect': 'Allow',
          'Principal': {
            'Service': 'events.amazonaws.com'
          },
          'Action': 'sts:AssumeRole'
        }
      ]
    }.to_json,
    path: '/',
    role_name: role_name
  )
  puts "Role created with ARN '#{response.role.arn}'."
  puts 'Adding access policy to role...'
  iam_client.put_role_policy(
    policy_document: {
      'Version': '2012-10-17',
      'Statement': [
        {
          'Sid': 'CloudWatchEventsFullAccess',
          'Effect': 'Allow',
          'Resource': '*',
          'Action': 'events:*'
```

```
        },
        {
          'Sid': 'IAMPassRoleForCloudWatchEvents',
          'Effect': 'Allow',
          'Resource': 'arn:aws:iam::*:role/AWS_Events_Invoke_Targets',
          'Action': 'iam:PassRole'
        }
      ]
    }.to_json,
    policy_name: 'CloudWatchEventsPolicy',
    role_name: role_name
  )
  puts 'Access policy added to role.'
  response.role.arn
rescue StandardError => e
  puts "Error creating role or adding policy to it: #{e.message}"
  puts 'If the role was created, you must add the access policy ' \
    'to the role yourself, or delete the role yourself and try again.'
  'Error'
end
```

Checks whether the specified EventBridge rule exists among those provided to this function.

```
# Checks whether the specified Amazon EventBridge rule exists among
# those provided to this function.
# This is a helper function that is called by the rule_exists? function.
#
# @param rules [Array] An array of Aws::CloudWatchEvents::Types::Rule objects.
# @param rule_arn [String] The name of the rule to find.
# @return [Boolean] true if the name of the rule was found; otherwise, false.
# @example
#   cloudwatchevents_client = Aws::CloudWatch::Client.new(region: 'us-east-1')
#   response = cloudwatchevents_client.list_rules
#   if rule_found?(response.rules, 'aws-doc-sdk-examples-ec2-state-change')
#     puts 'Rule found.'
#   end
def rule_found?(rules, rule_name)
  rules.each do |rule|
    return true if rule.name == rule_name
  end
  false
end
```

Checks whether the specified rule exists among those available to the caller in EventBridge.

```
# Checks whether the specified rule exists among those available to the
# caller in Amazon EventBridge.
#
# @param cloudwatchevents_client [Aws::CloudWatchEvents::Client]
#   An initialized Amazon EventBridge client.
# @param rule_name [String] The name of the rule to find.
# @return [Boolean] true if the rule name was found; otherwise, false.
# @example
#   exit 1 unless rule_exists?(
#     Aws::CloudWatch::Client.new(region: 'us-east-1')
#     'aws-doc-sdk-examples-ec2-state-change'
#   )
def rule_exists?(cloudwatchevents_client, rule_name)
  puts "Searching for rule with name '#{rule_name}'..."
  response = cloudwatchevents_client.list_rules
  if response.rules.count.positive?
    if rule_found?(response.rules, rule_name)
      puts 'Rule found.'
      return true
    end
    while response.next_page?
      response = response.next_page
      next unless response.rules.count.positive?

      if rule_found?(response.rules, rule_name)
        puts 'Rule found.'
        return true
      end
    end
  end
  puts 'Rule not found.'
  false
rescue StandardError => e
  puts "Rule not found: #{e.message}"
  false
end
```

Create a rule in EventBridge.

```
# Creates a rule in Amazon EventBridge.
# This rule is triggered whenever an available instance in
# Amazon EC2 changes to the specified state.
# This rule is designed to be used specifically by this code example.
#
# Prerequisites:
#
# - A role in AWS Identity and Access Management (IAM) that is designed
#   to be used specifically by this code example.
# - A topic in Amazon SNS.
#
# @param cloudwatchevents_client [Aws::CloudWatchEvents::Client]
#   An initialized Amazon EventBridge client.
# @param rule_name [String] The name of the rule to create.
# @param rule_description [String] Some description for this rule.
# @param instance_state [String] The state that available instances in
#   Amazon EC2 must change to, to
#   trigger this rule.
# @param role_arn [String] The Amazon Resource Name (ARN) of the IAM role.
# @param target_id [String] Some identifying string for the rule's target.
# @param topic_arn [String] The ARN of the Amazon SNS topic.
# @return [Boolean] true if the rule was created; otherwise, false.
# @example
#   exit 1 unless rule_created?(
#     Aws::CloudWatch::Client.new(region: 'us-east-1'),
#     'aws-doc-sdk-examples-ec2-state-change',
#     'Triggers when any available EC2 instance starts.',
#     'running',
#     'arn:aws:iam::111111111111:role/aws-doc-sdk-examples-ec2-state-change',
#     'sns-topic',
#     'arn:aws:sns:us-east-1:111111111111:aws-doc-sdk-examples-topic'
#   )
def rule_created?(
  cloudwatchevents_client,
  rule_name,
  rule_description,
  instance_state,
  role_arn,
  target_id,
  topic_arn
)
  puts "Creating rule with name '#{rule_name}'..."
  put_rule_response = cloudwatchevents_client.put_rule(
```

```
    name: rule_name,
    description: rule_description,
    event_pattern: {
      'source': [
        'aws.ec2'
      ],
      'detail-type': [
        'EC2 Instance State-change Notification'
      ],
      'detail': {
        'state': [
          instance_state
        ]
      }
    }.to_json,
    state: 'ENABLED',
    role_arn: role_arn
  )
  puts "Rule created with ARN '#{put_rule_response.rule_arn}'."

  put_targets_response = cloudwatchevents_client.put_targets(
    rule: rule_name,
    targets: [
      {
        id: target_id,
        arn: topic_arn
      }
    ]
  )
  if put_targets_response.key?(:failed_entry_count) &&
     put_targets_response.failed_entry_count.positive?
    puts 'Error(s) adding target to rule:'
    put_targets_response.failed_entries.each do |failure|
      puts failure.error_message
    end
    false
  else
    true
  end
rescue StandardError => e
  puts "Error creating rule or adding target to rule: #{e.message}"
  puts 'If the rule was created, you must add the target ' \
    'to the rule yourself, or delete the rule yourself and try again.'
  false
```

```
end
```

Check to see whether the specified log group exists among those available to the caller in Amazon CloudWatch Logs.

```
# Checks to see whether the specified log group exists among those available
# to the caller in Amazon CloudWatch Logs.
#
# @param cloudwatchlogs_client [Aws::CloudWatchLogs::Client] An initialized
#   Amazon CloudWatch Logs client.
# @param log_group_name [String] The name of the log group to find.
# @return [Boolean] true if the log group name was found; otherwise, false.
# @example
#   exit 1 unless log_group_exists?(
#     Aws::CloudWatchLogs::Client.new(region: 'us-east-1'),
#     'aws-doc-sdk-examples-cloudwatch-log'
#   )
def log_group_exists?(cloudwatchlogs_client, log_group_name)
  puts "Searching for log group with name '#{log_group_name}'..."
  response = cloudwatchlogs_client.describe_log_groups(
    log_group_name_prefix: log_group_name
  )
  if response.log_groups.count.positive?
    response.log_groups.each do |log_group|
      if log_group.log_group_name == log_group_name
        puts 'Log group found.'
        return true
      end
    end
  end
  puts 'Log group not found.'
  false
rescue StandardError => e
  puts "Log group not found: #{e.message}"
  false
end
```

Create a log group in CloudWatch Logs.

```
# Creates a log group in Amazon CloudWatch Logs.
#
```

```
# @param cloudwatchlogs_client [Aws::CloudWatchLogs::Client] An initialized
#   Amazon CloudWatch Logs client.
# @param log_group_name [String] The name of the log group to create.
# @return [Boolean] true if the log group name was created; otherwise, false.
# @example
#   exit 1 unless log_group_created?(
#     Aws::CloudWatchLogs::Client.new(region: 'us-east-1'),
#     'aws-doc-sdk-examples-cloudwatch-log'
#   )
def log_group_created?(cloudwatchlogs_client, log_group_name)
  puts "Attempting to create log group with the name '#{log_group_name}'..."
  cloudwatchlogs_client.create_log_group(log_group_name: log_group_name)
  puts 'Log group created.'
  true
rescue StandardError => e
  puts "Error creating log group: #{e.message}"
  false
end
```

Write an event to a log stream in CloudWatch Logs.

```
# Writes an event to a log stream in Amazon CloudWatch Logs.
#
# Prerequisites:
#
# - A log group in Amazon CloudWatch Logs.
# - A log stream within the log group.
#
# @param cloudwatchlogs_client [Aws::CloudWatchLogs::Client] An initialized
#   Amazon CloudWatch Logs client.
# @param log_group_name [String] The name of the log group.
# @param log_stream_name [String] The name of the log stream within
#   the log group.
# @param message [String] The message to write to the log stream.
# @param sequence_token [String] If available, the sequence token from the
#   message that was written immediately before this message. This sequence
#   token is returned by Amazon CloudWatch Logs whenever you programmatically
#   write a message to the log stream.
# @return [String] The sequence token that is returned by
#   Amazon CloudWatch Logs after successfully writing the message to the
#   log stream.
# @example
```

```
#   puts log_event(
#     Aws::EC2::Client.new(region: 'us-east-1'),
#     'aws-doc-sdk-examples-cloudwatch-log'
#     '2020/11/19/53f985be-199f-408e-9a45-fc242df41fEX',
#     "Instance 'i-033c48ef067af3dEX' restarted.",
#     '495426724868310740095796045676567882148068632824696073EX'
#   )
def log_event(
  cloudwatchlogs_client,
  log_group_name,
  log_stream_name,
  message,
  sequence_token
)
  puts "Attempting to log '#{message}' to log stream '#{log_stream_name}'..."
  event = {
    log_group_name: log_group_name,
    log_stream_name: log_stream_name,
    log_events: [
      {
        timestamp: (Time.now.utc.to_f.round(3) * 1_000).to_i,
        message: message
      }
    ]
  }
  event[:sequence_token] = sequence_token unless sequence_token.empty?

  response = cloudwatchlogs_client.put_log_events(event)
  puts 'Message logged.'
  response.next_sequence_token
rescue StandardError => e
  puts "Message not logged: #{e.message}"
end
```

Restart an Amazon Elastic Compute Cloud (Amazon EC2) instance and adds information about the related activity to a log stream in CloudWatch Logs.

```
# Restarts an Amazon EC2 instance
# and adds information about the related activity to a log stream
# in Amazon CloudWatch Logs.
#
# Prerequisites:
```

```
#
# - The Amazon EC2 instance to restart.
# - The log group in Amazon CloudWatch Logs to add related activity
#   information to.
#
# @param ec2_client [Aws::EC2::Client] An initialized Amazon EC2 client.
# @param cloudwatchlogs_client [Aws::CloudWatchLogs::Client]
#   An initialized Amazon CloudWatch Logs client.
# @param instance_id [String] The ID of the instance.
# @param log_group_name [String] The name of the log group.
# @return [Boolean] true if the instance was restarted and the information
#   was written to the log stream; otherwise, false.
# @example
#   exit 1 unless instance_restarted?(
#     Aws::EC2::Client.new(region: 'us-east-1'),
#     Aws::CloudWatchLogs::Client.new(region: 'us-east-1'),
#     'i-033c48ef067af3dEX',
#     'aws-doc-sdk-examples-cloudwatch-log'
#   )
def instance_restarted?(
  ec2_client,
  cloudwatchlogs_client,
  instance_id,
  log_group_name
)
  log_stream_name = "#{Time.now.year}/#{Time.now.month}/#{Time.now.day}/" \
    "#{SecureRandom.uuid}"
  cloudwatchlogs_client.create_log_stream(
    log_group_name: log_group_name,
    log_stream_name: log_stream_name
  )
  sequence_token = ''

  puts "Attempting to stop the instance with the ID '#{instance_id}'. " \
    'This might take a few minutes...'
  ec2_client.stop_instances(instance_ids: [instance_id])
  ec2_client.wait_until(:instance_stopped, instance_ids: [instance_id])
  puts 'Instance stopped.'
  sequence_token = log_event(
    cloudwatchlogs_client,
    log_group_name,
    log_stream_name,
    "Instance '#{instance_id}' stopped.",
    sequence_token
```

```
  )

  puts 'Attempting to restart the instance. This might take a few minutes...'
  ec2_client.start_instances(instance_ids: [instance_id])
  ec2_client.wait_until(:instance_running, instance_ids: [instance_id])
  puts 'Instance restarted.'
  sequence_token = log_event(
    cloudwatchlogs_client,
    log_group_name,
    log_stream_name,
    "Instance '#{instance_id}' restarted.",
    sequence_token
  )

  true
rescue StandardError => e
  puts 'Error creating log stream or stopping or restarting the instance: ' \
    "#{e.message}"
  log_event(
    cloudwatchlogs_client,
    log_group_name,
    log_stream_name,
    "Error stopping or starting instance '#{instance_id}': #{e.message}",
    sequence_token
  )
  false
end
```

Display information about activity for a rule in EventBridge.

```
# Displays information about activity for a rule in Amazon EventBridge.
#
# Prerequisites:
#
# - A rule in Amazon EventBridge.
#
# @param cloudwatch_client [Amazon::CloudWatch::Client] An initialized
#   Amazon CloudWatch client.
# @param rule_name [String] The name of the rule.
# @param start_time [Time] The timestamp that determines the first datapoint
#   to return. Can also be expressed as DateTime, Date, Integer, or String.
# @param end_time [Time] The timestamp that determines the last datapoint
```

```
#   to return. Can also be expressed as DateTime, Date, Integer, or String.
# @param period [Integer] The interval, in seconds, to check for activity.
# @example
#   display_rule_activity(
#     Aws::CloudWatch::Client.new(region: 'us-east-1'),
#     'aws-doc-sdk-examples-ec2-state-change',
#     Time.now - 600, # Start checking from 10 minutes ago.
#     Time.now, # Check up until now.
#     60 # Check every minute during those 10 minutes.
#   )
def display_rule_activity(
  cloudwatch_client,
  rule_name,
  start_time,
  end_time,
  period
)
  puts 'Attempting to display rule activity...'
  response = cloudwatch_client.get_metric_statistics(
    namespace: 'AWS/Events',
    metric_name: 'Invocations',
    dimensions: [
      {
        name: 'RuleName',
        value: rule_name
      }
    ],
    start_time: start_time,
    end_time: end_time,
    period: period,
    statistics: ['Sum'],
    unit: 'Count'
  )

  if response.key?(:datapoints) && response.datapoints.count.positive?
    puts "The event rule '#{rule_name}' was triggered:"
    response.datapoints.each do |datapoint|
      puts "  #{datapoint.sum} time(s) at #{datapoint.timestamp}"
    end
  else
    puts "The event rule '#{rule_name}' was not triggered during the " \
      'specified time period.'
  end
rescue StandardError => e
```

```
  puts "Error getting information about event rule activity: #{e.message}"
end
```

Display log information for all of the log streams in a CloudWatch Logs log group.

```
# Displays log information for all of the log streams in a log group in
# Amazon CloudWatch Logs.
#
# Prerequisites:
#
# - A log group in Amazon CloudWatch Logs.
#
# @param cloudwatchlogs_client [Amazon::CloudWatchLogs::Client] An initialized
#   Amazon CloudWatch Logs client.
# @param log_group_name [String] The name of the log group.
# @example
#   display_log_data(
#     Amazon::CloudWatchLogs::Client.new(region: 'us-east-1'),
#     'aws-doc-sdk-examples-cloudwatch-log'
#   )
def display_log_data(cloudwatchlogs_client, log_group_name)
  puts 'Attempting to display log stream data for the log group ' \
    "named '#{log_group_name}'..."
  describe_log_streams_response = cloudwatchlogs_client.describe_log_streams(
    log_group_name: log_group_name,
    order_by: 'LastEventTime',
    descending: true
  )
  if describe_log_streams_response.key?(:log_streams) &&
     describe_log_streams_response.log_streams.count.positive?
    describe_log_streams_response.log_streams.each do |log_stream|
      get_log_events_response = cloudwatchlogs_client.get_log_events(
        log_group_name: log_group_name,
        log_stream_name: log_stream.log_stream_name
      )
      puts "\nLog messages for '#{log_stream.log_stream_name}':"
      puts '-' * (log_stream.log_stream_name.length + 20)
      if get_log_events_response.key?(:events) &&
         get_log_events_response.events.count.positive?
        get_log_events_response.events.each do |event|
          puts event.message
        end
```

```
      else
        puts 'No log messages for this log stream.'
      end
    end
  end
rescue StandardError => e
  puts 'Error getting information about the log streams or their messages: ' \
    "#{e.message}"
end
```

Display a reminder to the caller to manually clean up any associated AWS resources that they no longer need.

```
# Displays a reminder to the caller to manually clean up any associated
# AWS resources that they no longer need.
#
# @param topic_name [String] The name of the Amazon SNS topic.
# @param role_name [String] The name of the IAM role.
# @param rule_name [String] The name of the Amazon EventBridge rule.
# @param log_group_name [String] The name of the Amazon CloudWatch Logs log group.
# @param instance_id [String] The ID of the Amazon EC2 instance.
# @example
#   manual_cleanup_notice(
#     'aws-doc-sdk-examples-topic',
#     'aws-doc-sdk-examples-cloudwatch-events-rule-role',
#     'aws-doc-sdk-examples-ec2-state-change',
#     'aws-doc-sdk-examples-cloudwatch-log',
#     'i-033c48ef067af3dEX'
#   )
def manual_cleanup_notice(
  topic_name, role_name, rule_name, log_group_name, instance_id
)
  puts '-' * 10
  puts 'Some of the following AWS resources might still exist in your account.'
  puts 'If you no longer want to use this code example, then to clean up'
  puts 'your AWS account and avoid unexpected costs, you might want to'
  puts 'manually delete any of the following resources if they exist:'
  puts "- The Amazon SNS topic named '#{topic_name}'."
  puts "- The IAM role named '#{role_name}'."
  puts "- The Amazon EventBridge rule named '#{rule_name}'."
  puts "- The Amazon CloudWatch Logs log group named '#{log_group_name}'."
  puts "- The Amazon EC2 instance with the ID '#{instance_id}'."
```

```
end
```

- For API details, see the following topics in *AWS SDK for Ruby API Reference*.
  - PutEvents
  - PutRule

AWS Glue examples using SDK for Ruby

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

- Get started
- Basics
- Actions

Get started

Hello AWS Glue

The following code example shows how to get started using AWS Glue.

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
require 'aws-sdk-glue'
require 'logger'

# GlueManager is a class responsible for managing AWS Glue operations
# such as listing all Glue jobs in the current AWS account.
class GlueManager
  def initialize(client)
    @client = client
    @logger = Logger.new($stdout)
  end

  # Lists and prints all Glue jobs in the current AWS account.
  def list_jobs
    @logger.info('Here are the Glue jobs in your account:')

    paginator = @client.get_jobs(max_results: 10)
    jobs = []

    paginator.each_page do |page|
      jobs.concat(page.jobs)
    end

    if jobs.empty?
      @logger.info("You don't have any Glue jobs.")
    else
      jobs.each do |job|
        @logger.info("- #{job.name}")
      end
    end
  end
end

if $PROGRAM_NAME == __FILE__
  glue_client = Aws::Glue::Client.new
  manager = GlueManager.new(glue_client)
  manager.list_jobs
end
```

- For API details, see ListJobs in *AWS SDK for Ruby API Reference*.

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 Ruby

> **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 class that wraps AWS Glue functions used in the scenario.

```
# The `GlueWrapper` class serves as a wrapper around the AWS Glue API, providing a
 simplified interface for common operations.
# It encapsulates the functionality of the AWS SDK for Glue and provides methods for
 interacting with Glue crawlers, databases, tables, jobs, and S3 resources.
# The class initializes with a Glue client and a logger, allowing it to make API
 calls and log any errors or informational messages.
class GlueWrapper
  def initialize(glue_client, logger)
    @glue_client = glue_client
    @logger = logger
  end

  # Retrieves information about a specific crawler.
  #
```

```
  # @param name [String] The name of the crawler to retrieve information about.
  # @return [Aws::Glue::Types::Crawler, nil] The crawler object if found, or nil if
not found.
  def get_crawler(name)
    @glue_client.get_crawler(name: name)
  rescue Aws::Glue::Errors::EntityNotFoundException
    @logger.info("Crawler #{name} doesn't exist.")
    false
  rescue Aws::Glue::Errors::GlueException => e
    @logger.error("Glue could not get crawler #{name}: \n#{e.message}")
    raise
  end

  # Creates a new crawler with the specified configuration.
  #
  # @param name [String] The name of the crawler.
  # @param role_arn [String] The ARN of the IAM role to be used by the crawler.
  # @param db_name [String] The name of the database where the crawler stores its
metadata.
  # @param db_prefix [String] The prefix to be added to the names of tables that the
crawler creates.
  # @param s3_target [String] The S3 path that the crawler will crawl.
  # @return [void]
  def create_crawler(name, role_arn, db_name, _db_prefix, s3_target)
    @glue_client.create_crawler(
      name: name,
      role: role_arn,
      database_name: db_name,
      targets: {
        s3_targets: [
          {
            path: s3_target
          }
        ]
      }
    )
  rescue Aws::Glue::Errors::GlueException => e
    @logger.error("Glue could not create crawler: \n#{e.message}")
    raise
  end

  # Starts a crawler with the specified name.
  #
  # @param name [String] The name of the crawler to start.
```

```
  # @return [void]
  def start_crawler(name)
    @glue_client.start_crawler(name: name)
  rescue Aws::Glue::Errors::ServiceError => e
    @logger.error("Glue could not start crawler #{name}: \n#{e.message}")
    raise
  end

  # Deletes a crawler with the specified name.
  #
  # @param name [String] The name of the crawler to delete.
  # @return [void]
  def delete_crawler(name)
    @glue_client.delete_crawler(name: name)
  rescue Aws::Glue::Errors::ServiceError => e
    @logger.error("Glue could not delete crawler #{name}: \n#{e.message}")
    raise
  end

  # Retrieves information about a specific database.
  #
  # @param name [String] The name of the database to retrieve information about.
  # @return [Aws::Glue::Types::Database, nil] The database object if found, or nil
if not found.
  def get_database(name)
    response = @glue_client.get_database(name: name)
    response.database
  rescue Aws::Glue::Errors::GlueException => e
    @logger.error("Glue could not get database #{name}: \n#{e.message}")
    raise
  end

  # Retrieves a list of tables in the specified database.
  #
  # @param db_name [String] The name of the database to retrieve tables from.
  # @return [Array<Aws::Glue::Types::Table>]
  def get_tables(db_name)
    response = @glue_client.get_tables(database_name: db_name)
    response.table_list
  rescue Aws::Glue::Errors::GlueException => e
    @logger.error("Glue could not get tables #{db_name}: \n#{e.message}")
    raise
  end
```

```
  # Creates a new job with the specified configuration.
  #
  # @param name [String] The name of the job.
  # @param description [String] The description of the job.
  # @param role_arn [String] The ARN of the IAM role to be used by the job.
  # @param script_location [String] The location of the ETL script for the job.
  # @return [void]
  def create_job(name, description, role_arn, script_location)
    @glue_client.create_job(
      name: name,
      description: description,
      role: role_arn,
      command: {
        name: 'glueetl',
        script_location: script_location,
        python_version: '3'
      },
      glue_version: '3.0'
    )
  rescue Aws::Glue::Errors::GlueException => e
    @logger.error("Glue could not create job #{name}: \n#{e.message}")
    raise
  end

  # Starts a job run for the specified job.
  #
  # @param name [String] The name of the job to start the run for.
  # @param input_database [String] The name of the input database for the job.
  # @param input_table [String] The name of the input table for the job.
  # @param output_bucket_name [String] The name of the output S3 bucket for the job.
  # @return [String] The ID of the started job run.
  def start_job_run(name, input_database, input_table, output_bucket_name)
    response = @glue_client.start_job_run(
      job_name: name,
      arguments: {
        '--input_database': input_database,
        '--input_table': input_table,
        '--output_bucket_url': "s3://#{output_bucket_name}/"
      }
    )
    response.job_run_id
  rescue Aws::Glue::Errors::GlueException => e
    @logger.error("Glue could not start job run #{name}: \n#{e.message}")
    raise
```

```
  end

  # Retrieves a list of jobs in AWS Glue.
  #
  # @return [Aws::Glue::Types::ListJobsResponse]
  def list_jobs
    @glue_client.list_jobs
  rescue Aws::Glue::Errors::GlueException => e
    @logger.error("Glue could not list jobs: \n#{e.message}")
    raise
  end

  # Retrieves a list of job runs for the specified job.
  #
  # @param job_name [String] The name of the job to retrieve job runs for.
  # @return [Array<Aws::Glue::Types::JobRun>]
  def get_job_runs(job_name)
    response = @glue_client.get_job_runs(job_name: job_name)
    response.job_runs
  rescue Aws::Glue::Errors::GlueException => e
    @logger.error("Glue could not get job runs: \n#{e.message}")
  end

  # Retrieves data for a specific job run.
  #
  # @param job_name [String] The name of the job run to retrieve data for.
  # @return [Glue::Types::GetJobRunResponse]
  def get_job_run(job_name, run_id)
    @glue_client.get_job_run(job_name: job_name, run_id: run_id)
  rescue Aws::Glue::Errors::GlueException => e
    @logger.error("Glue could not get job runs: \n#{e.message}")
  end

  # Deletes a job with the specified name.
  #
  # @param job_name [String] The name of the job to delete.
  # @return [void]
  def delete_job(job_name)
    @glue_client.delete_job(job_name: job_name)
  rescue Aws::Glue::Errors::ServiceError => e
    @logger.error("Glue could not delete job: \n#{e.message}")
  end

  # Deletes a table with the specified name.
```

```
  #
  # @param database_name [String] The name of the catalog database in which the
 table resides.
  # @param table_name [String] The name of the table to be deleted.
  # @return [void]
  def delete_table(database_name, table_name)
    @glue_client.delete_table(database_name: database_name, name: table_name)
  rescue Aws::Glue::Errors::ServiceError => e
    @logger.error("Glue could not delete job: \n#{e.message}")
  end

  # Removes a specified database from a Data Catalog.
  #
  # @param database_name [String] The name of the database to delete.
  # @return [void]
  def delete_database(database_name)
    @glue_client.delete_database(name: database_name)
  rescue Aws::Glue::Errors::ServiceError => e
    @logger.error("Glue could not delete database: \n#{e.message}")
  end

  # Uploads a job script file to an S3 bucket.
  #
  # @param file_path [String] The local path of the job script file.
  # @param bucket_resource [Aws::S3::Bucket] The S3 bucket resource to upload the
 file to.
  # @return [void]
  def upload_job_script(file_path, bucket_resource)
    File.open(file_path) do |file|
      bucket_resource.client.put_object({
                                          body: file,
                                          bucket: bucket_resource.name,
                                          key: file_path
                                        })
    end
  rescue Aws::S3::Errors::S3UploadFailedError => e
    @logger.error("S3 could not upload job script: \n#{e.message}")
    raise
  end
end
```

Create a class that runs the scenario.

```
class GlueCrawlerJobScenario
  def initialize(glue_client, glue_service_role, glue_bucket, logger)
    @glue_client = glue_client
    @glue_service_role = glue_service_role
    @glue_bucket = glue_bucket
    @logger = logger
  end

  def run(crawler_name, db_name, db_prefix, data_source, job_script, job_name)
    wrapper = GlueWrapper.new(@glue_client, @logger)
    setup_crawler(wrapper, crawler_name, db_name, db_prefix, data_source)
    query_database(wrapper, crawler_name, db_name)
    create_and_run_job(wrapper, job_script, job_name, db_name)
  end

  private

  def setup_crawler(wrapper, crawler_name, db_name, db_prefix, data_source)
    new_step(1, 'Create a crawler')
    crawler = wrapper.get_crawler(crawler_name)
    unless crawler
      puts "Creating crawler #{crawler_name}."
      wrapper.create_crawler(crawler_name, @glue_service_role.arn, db_name,
 db_prefix, data_source)
      puts "Successfully created #{crawler_name}."
    end
    wrapper.start_crawler(crawler_name)
    monitor_crawler(wrapper, crawler_name)
  end

  def monitor_crawler(wrapper, crawler_name)
    new_step(2, 'Monitor Crawler')
    crawler_state = nil
    until crawler_state == 'READY'
      custom_wait(15)
      crawler = wrapper.get_crawler(crawler_name)
      crawler_state = crawler[0]['state']
      print "Crawler status: #{crawler_state}".yellow
    end
  end

  def query_database(wrapper, _crawler_name, db_name)
    new_step(3, 'Query the database.')
```

```
    wrapper.get_database(db_name)
    puts "The crawler created database #{db_name}:"
    puts "Database contains tables: #{wrapper.get_tables(db_name).map { |t|
 t['name'] }}"
  end

  def create_and_run_job(wrapper, job_script, job_name, db_name)
    new_step(4, 'Create and run job.')
    wrapper.upload_job_script(job_script, @glue_bucket)
    wrapper.create_job(job_name, 'ETL Job', @glue_service_role.arn, "s3://
#{@glue_bucket.name}/#{job_script}")
    run_job(wrapper, job_name, db_name)
  end

  def run_job(wrapper, job_name, db_name)
    new_step(5, 'Run the job.')
    wrapper.start_job_run(job_name, db_name, wrapper.get_tables(db_name)[0]['name'],
 @glue_bucket.name)
    job_run_status = nil
    until %w[SUCCEEDED FAILED STOPPED].include?(job_run_status)
      custom_wait(10)
      job_run = wrapper.get_job_runs(job_name)
      job_run_status = job_run[0]['job_run_state']
      print "Job #{job_name} status: #{job_run_status}".yellow
    end
  end
end

def main
  banner('../../helpers/banner.txt')
  puts 'Starting AWS Glue demo...'

  # Load resource names from YAML.
  resource_names = YAML.load_file('resource_names.yaml')

  # Setup services and resources.
  iam_role = Aws::IAM::Resource.new(region: 'us-
east-1').role(resource_names['glue_service_role'])
  s3_bucket = Aws::S3::Resource.new(region: 'us-
east-1').bucket(resource_names['glue_bucket'])

  # Instantiate scenario and run.
  scenario = GlueCrawlerJobScenario.new(Aws::Glue::Client.new(region: 'us-east-1'),
 iam_role, s3_bucket, @logger)
```

```
  random_suffix = rand(10**4)
  scenario.run("crawler-#{random_suffix}", "db-#{random_suffix}", "prefix-
#{random_suffix}-", 's3://data_source',
               'job_script.py', "job-#{random_suffix}")

  puts 'Demo complete.'
end
```

Create an ETL script that is used by AWS Glue to extract, transform, and load data during job runs.

```
import sys
from awsglue.transforms import *
from awsglue.utils import getResolvedOptions
from pyspark.context import SparkContext
from awsglue.context import GlueContext
from awsglue.job import Job

"""
These custom arguments must be passed as Arguments to the StartJobRun request.
    --input_database    The name of a metadata database that is contained in your
                        AWS Glue Data Catalog and that contains tables that
 describe
                        the data to be processed.
    --input_table       The name of a table in the database that describes the data
 to
                        be processed.
    --output_bucket_url An S3 bucket that receives the transformed output data.
"""
args = getResolvedOptions(
    sys.argv, ["JOB_NAME", "input_database", "input_table", "output_bucket_url"]
)
sc = SparkContext()
glueContext = GlueContext(sc)
spark = glueContext.spark_session
job = Job(glueContext)
job.init(args["JOB_NAME"], args)

# Script generated for node S3 Flight Data.
S3FlightData_node1 = glueContext.create_dynamic_frame.from_catalog(
    database=args["input_database"],
    table_name=args["input_table"],
```

```
    transformation_ctx="S3FlightData_node1",
)

# This mapping performs two main functions:
# 1. It simplifies the output by removing most of the fields from the data.
# 2. It renames some fields. For example, `fl_date` is renamed to `flight_date`.
ApplyMapping_node2 = ApplyMapping.apply(
    frame=S3FlightData_node1,
    mappings=[
        ("year", "long", "year", "long"),
        ("month", "long", "month", "tinyint"),
        ("day_of_month", "long", "day", "tinyint"),
        ("fl_date", "string", "flight_date", "string"),
        ("carrier", "string", "carrier", "string"),
        ("fl_num", "long", "flight_num", "long"),
        ("origin_city_name", "string", "origin_city_name", "string"),
        ("origin_state_abr", "string", "origin_state_abr", "string"),
        ("dest_city_name", "string", "dest_city_name", "string"),
        ("dest_state_abr", "string", "dest_state_abr", "string"),
        ("dep_time", "long", "departure_time", "long"),
        ("wheels_off", "long", "wheels_off", "long"),
        ("wheels_on", "long", "wheels_on", "long"),
        ("arr_time", "long", "arrival_time", "long"),
        ("mon", "string", "mon", "string"),
    ],
    transformation_ctx="ApplyMapping_node2",
)

# Script generated for node Revised Flight Data.
RevisedFlightData_node3 = glueContext.write_dynamic_frame.from_options(
    frame=ApplyMapping_node2,
    connection_type="s3",
    format="json",
    connection_options={"path": args["output_bucket_url"], "partitionKeys": []},
    transformation_ctx="RevisedFlightData_node3",
)

job.commit()
```

- For API details, see the following topics in *AWS SDK for Ruby 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 Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
# The `GlueWrapper` class serves as a wrapper around the AWS Glue API, providing a
 simplified interface for common operations.
# It encapsulates the functionality of the AWS SDK for Glue and provides methods for
 interacting with Glue crawlers, databases, tables, jobs, and S3 resources.
# The class initializes with a Glue client and a logger, allowing it to make API
 calls and log any errors or informational messages.
```

```
class GlueWrapper
  def initialize(glue_client, logger)
    @glue_client = glue_client
    @logger = logger
  end

  # Creates a new crawler with the specified configuration.
  #
  # @param name [String] The name of the crawler.
  # @param role_arn [String] The ARN of the IAM role to be used by the crawler.
  # @param db_name [String] The name of the database where the crawler stores its
 metadata.
  # @param db_prefix [String] The prefix to be added to the names of tables that the
 crawler creates.
  # @param s3_target [String] The S3 path that the crawler will crawl.
  # @return [void]
  def create_crawler(name, role_arn, db_name, _db_prefix, s3_target)
    @glue_client.create_crawler(
      name: name,
      role: role_arn,
      database_name: db_name,
      targets: {
        s3_targets: [
          {
            path: s3_target
          }
        ]
      }
    )
  rescue Aws::Glue::Errors::GlueException => e
    @logger.error("Glue could not create crawler: \n#{e.message}")
    raise
  end
```

- For API details, see CreateCrawler in *AWS SDK for Ruby API Reference*.

`CreateJob`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
# The `GlueWrapper` class serves as a wrapper around the AWS Glue API, providing a
 simplified interface for common operations.
# It encapsulates the functionality of the AWS SDK for Glue and provides methods for
 interacting with Glue crawlers, databases, tables, jobs, and S3 resources.
# The class initializes with a Glue client and a logger, allowing it to make API
 calls and log any errors or informational messages.
class GlueWrapper
  def initialize(glue_client, logger)
    @glue_client = glue_client
    @logger = logger
  end

  # Creates a new job with the specified configuration.
  #
  # @param name [String] The name of the job.
  # @param description [String] The description of the job.
  # @param role_arn [String] The ARN of the IAM role to be used by the job.
  # @param script_location [String] The location of the ETL script for the job.
  # @return [void]
  def create_job(name, description, role_arn, script_location)
    @glue_client.create_job(
      name: name,
      description: description,
      role: role_arn,
      command: {
        name: 'glueetl',
        script_location: script_location,
        python_version: '3'
      },
      glue_version: '3.0'
    )
  rescue Aws::Glue::Errors::GlueException => e
    @logger.error("Glue could not create job #{name}: \n#{e.message}")
```

```
    raise
  end
```

- For API details, see CreateJob in *AWS SDK for Ruby API Reference*.

`DeleteCrawler`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
# The `GlueWrapper` class serves as a wrapper around the AWS Glue API, providing a
 simplified interface for common operations.
# It encapsulates the functionality of the AWS SDK for Glue and provides methods for
 interacting with Glue crawlers, databases, tables, jobs, and S3 resources.
# The class initializes with a Glue client and a logger, allowing it to make API
 calls and log any errors or informational messages.
class GlueWrapper
  def initialize(glue_client, logger)
    @glue_client = glue_client
    @logger = logger
  end

  # Deletes a crawler with the specified name.
  #
  # @param name [String] The name of the crawler to delete.
  # @return [void]
  def delete_crawler(name)
    @glue_client.delete_crawler(name: name)
  rescue Aws::Glue::Errors::ServiceError => e
    @logger.error("Glue could not delete crawler #{name}: \n#{e.message}")
    raise
  end
```

- For API details, see DeleteCrawler in *AWS SDK for Ruby API Reference*.

`DeleteDatabase`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
# The `GlueWrapper` class serves as a wrapper around the AWS Glue API, providing a
 simplified interface for common operations.
# It encapsulates the functionality of the AWS SDK for Glue and provides methods for
 interacting with Glue crawlers, databases, tables, jobs, and S3 resources.
# The class initializes with a Glue client and a logger, allowing it to make API
 calls and log any errors or informational messages.
class GlueWrapper
  def initialize(glue_client, logger)
    @glue_client = glue_client
    @logger = logger
  end

  # Removes a specified database from a Data Catalog.
  #
  # @param database_name [String] The name of the database to delete.
  # @return [void]
  def delete_database(database_name)
    @glue_client.delete_database(name: database_name)
  rescue Aws::Glue::Errors::ServiceError => e
    @logger.error("Glue could not delete database: \n#{e.message}")
  end
```

- For API details, see DeleteDatabase in *AWS SDK for Ruby API Reference*.

`DeleteJob`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
# The `GlueWrapper` class serves as a wrapper around the AWS Glue API, providing a
 simplified interface for common operations.
# It encapsulates the functionality of the AWS SDK for Glue and provides methods for
 interacting with Glue crawlers, databases, tables, jobs, and S3 resources.
# The class initializes with a Glue client and a logger, allowing it to make API
 calls and log any errors or informational messages.
class GlueWrapper
  def initialize(glue_client, logger)
    @glue_client = glue_client
    @logger = logger
  end

  # Deletes a job with the specified name.
  #
  # @param job_name [String] The name of the job to delete.
  # @return [void]
  def delete_job(job_name)
    @glue_client.delete_job(job_name: job_name)
  rescue Aws::Glue::Errors::ServiceError => e
    @logger.error("Glue could not delete job: \n#{e.message}")
  end
```

- For API details, see DeleteJob in *AWS SDK for Ruby API Reference*.

`DeleteTable`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
# The `GlueWrapper` class serves as a wrapper around the AWS Glue API, providing a
 simplified interface for common operations.
# It encapsulates the functionality of the AWS SDK for Glue and provides methods for
 interacting with Glue crawlers, databases, tables, jobs, and S3 resources.
# The class initializes with a Glue client and a logger, allowing it to make API
 calls and log any errors or informational messages.
class GlueWrapper
  def initialize(glue_client, logger)
    @glue_client = glue_client
    @logger = logger
  end

  # Deletes a table with the specified name.
  #
  # @param database_name [String] The name of the catalog database in which the
 table resides.
  # @param table_name [String] The name of the table to be deleted.
  # @return [void]
  def delete_table(database_name, table_name)
    @glue_client.delete_table(database_name: database_name, name: table_name)
  rescue Aws::Glue::Errors::ServiceError => e
    @logger.error("Glue could not delete job: \n#{e.message}")
  end
```

- For API details, see DeleteTable in *AWS SDK for Ruby API Reference*.

`GetCrawler`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
# The `GlueWrapper` class serves as a wrapper around the AWS Glue API, providing a
 simplified interface for common operations.
# It encapsulates the functionality of the AWS SDK for Glue and provides methods for
 interacting with Glue crawlers, databases, tables, jobs, and S3 resources.
# The class initializes with a Glue client and a logger, allowing it to make API
 calls and log any errors or informational messages.
class GlueWrapper
  def initialize(glue_client, logger)
    @glue_client = glue_client
    @logger = logger
  end

  # Retrieves information about a specific crawler.
  #
  # @param name [String] The name of the crawler to retrieve information about.
  # @return [Aws::Glue::Types::Crawler, nil] The crawler object if found, or nil if
 not found.
  def get_crawler(name)
    @glue_client.get_crawler(name: name)
  rescue Aws::Glue::Errors::EntityNotFoundException
    @logger.info("Crawler #{name} doesn't exist.")
    false
  rescue Aws::Glue::Errors::GlueException => e
    @logger.error("Glue could not get crawler #{name}: \n#{e.message}")
    raise
  end
```

- For API details, see GetCrawler in *AWS SDK for Ruby API Reference*.

`GetDatabase`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
# The `GlueWrapper` class serves as a wrapper around the AWS Glue API, providing a
 simplified interface for common operations.
# It encapsulates the functionality of the AWS SDK for Glue and provides methods for
 interacting with Glue crawlers, databases, tables, jobs, and S3 resources.
# The class initializes with a Glue client and a logger, allowing it to make API
 calls and log any errors or informational messages.
class GlueWrapper
  def initialize(glue_client, logger)
    @glue_client = glue_client
    @logger = logger
  end

  # Retrieves information about a specific database.
  #
  # @param name [String] The name of the database to retrieve information about.
  # @return [Aws::Glue::Types::Database, nil] The database object if found, or nil
 if not found.
  def get_database(name)
    response = @glue_client.get_database(name: name)
    response.database
  rescue Aws::Glue::Errors::GlueException => e
    @logger.error("Glue could not get database #{name}: \n#{e.message}")
    raise
  end
```

- For API details, see GetDatabase in *AWS SDK for Ruby API Reference*.

`GetJobRun`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
# The `GlueWrapper` class serves as a wrapper around the AWS Glue API, providing a
 simplified interface for common operations.
# It encapsulates the functionality of the AWS SDK for Glue and provides methods for
 interacting with Glue crawlers, databases, tables, jobs, and S3 resources.
# The class initializes with a Glue client and a logger, allowing it to make API
 calls and log any errors or informational messages.
class GlueWrapper
  def initialize(glue_client, logger)
    @glue_client = glue_client
    @logger = logger
  end

  # Retrieves data for a specific job run.
  #
  # @param job_name [String] The name of the job run to retrieve data for.
  # @return [Glue::Types::GetJobRunResponse]
  def get_job_run(job_name, run_id)
    @glue_client.get_job_run(job_name: job_name, run_id: run_id)
  rescue Aws::Glue::Errors::GlueException => e
    @logger.error("Glue could not get job runs: \n#{e.message}")
  end
```

- For API details, see GetJobRun in *AWS SDK for Ruby API Reference*.

`GetJobRuns`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
# The `GlueWrapper` class serves as a wrapper around the AWS Glue API, providing a
 simplified interface for common operations.
# It encapsulates the functionality of the AWS SDK for Glue and provides methods for
 interacting with Glue crawlers, databases, tables, jobs, and S3 resources.
# The class initializes with a Glue client and a logger, allowing it to make API
 calls and log any errors or informational messages.
class GlueWrapper
  def initialize(glue_client, logger)
    @glue_client = glue_client
    @logger = logger
  end

  # Retrieves a list of job runs for the specified job.
  #
  # @param job_name [String] The name of the job to retrieve job runs for.
  # @return [Array<Aws::Glue::Types::JobRun>]
  def get_job_runs(job_name)
    response = @glue_client.get_job_runs(job_name: job_name)
    response.job_runs
  rescue Aws::Glue::Errors::GlueException => e
    @logger.error("Glue could not get job runs: \n#{e.message}")
  end
```

- For API details, see GetJobRuns in *AWS SDK for Ruby API Reference*.

`GetTables`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
# The `GlueWrapper` class serves as a wrapper around the AWS Glue API, providing a
 simplified interface for common operations.
# It encapsulates the functionality of the AWS SDK for Glue and provides methods for
 interacting with Glue crawlers, databases, tables, jobs, and S3 resources.
# The class initializes with a Glue client and a logger, allowing it to make API
 calls and log any errors or informational messages.
class GlueWrapper
  def initialize(glue_client, logger)
    @glue_client = glue_client
    @logger = logger
  end

  # Retrieves a list of tables in the specified database.
  #
  # @param db_name [String] The name of the database to retrieve tables from.
  # @return [Array<Aws::Glue::Types::Table>]
  def get_tables(db_name)
    response = @glue_client.get_tables(database_name: db_name)
    response.table_list
  rescue Aws::Glue::Errors::GlueException => e
    @logger.error("Glue could not get tables #{db_name}: \n#{e.message}")
    raise
  end
```

- For API details, see GetTables in *AWS SDK for Ruby API Reference*.

`ListJobs`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
# The `GlueWrapper` class serves as a wrapper around the AWS Glue API, providing a
 simplified interface for common operations.
# It encapsulates the functionality of the AWS SDK for Glue and provides methods for
 interacting with Glue crawlers, databases, tables, jobs, and S3 resources.
# The class initializes with a Glue client and a logger, allowing it to make API
 calls and log any errors or informational messages.
class GlueWrapper
  def initialize(glue_client, logger)
    @glue_client = glue_client
    @logger = logger
  end

  # Retrieves a list of jobs in AWS Glue.
  #
  # @return [Aws::Glue::Types::ListJobsResponse]
  def list_jobs
    @glue_client.list_jobs
  rescue Aws::Glue::Errors::GlueException => e
    @logger.error("Glue could not list jobs: \n#{e.message}")
    raise
  end
```

- For API details, see ListJobs in *AWS SDK for Ruby API Reference*.

`StartCrawler`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
# The `GlueWrapper` class serves as a wrapper around the AWS Glue API, providing a
 simplified interface for common operations.
# It encapsulates the functionality of the AWS SDK for Glue and provides methods for
 interacting with Glue crawlers, databases, tables, jobs, and S3 resources.
# The class initializes with a Glue client and a logger, allowing it to make API
 calls and log any errors or informational messages.
class GlueWrapper
  def initialize(glue_client, logger)
    @glue_client = glue_client
    @logger = logger
  end

  # Starts a crawler with the specified name.
  #
  # @param name [String] The name of the crawler to start.
  # @return [void]
  def start_crawler(name)
    @glue_client.start_crawler(name: name)
  rescue Aws::Glue::Errors::ServiceError => e
    @logger.error("Glue could not start crawler #{name}: \n#{e.message}")
    raise
  end
```

- For API details, see StartCrawler in *AWS SDK for Ruby API Reference*.

`StartJobRun`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
# The `GlueWrapper` class serves as a wrapper around the AWS Glue API, providing a
 simplified interface for common operations.
# It encapsulates the functionality of the AWS SDK for Glue and provides methods for
 interacting with Glue crawlers, databases, tables, jobs, and S3 resources.
# The class initializes with a Glue client and a logger, allowing it to make API
 calls and log any errors or informational messages.
class GlueWrapper
  def initialize(glue_client, logger)
    @glue_client = glue_client
    @logger = logger
  end

  # Starts a job run for the specified job.
  #
  # @param name [String] The name of the job to start the run for.
  # @param input_database [String] The name of the input database for the job.
  # @param input_table [String] The name of the input table for the job.
  # @param output_bucket_name [String] The name of the output S3 bucket for the job.
  # @return [String] The ID of the started job run.
  def start_job_run(name, input_database, input_table, output_bucket_name)
    response = @glue_client.start_job_run(
      job_name: name,
      arguments: {
        '--input_database': input_database,
        '--input_table': input_table,
        '--output_bucket_url': "s3://#{output_bucket_name}/"
      }
    )
    response.job_run_id
  rescue Aws::Glue::Errors::GlueException => e
    @logger.error("Glue could not start job run #{name}: \n#{e.message}")
    raise
  end
```

- For API details, see StartJobRun in *AWS SDK for Ruby API Reference*.

IAM examples using SDK for Ruby

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

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

- Get started
- Basics
- Actions

Get started

Hello IAM

The following code example shows how to get started using IAM.

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
require 'aws-sdk-iam'
require 'logger'

# IAMManager is a class responsible for managing IAM operations
# such as listing all IAM policies in the current AWS account.
class IAMManager
  def initialize(client)
    @client = client
    @logger = Logger.new($stdout)
  end

  # Lists and prints all IAM policies in the current AWS account.
  def list_policies
    @logger.info('Here are the IAM policies in your account:')

    paginator = @client.list_policies
    policies = []

    paginator.each_page do |page|
      policies.concat(page.policies)
    end

    if policies.empty?
      @logger.info("You don't have any IAM policies.")
    else
      policies.each do |policy|
        @logger.info("- #{policy.policy_name}")
      end
    end
  end
end

if $PROGRAM_NAME == __FILE__
  iam_client = Aws::IAM::Client.new
  manager = IAMManager.new(iam_client)
  manager.list_policies
end
```

- For API details, see ListPolicies in *AWS SDK for Ruby API Reference*.

Basics

Learn the basics

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 Ruby

> **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 an IAM user and a role that grants permission to list Amazon S3 buckets. The user has rights only to assume the role. After assuming the role, use temporary credentials to list buckets for the account.

```
# Wraps the scenario actions.
class ScenarioCreateUserAssumeRole
  attr_reader :iam_client

  # @param [Aws::IAM::Client] iam_client: The AWS IAM client.
  def initialize(iam_client, logger: Logger.new($stdout))
    @iam_client = iam_client
    @logger = logger
  end
```

```
# Waits for the specified number of seconds.
#
# @param duration [Integer] The number of seconds to wait.
def wait(duration)
  puts('Give AWS time to propagate resources...')
  sleep(duration)
end

# Creates a user.
#
# @param user_name [String] The name to give the user.
# @return [Aws::IAM::User] The newly created user.
def create_user(user_name)
  user = @iam_client.create_user(user_name: user_name).user
  @logger.info("Created demo user named #{user.user_name}.")
rescue Aws::Errors::ServiceError => e
  @logger.info('Tried and failed to create demo user.')
  @logger.info("\t#{e.code}: #{e.message}")
  @logger.info("\nCan't continue the demo without a user!")
  raise
else
  user
end

# Creates an access key for a user.
#
# @param user [Aws::IAM::User] The user that owns the key.
# @return [Aws::IAM::AccessKeyPair] The newly created access key.
def create_access_key_pair(user)
  user_key = @iam_client.create_access_key(user_name: user.user_name).access_key
  @logger.info("Created accesskey pair for user #{user.user_name}.")
rescue Aws::Errors::ServiceError => e
  @logger.info("Couldn't create access keys for user #{user.user_name}.")
  @logger.info("\t#{e.code}: #{e.message}")
  raise
else
  user_key
end

# Creates a role that can be assumed by a user.
#
# @param role_name [String] The name to give the role.
```

```
 # @param user [Aws::IAM::User] The user who is granted permission to assume the
role.
 # @return [Aws::IAM::Role] The newly created role.
 def create_role(role_name, user)
   trust_policy = {
     Version: '2012-10-17',
     Statement: [{
       Effect: 'Allow',
       Principal: { 'AWS': user.arn },
       Action: 'sts:AssumeRole'
     }]
   }.to_json
   role = @iam_client.create_role(
     role_name: role_name,
     assume_role_policy_document: trust_policy
   ).role
   @logger.info("Created role #{role.role_name}.")
 rescue Aws::Errors::ServiceError => e
   @logger.info("Couldn't create a role for the demo. Here's why: ")
   @logger.info("\t#{e.code}: #{e.message}")
   raise
 else
   role
 end

 # Creates a policy that grants permission to list S3 buckets in the account, and
 # then attaches the policy to a role.
 #
 # @param policy_name [String] The name to give the policy.
 # @param role [Aws::IAM::Role] The role that the policy is attached to.
 # @return [Aws::IAM::Policy] The newly created policy.
 def create_and_attach_role_policy(policy_name, role)
   policy_document = {
     Version: '2012-10-17',
     Statement: [{
       Effect: 'Allow',
       Action: 's3:ListAllMyBuckets',
       Resource: 'arn:aws:s3:::*'
     }]
   }.to_json
   policy = @iam_client.create_policy(
     policy_name: policy_name,
     policy_document: policy_document
   ).policy
```

```
    @iam_client.attach_role_policy(
      role_name: role.role_name,
      policy_arn: policy.arn
    )
    @logger.info("Created policy #{policy.policy_name} and attached it to role
#{role.role_name}.")
  rescue Aws::Errors::ServiceError => e
    @logger.info("Couldn't create a policy and attach it to role #{role.role_name}.
Here's why: ")
    @logger.info("\t#{e.code}: #{e.message}")
    raise
  end

  # Creates an inline policy for a user that lets the user assume a role.
  #
  # @param policy_name [String] The name to give the policy.
  # @param user [Aws::IAM::User] The user that owns the policy.
  # @param role [Aws::IAM::Role] The role that can be assumed.
  # @return [Aws::IAM::UserPolicy] The newly created policy.
  def create_user_policy(policy_name, user, role)
    policy_document = {
      Version: '2012-10-17',
      Statement: [{
        Effect: 'Allow',
        Action: 'sts:AssumeRole',
        Resource: role.arn
      }]
    }.to_json
    @iam_client.put_user_policy(
      user_name: user.user_name,
      policy_name: policy_name,
      policy_document: policy_document
    )
    puts("Created an inline policy for #{user.user_name} that lets the user assume
role #{role.role_name}.")
  rescue Aws::Errors::ServiceError => e
    @logger.info("Couldn't create an inline policy for user #{user.user_name}.
Here's why: ")
    @logger.info("\t#{e.code}: #{e.message}")
    raise
  end

  # Creates an Amazon S3 resource with specified credentials. This is separated into
a
```

```
 # factory function so that it can be mocked for unit testing.
 #
 # @param credentials [Aws::Credentials] The credentials used by the Amazon S3
resource.
 def create_s3_resource(credentials)
   Aws::S3::Resource.new(client: Aws::S3::Client.new(credentials: credentials))
 end

 # Lists the S3 buckets for the account, using the specified Amazon S3 resource.
 # Because the resource uses credentials with limited access, it may not be able to
 # list the S3 buckets.
 #
 # @param s3_resource [Aws::S3::Resource] An Amazon S3 resource.
 def list_buckets(s3_resource)
   count = 10
   s3_resource.buckets.each do |bucket|
     @logger.info "\t#{bucket.name}"
     count -= 1
     break if count.zero?
   end
 rescue Aws::Errors::ServiceError => e
   if e.code == 'AccessDenied'
     puts('Attempt to list buckets with no permissions: AccessDenied.')
   else
     @logger.info("Couldn't list buckets for the account. Here's why: ")
     @logger.info("\t#{e.code}: #{e.message}")
     raise
   end
 end

 # Creates an AWS Security Token Service (AWS STS) client with specified
credentials.
 # This is separated into a factory function so that it can be mocked for unit
testing.
 #
 # @param key_id [String] The ID of the access key used by the STS client.
 # @param key_secret [String] The secret part of the access key used by the STS
client.
 def create_sts_client(key_id, key_secret)
   Aws::STS::Client.new(access_key_id: key_id, secret_access_key: key_secret)
 end

 # Gets temporary credentials that can be used to assume a role.
 #
```

```
 # @param role_arn [String] The ARN of the role that is assumed when these
credentials
 #                          are used.
 # @param sts_client [AWS::STS::Client] An AWS STS client.
 # @return [Aws::AssumeRoleCredentials] The credentials that can be used to assume
the role.
 def assume_role(role_arn, sts_client)
   credentials = Aws::AssumeRoleCredentials.new(
     client: sts_client,
     role_arn: role_arn,
     role_session_name: 'create-use-assume-role-scenario'
   )
   @logger.info("Assumed role '#{role_arn}', got temporary credentials.")
   credentials
 end

 # Deletes a role. If the role has policies attached, they are detached and
 # deleted before the role is deleted.
 #
 # @param role_name [String] The name of the role to delete.
 def delete_role(role_name)
   @iam_client.list_attached_role_policies(role_name:
role_name).attached_policies.each do |policy|
     @iam_client.detach_role_policy(role_name: role_name, policy_arn:
policy.policy_arn)
     @iam_client.delete_policy(policy_arn: policy.policy_arn)
     @logger.info("Detached and deleted policy #{policy.policy_name}.")
   end
   @iam_client.delete_role({ role_name: role_name })
   @logger.info("Role deleted: #{role_name}.")
 rescue Aws::Errors::ServiceError => e
   @logger.info("Couldn't detach policies and delete role #{role.name}. Here's
why:")
   @logger.info("\t#{e.code}: #{e.message}")
   raise
 end

 # Deletes a user. If the user has inline policies or access keys, they are deleted
 # before the user is deleted.
 #
 # @param user [Aws::IAM::User] The user to delete.
 def delete_user(user_name)
   user = @iam_client.list_access_keys(user_name: user_name).access_key_metadata
   user.each do |key|
```

```
      @iam_client.delete_access_key({ access_key_id: key.access_key_id, user_name:
 user_name })
      @logger.info("Deleted access key #{key.access_key_id} for user
 '#{user_name}'.")
    end

    @iam_client.delete_user(user_name: user_name)
    @logger.info("Deleted user '#{user_name}'.")
  rescue Aws::IAM::Errors::ServiceError => e
    @logger.error("Error deleting user '#{user_name}': #{e.message}")
  end
end

# Runs the IAM create a user and assume a role scenario.
def run_scenario(scenario)
  puts('-' * 88)
  puts('Welcome to the IAM create a user and assume a role demo!')
  puts('-' * 88)
  user = scenario.create_user("doc-example-user-#{Random.uuid}")
  user_key = scenario.create_access_key_pair(user)
  scenario.wait(10)
  role = scenario.create_role("doc-example-role-#{Random.uuid}", user)
  scenario.create_and_attach_role_policy("doc-example-role-policy-#{Random.uuid}",
 role)
  scenario.create_user_policy("doc-example-user-policy-#{Random.uuid}", user, role)
  scenario.wait(10)
  puts('Try to list buckets with credentials for a user who has no permissions.')
  puts('Expect AccessDenied from this call.')
  scenario.list_buckets(
    scenario.create_s3_resource(Aws::Credentials.new(user_key.access_key_id,
 user_key.secret_access_key))
  )
  puts('Now, assume the role that grants permission.')
  temp_credentials = scenario.assume_role(
    role.arn, scenario.create_sts_client(user_key.access_key_id,
 user_key.secret_access_key)
  )
  puts('Here are your buckets:')
  scenario.list_buckets(scenario.create_s3_resource(temp_credentials))
  puts("Deleting role '#{role.role_name}' and attached policies.")
  scenario.delete_role(role.role_name)
  puts("Deleting user '#{user.user_name}', policies, and keys.")
  scenario.delete_user(user.user_name)
  puts('Thanks for watching!')
```

```
  puts('-' * 88)
rescue Aws::Errors::ServiceError => e
  puts('Something went wrong with the demo.')
  puts("\t#{e.code}: #{e.message}")
end

run_scenario(ScenarioCreateUserAssumeRole.new(Aws::IAM::Client.new)) if
 $PROGRAM_NAME == __FILE__
```

- For API details, see the following topics in *AWS SDK for Ruby API Reference*.
  - AttachRolePolicy
  - CreateAccessKey
  - CreatePolicy
  - CreateRole
  - CreateUser
  - DeleteAccessKey
  - DeletePolicy
  - DeleteRole
  - DeleteUser
  - DeleteUserPolicy
  - DetachRolePolicy
  - PutUserPolicy

Actions

`AttachRolePolicy`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

This example module lists, creates, attaches, and detaches role policies.

```
# Manages policies in AWS Identity and Access Management (IAM)
class RolePolicyManager
  # Initialize with an AWS IAM client
  #
  # @param iam_client [Aws::IAM::Client] An initialized IAM client
  def initialize(iam_client, logger: Logger.new($stdout))
    @iam_client = iam_client
    @logger = logger
    @logger.progname = 'PolicyManager'
  end

  # Creates a policy
  #
  # @param policy_name [String] The name of the policy
  # @param policy_document [Hash] The policy document
  # @return [String] The policy ARN if successful, otherwise nil
  def create_policy(policy_name, policy_document)
    response = @iam_client.create_policy(
      policy_name: policy_name,
      policy_document: policy_document.to_json
    )
    response.policy.arn
  rescue Aws::IAM::Errors::ServiceError => e
    @logger.error("Error creating policy: #{e.message}")
    nil
  end

  # Fetches an IAM policy by its ARN
  # @param policy_arn [String] the ARN of the IAM policy to retrieve
  # @return [Aws::IAM::Types::GetPolicyResponse] the policy object if found
  def get_policy(policy_arn)
    response = @iam_client.get_policy(policy_arn: policy_arn)
    policy = response.policy
    @logger.info("Got policy '#{policy.policy_name}'. Its ID is:
 #{policy.policy_id}.")
    policy
  rescue Aws::IAM::Errors::NoSuchEntity
    @logger.error("Couldn't get policy '#{policy_arn}'. The policy does not exist.")
    raise
  rescue Aws::IAM::Errors::ServiceError => e
    @logger.error("Couldn't get policy '#{policy_arn}'. Here's why: #{e.code}:
 #{e.message}")
```

```
    raise
  end

  # Attaches a policy to a role
  #
  # @param role_name [String] The name of the role
  # @param policy_arn [String] The policy ARN
  # @return [Boolean] true if successful, false otherwise
  def attach_policy_to_role(role_name, policy_arn)
    @iam_client.attach_role_policy(
      role_name: role_name,
      policy_arn: policy_arn
    )
    true
  rescue Aws::IAM::Errors::ServiceError => e
    @logger.error("Error attaching policy to role: #{e.message}")
    false
  end

  # Lists policy ARNs attached to a role
  #
  # @param role_name [String] The name of the role
  # @return [Array<String>] List of policy ARNs
  def list_attached_policy_arns(role_name)
    response = @iam_client.list_attached_role_policies(role_name: role_name)
    response.attached_policies.map(&:policy_arn)
  rescue Aws::IAM::Errors::ServiceError => e
    @logger.error("Error listing policies attached to role: #{e.message}")
    []
  end

  # Detaches a policy from a role
  #
  # @param role_name [String] The name of the role
  # @param policy_arn [String] The policy ARN
  # @return [Boolean] true if successful, false otherwise
  def detach_policy_from_role(role_name, policy_arn)
    @iam_client.detach_role_policy(
      role_name: role_name,
      policy_arn: policy_arn
    )
    true
  rescue Aws::IAM::Errors::ServiceError => e
    @logger.error("Error detaching policy from role: #{e.message}")
```

```
    false
  end
end
```

- For API details, see AttachRolePolicy in *AWS SDK for Ruby API Reference*.

`AttachUserPolicy`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
# Attaches a policy to a user
#
# @param user_name [String] The name of the user
# @param policy_arn [String] The Amazon Resource Name (ARN) of the policy
# @return [Boolean] true if successful, false otherwise
def attach_policy_to_user(user_name, policy_arn)
  @iam_client.attach_user_policy(
    user_name: user_name,
    policy_arn: policy_arn
  )
  true
rescue Aws::IAM::Errors::ServiceError => e
  @logger.error("Error attaching policy to user: #{e.message}")
  false
end
```

- For API details, see AttachUserPolicy in *AWS SDK for Ruby API Reference*.

`CreateAccessKey`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

This example module lists, creates, deactivates, and deletes access keys.

```
# Manages access keys for IAM users
class AccessKeyManager
  def initialize(iam_client, logger: Logger.new($stdout))
    @iam_client = iam_client
    @logger = logger
    @logger.progname = 'AccessKeyManager'
  end

  # Lists access keys for a user
  #
  # @param user_name [String] The name of the user.
  def list_access_keys(user_name)
    response = @iam_client.list_access_keys(user_name: user_name)
    if response.access_key_metadata.empty?
      @logger.info("No access keys found for user '#{user_name}'.")
    else
      response.access_key_metadata.map(&:access_key_id)
    end
  rescue Aws::IAM::Errors::NoSuchEntity
    @logger.error("Error listing access keys: cannot find user '#{user_name}'.")
    []
  rescue StandardError => e
    @logger.error("Error listing access keys: #{e.message}")
    []
  end

  # Creates an access key for a user
  #
  # @param user_name [String] The name of the user.
  # @return [Boolean]
  def create_access_key(user_name)
    response = @iam_client.create_access_key(user_name: user_name)
    access_key = response.access_key
```

```
    @logger.info("Access key created for user '#{user_name}':
 #{access_key.access_key_id}")
    access_key
  rescue Aws::IAM::Errors::LimitExceeded
    @logger.error('Error creating access key: limit exceeded. Cannot create more.')
    nil
  rescue StandardError => e
    @logger.error("Error creating access key: #{e.message}")
    nil
  end

  # Deactivates an access key
  #
  # @param user_name [String] The name of the user.
  # @param access_key_id [String] The ID for the access key.
  # @return [Boolean]
  def deactivate_access_key(user_name, access_key_id)
    @iam_client.update_access_key(
      user_name: user_name,
      access_key_id: access_key_id,
      status: 'Inactive'
    )
    true
  rescue StandardError => e
    @logger.error("Error deactivating access key: #{e.message}")
    false
  end

  # Deletes an access key
  #
  # @param user_name [String] The name of the user.
  # @param access_key_id [String] The ID for the access key.
  # @return [Boolean]
  def delete_access_key(user_name, access_key_id)
    @iam_client.delete_access_key(
      user_name: user_name,
      access_key_id: access_key_id
    )
    true
  rescue StandardError => e
    @logger.error("Error deleting access key: #{e.message}")
    false
  end
end
```

- For API details, see CreateAccessKey in *AWS SDK for Ruby API Reference*.

`CreateAccountAlias`

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

SDK for Ruby

> **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, create, and delete account aliases.

```
class IAMAliasManager
  # Initializes the IAM client and logger
  #
  # @param iam_client [Aws::IAM::Client] An initialized IAM client.
  def initialize(iam_client, logger: Logger.new($stdout))
    @iam_client = iam_client
    @logger = logger
  end

  # Lists available AWS account aliases.
  def list_aliases
    response = @iam_client.list_account_aliases

    if response.account_aliases.count.positive?
      @logger.info('Account aliases are:')
      response.account_aliases.each { |account_alias| @logger.info("
 #{account_alias}") }
    else
      @logger.info('No account aliases found.')
    end
  rescue Aws::IAM::Errors::ServiceError => e
    @logger.error("Error listing account aliases: #{e.message}")
  end
```

```
  # Creates an AWS account alias.
  #
  # @param account_alias [String] The name of the account alias to create.
  # @return [Boolean] true if the account alias was created; otherwise, false.
  def create_account_alias(account_alias)
    @iam_client.create_account_alias(account_alias: account_alias)
    true
  rescue Aws::IAM::Errors::ServiceError => e
    @logger.error("Error creating account alias: #{e.message}")
    false
  end

  # Deletes an AWS account alias.
  #
  # @param account_alias [String] The name of the account alias to delete.
  # @return [Boolean] true if the account alias was deleted; otherwise, false.
  def delete_account_alias(account_alias)
    @iam_client.delete_account_alias(account_alias: account_alias)
    true
  rescue Aws::IAM::Errors::ServiceError => e
    @logger.error("Error deleting account alias: #{e.message}")
    false
  end
end
```

- For API details, see CreateAccountAlias in *AWS SDK for Ruby API Reference*.

`CreatePolicy`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

This example module lists, creates, attaches, and detaches role policies.

```
# Manages policies in AWS Identity and Access Management (IAM)
class RolePolicyManager
  # Initialize with an AWS IAM client
  #
  # @param iam_client [Aws::IAM::Client] An initialized IAM client
  def initialize(iam_client, logger: Logger.new($stdout))
    @iam_client = iam_client
    @logger = logger
    @logger.progname = 'PolicyManager'
  end

  # Creates a policy
  #
  # @param policy_name [String] The name of the policy
  # @param policy_document [Hash] The policy document
  # @return [String] The policy ARN if successful, otherwise nil
  def create_policy(policy_name, policy_document)
    response = @iam_client.create_policy(
      policy_name: policy_name,
      policy_document: policy_document.to_json
    )
    response.policy.arn
  rescue Aws::IAM::Errors::ServiceError => e
    @logger.error("Error creating policy: #{e.message}")
    nil
  end

  # Fetches an IAM policy by its ARN
  # @param policy_arn [String] the ARN of the IAM policy to retrieve
  # @return [Aws::IAM::Types::GetPolicyResponse] the policy object if found
  def get_policy(policy_arn)
    response = @iam_client.get_policy(policy_arn: policy_arn)
    policy = response.policy
    @logger.info("Got policy '#{policy.policy_name}'. Its ID is:
 #{policy.policy_id}.")
    policy
  rescue Aws::IAM::Errors::NoSuchEntity
    @logger.error("Couldn't get policy '#{policy_arn}'. The policy does not exist.")
    raise
  rescue Aws::IAM::Errors::ServiceError => e
    @logger.error("Couldn't get policy '#{policy_arn}'. Here's why: #{e.code}:
 #{e.message}")
    raise
```

```
  end

  # Attaches a policy to a role
  #
  # @param role_name [String] The name of the role
  # @param policy_arn [String] The policy ARN
  # @return [Boolean] true if successful, false otherwise
  def attach_policy_to_role(role_name, policy_arn)
    @iam_client.attach_role_policy(
      role_name: role_name,
      policy_arn: policy_arn
    )
    true
  rescue Aws::IAM::Errors::ServiceError => e
    @logger.error("Error attaching policy to role: #{e.message}")
    false
  end

  # Lists policy ARNs attached to a role
  #
  # @param role_name [String] The name of the role
  # @return [Array<String>] List of policy ARNs
  def list_attached_policy_arns(role_name)
    response = @iam_client.list_attached_role_policies(role_name: role_name)
    response.attached_policies.map(&:policy_arn)
  rescue Aws::IAM::Errors::ServiceError => e
    @logger.error("Error listing policies attached to role: #{e.message}")
    []
  end

  # Detaches a policy from a role
  #
  # @param role_name [String] The name of the role
  # @param policy_arn [String] The policy ARN
  # @return [Boolean] true if successful, false otherwise
  def detach_policy_from_role(role_name, policy_arn)
    @iam_client.detach_role_policy(
      role_name: role_name,
      policy_arn: policy_arn
    )
    true
  rescue Aws::IAM::Errors::ServiceError => e
    @logger.error("Error detaching policy from role: #{e.message}")
    false
```

```
  end
end
```

- For API details, see CreatePolicy in *AWS SDK for Ruby API Reference*.

`CreateRole`

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

SDK for Ruby

> **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 a role and attaches policies to it.
 #
 # @param role_name [String] The name of the role.
 # @param assume_role_policy_document [Hash] The trust relationship policy
document.
 # @param policy_arns [Array<String>] The ARNs of the policies to attach.
 # @return [String, nil] The ARN of the new role if successful, or nil if an error
occurred.
 def create_role(role_name, assume_role_policy_document, policy_arns)
   response = @iam_client.create_role(
     role_name: role_name,
     assume_role_policy_document: assume_role_policy_document.to_json
   )
   role_arn = response.role.arn

   policy_arns.each do |policy_arn|
     @iam_client.attach_role_policy(
       role_name: role_name,
       policy_arn: policy_arn
     )
   end

   role_arn
```

```
  rescue Aws::IAM::Errors::ServiceError => e
    @logger.error("Error creating role: #{e.message}")
    nil
  end
```

- For API details, see CreateRole in *AWS SDK for Ruby API Reference*.

`CreateServiceLinkedRole`

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

SDK for Ruby

> **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 a service-linked role
  #
  # @param service_name [String] The service name to create the role for.
  # @param description [String] The description of the service-linked role.
  # @param suffix [String] Suffix for customizing role name.
  # @return [String] The name of the created role
  def create_service_linked_role(service_name, description, suffix)
    response = @iam_client.create_service_linked_role(
      aws_service_name: service_name, description: description, custom_suffix:
suffix
    )
    role_name = response.role.role_name
    @logger.info("Created service-linked role #{role_name}.")
    role_name
  rescue Aws::Errors::ServiceError => e
    @logger.error("Couldn't create service-linked role for #{service_name}. Here's
why:")
    @logger.error("\t#{e.code}: #{e.message}")
    raise
  end
```

- For API details, see CreateServiceLinkedRole in *AWS SDK for Ruby API Reference*.

`CreateUser`

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

SDK for Ruby

> **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 a user and their login profile
#
# @param user_name [String] The name of the user
# @param initial_password [String] The initial password for the user
# @return [String, nil] The ID of the user if created, or nil if an error occurred
def create_user(user_name, initial_password)
  response = @iam_client.create_user(user_name: user_name)
  @iam_client.wait_until(:user_exists, user_name: user_name)
  @iam_client.create_login_profile(
    user_name: user_name,
    password: initial_password,
    password_reset_required: true
  )
  @logger.info("User '#{user_name}' created successfully.")
  response.user.user_id
rescue Aws::IAM::Errors::EntityAlreadyExists
  @logger.error("Error creating user '#{user_name}': user already exists.")
  nil
rescue Aws::IAM::Errors::ServiceError => e
  @logger.error("Error creating user '#{user_name}': #{e.message}")
  nil
end
```

- For API details, see CreateUser in *AWS SDK for Ruby API Reference*.

`DeleteAccessKey`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

This example module lists, creates, deactivates, and deletes access keys.

```
# Manages access keys for IAM users
class AccessKeyManager
  def initialize(iam_client, logger: Logger.new($stdout))
    @iam_client = iam_client
    @logger = logger
    @logger.progname = 'AccessKeyManager'
  end

  # Lists access keys for a user
  #
  # @param user_name [String] The name of the user.
  def list_access_keys(user_name)
    response = @iam_client.list_access_keys(user_name: user_name)
    if response.access_key_metadata.empty?
      @logger.info("No access keys found for user '#{user_name}'.")
    else
      response.access_key_metadata.map(&:access_key_id)
    end
  rescue Aws::IAM::Errors::NoSuchEntity
    @logger.error("Error listing access keys: cannot find user '#{user_name}'.")
    []
  rescue StandardError => e
    @logger.error("Error listing access keys: #{e.message}")
    []
  end

  # Creates an access key for a user
  #
  # @param user_name [String] The name of the user.
```

```
  # @return [Boolean]
  def create_access_key(user_name)
    response = @iam_client.create_access_key(user_name: user_name)
    access_key = response.access_key
    @logger.info("Access key created for user '#{user_name}':
#{access_key.access_key_id}")
    access_key
  rescue Aws::IAM::Errors::LimitExceeded
    @logger.error('Error creating access key: limit exceeded. Cannot create more.')
    nil
  rescue StandardError => e
    @logger.error("Error creating access key: #{e.message}")
    nil
  end

  # Deactivates an access key
  #
  # @param user_name [String] The name of the user.
  # @param access_key_id [String] The ID for the access key.
  # @return [Boolean]
  def deactivate_access_key(user_name, access_key_id)
    @iam_client.update_access_key(
      user_name: user_name,
      access_key_id: access_key_id,
      status: 'Inactive'
    )
    true
  rescue StandardError => e
    @logger.error("Error deactivating access key: #{e.message}")
    false
  end

  # Deletes an access key
  #
  # @param user_name [String] The name of the user.
  # @param access_key_id [String] The ID for the access key.
  # @return [Boolean]
  def delete_access_key(user_name, access_key_id)
    @iam_client.delete_access_key(
      user_name: user_name,
      access_key_id: access_key_id
    )
    true
  rescue StandardError => e
```

```
    @logger.error("Error deleting access key: #{e.message}")
    false
  end
end
```

- For API details, see DeleteAccessKey in *AWS SDK for Ruby API Reference*.

`DeleteAccountAlias`

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

SDK for Ruby

> **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, create, and delete account aliases.

```
class IAMAliasManager
  # Initializes the IAM client and logger
  #
  # @param iam_client [Aws::IAM::Client] An initialized IAM client.
  def initialize(iam_client, logger: Logger.new($stdout))
    @iam_client = iam_client
    @logger = logger
  end

  # Lists available AWS account aliases.
  def list_aliases
    response = @iam_client.list_account_aliases

    if response.account_aliases.count.positive?
      @logger.info('Account aliases are:')
      response.account_aliases.each { |account_alias| @logger.info("
 #{account_alias}") }
    else
      @logger.info('No account aliases found.')
    end
```

```
  rescue Aws::IAM::Errors::ServiceError => e
    @logger.error("Error listing account aliases: #{e.message}")
  end

  # Creates an AWS account alias.
  #
  # @param account_alias [String] The name of the account alias to create.
  # @return [Boolean] true if the account alias was created; otherwise, false.
  def create_account_alias(account_alias)
    @iam_client.create_account_alias(account_alias: account_alias)
    true
  rescue Aws::IAM::Errors::ServiceError => e
    @logger.error("Error creating account alias: #{e.message}")
    false
  end

  # Deletes an AWS account alias.
  #
  # @param account_alias [String] The name of the account alias to delete.
  # @return [Boolean] true if the account alias was deleted; otherwise, false.
  def delete_account_alias(account_alias)
    @iam_client.delete_account_alias(account_alias: account_alias)
    true
  rescue Aws::IAM::Errors::ServiceError => e
    @logger.error("Error deleting account alias: #{e.message}")
    false
  end
end
```

- For API details, see DeleteAccountAlias in *AWS SDK for Ruby API Reference*.

`DeleteRole`

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

SDK for Ruby

> **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 a role and its attached policies.
  #
  # @param role_name [String] The name of the role to delete.
  def delete_role(role_name)
    # Detach and delete attached policies
    @iam_client.list_attached_role_policies(role_name: role_name).each do |response|
      response.attached_policies.each do |policy|
        @iam_client.detach_role_policy({
                                         role_name: role_name,
                                         policy_arn: policy.policy_arn
                                       })
        # Check if the policy is a customer managed policy (not AWS managed)
        unless policy.policy_arn.include?('aws:policy/')
          @iam_client.delete_policy({ policy_arn: policy.policy_arn })
          @logger.info("Deleted customer managed policy #{policy.policy_name}.")
        end
      end
    end

    # Delete the role
    @iam_client.delete_role({ role_name: role_name })
    @logger.info("Deleted role #{role_name}.")
  rescue Aws::IAM::Errors::ServiceError => e
    @logger.error("Couldn't detach policies and delete role #{role_name}. Here's
why:")
    @logger.error("\t#{e.code}: #{e.message}")
    raise
  end
```

- For API details, see DeleteRole in *AWS SDK for Ruby API Reference*.

`DeleteServerCertificate`

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

SDK for Ruby

> **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, update, and delete server certificates.

```
class ServerCertificateManager
  def initialize(iam_client, logger: Logger.new($stdout))
    @iam_client = iam_client
    @logger = logger
    @logger.progname = 'ServerCertificateManager'
  end

  # Creates a new server certificate.
  # @param name [String] the name of the server certificate
  # @param certificate_body [String] the contents of the certificate
  # @param private_key [String] the private key contents
  # @return [Boolean] returns true if the certificate was successfully created
  def create_server_certificate(name, certificate_body, private_key)
    @iam_client.upload_server_certificate({
                                            server_certificate_name: name,
                                            certificate_body: certificate_body,
                                            private_key: private_key
                                          })
    true
  rescue Aws::IAM::Errors::ServiceError => e
    puts "Failed to create server certificate: #{e.message}"
    false
  end

  # Lists available server certificate names.
  def list_server_certificate_names
    response = @iam_client.list_server_certificates

    if response.server_certificate_metadata_list.empty?
      @logger.info('No server certificates found.')
      return
    end
```

```
    response.server_certificate_metadata_list.each do |certificate_metadata|
      @logger.info("Certificate Name:
 #{certificate_metadata.server_certificate_name}")
    end
  rescue Aws::IAM::Errors::ServiceError => e
    @logger.error("Error listing server certificates: #{e.message}")
  end

  # Updates the name of a server certificate.
  def update_server_certificate_name(current_name, new_name)
    @iam_client.update_server_certificate(
      server_certificate_name: current_name,
      new_server_certificate_name: new_name
    )
    @logger.info("Server certificate name updated from '#{current_name}' to
 '#{new_name}'.")
    true
  rescue Aws::IAM::Errors::ServiceError => e
    @logger.error("Error updating server certificate name: #{e.message}")
    false
  end

  # Deletes a server certificate.
  def delete_server_certificate(name)
    @iam_client.delete_server_certificate(server_certificate_name: name)
    @logger.info("Server certificate '#{name}' deleted.")
    true
  rescue Aws::IAM::Errors::ServiceError => e
    @logger.error("Error deleting server certificate: #{e.message}")
    false
  end
end
```

- For API details, see DeleteServerCertificate in *AWS SDK for Ruby API Reference*.

`DeleteServiceLinkedRole`

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

SDK for Ruby

> **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 a service-linked role.
#
# @param role_name [String] The name of the role to delete.
def delete_service_linked_role(role_name)
  response = @iam_client.delete_service_linked_role(role_name: role_name)
  task_id = response.deletion_task_id
  check_deletion_status(role_name, task_id)
rescue Aws::Errors::ServiceError => e
  handle_deletion_error(e, role_name)
end

private

# Checks the deletion status of a service-linked role
#
# @param role_name [String] The name of the role being deleted
# @param task_id [String] The task ID for the deletion process
def check_deletion_status(role_name, task_id)
  loop do
    response = @iam_client.get_service_linked_role_deletion_status(
      deletion_task_id: task_id
    )
    status = response.status
    @logger.info("Deletion of #{role_name} #{status}.")
    break if %w[SUCCEEDED FAILED].include?(status)

    sleep(3)
  end
end

# Handles deletion error
#
# @param e [Aws::Errors::ServiceError] The error encountered during deletion
# @param role_name [String] The name of the role attempted to delete
```

```
  def handle_deletion_error(e, role_name)
    return if e.code == 'NoSuchEntity'

    @logger.error("Couldn't delete #{role_name}. Here's why:")
    @logger.error("\t#{e.code}: #{e.message}")
    raise
  end
```

- For API details, see DeleteServiceLinkedRole in *AWS SDK for Ruby API Reference*.

`DeleteUser`

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

SDK for Ruby

> **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 a user and their associated resources
  #
  # @param user_name [String] The name of the user to delete
  def delete_user(user_name)
    user = @iam_client.list_access_keys(user_name: user_name).access_key_metadata
    user.each do |key|
      @iam_client.delete_access_key({ access_key_id: key.access_key_id, user_name:
user_name })
      @logger.info("Deleted access key #{key.access_key_id} for user
'#{user_name}'.")
    end

    @iam_client.delete_user(user_name: user_name)
    @logger.info("Deleted user '#{user_name}'.")
  rescue Aws::IAM::Errors::ServiceError => e
    @logger.error("Error deleting user '#{user_name}': #{e.message}")
  end
```

- For API details, see DeleteUser in *AWS SDK for Ruby API Reference*.

`DeleteUserPolicy`

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

SDK for Ruby

> **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 a user and their associated resources
 #
 # @param user_name [String] The name of the user to delete
 def delete_user(user_name)
   user = @iam_client.list_access_keys(user_name: user_name).access_key_metadata
   user.each do |key|
     @iam_client.delete_access_key({ access_key_id: key.access_key_id, user_name:
user_name })
     @logger.info("Deleted access key #{key.access_key_id} for user
'#{user_name}'.")
   end

   @iam_client.delete_user(user_name: user_name)
   @logger.info("Deleted user '#{user_name}'.")
 rescue Aws::IAM::Errors::ServiceError => e
   @logger.error("Error deleting user '#{user_name}': #{e.message}")
 end
```

- For API details, see DeleteUserPolicy in *AWS SDK for Ruby API Reference*.

`DetachRolePolicy`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

This example module lists, creates, attaches, and detaches role policies.

```
# Manages policies in AWS Identity and Access Management (IAM)
class RolePolicyManager
  # Initialize with an AWS IAM client
  #
  # @param iam_client [Aws::IAM::Client] An initialized IAM client
  def initialize(iam_client, logger: Logger.new($stdout))
    @iam_client = iam_client
    @logger = logger
    @logger.progname = 'PolicyManager'
  end

  # Creates a policy
  #
  # @param policy_name [String] The name of the policy
  # @param policy_document [Hash] The policy document
  # @return [String] The policy ARN if successful, otherwise nil
  def create_policy(policy_name, policy_document)
    response = @iam_client.create_policy(
      policy_name: policy_name,
      policy_document: policy_document.to_json
    )
    response.policy.arn
  rescue Aws::IAM::Errors::ServiceError => e
    @logger.error("Error creating policy: #{e.message}")
    nil
  end

  # Fetches an IAM policy by its ARN
  # @param policy_arn [String] the ARN of the IAM policy to retrieve
  # @return [Aws::IAM::Types::GetPolicyResponse] the policy object if found
  def get_policy(policy_arn)
    response = @iam_client.get_policy(policy_arn: policy_arn)
    policy = response.policy
```

```
    @logger.info("Got policy '#{policy.policy_name}'. Its ID is:
#{policy.policy_id}.")
    policy
  rescue Aws::IAM::Errors::NoSuchEntity
    @logger.error("Couldn't get policy '#{policy_arn}'. The policy does not exist.")
    raise
  rescue Aws::IAM::Errors::ServiceError => e
    @logger.error("Couldn't get policy '#{policy_arn}'. Here's why: #{e.code}:
#{e.message}")
    raise
  end

  # Attaches a policy to a role
  #
  # @param role_name [String] The name of the role
  # @param policy_arn [String] The policy ARN
  # @return [Boolean] true if successful, false otherwise
  def attach_policy_to_role(role_name, policy_arn)
    @iam_client.attach_role_policy(
      role_name: role_name,
      policy_arn: policy_arn
    )
    true
  rescue Aws::IAM::Errors::ServiceError => e
    @logger.error("Error attaching policy to role: #{e.message}")
    false
  end

  # Lists policy ARNs attached to a role
  #
  # @param role_name [String] The name of the role
  # @return [Array<String>] List of policy ARNs
  def list_attached_policy_arns(role_name)
    response = @iam_client.list_attached_role_policies(role_name: role_name)
    response.attached_policies.map(&:policy_arn)
  rescue Aws::IAM::Errors::ServiceError => e
    @logger.error("Error listing policies attached to role: #{e.message}")
    []
  end

  # Detaches a policy from a role
  #
  # @param role_name [String] The name of the role
  # @param policy_arn [String] The policy ARN
```

```
  # @return [Boolean] true if successful, false otherwise
  def detach_policy_from_role(role_name, policy_arn)
    @iam_client.detach_role_policy(
      role_name: role_name,
      policy_arn: policy_arn
    )
    true
  rescue Aws::IAM::Errors::ServiceError => e
    @logger.error("Error detaching policy from role: #{e.message}")
    false
  end
end
```

- For API details, see DetachRolePolicy in *AWS SDK for Ruby API Reference*.

`DetachUserPolicy`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
  # Detaches a policy from a user
  #
  # @param user_name [String] The name of the user
  # @param policy_arn [String] The ARN of the policy to detach
  # @return [Boolean] true if the policy was successfully detached, false otherwise
  def detach_user_policy(user_name, policy_arn)
    @iam_client.detach_user_policy(
      user_name: user_name,
      policy_arn: policy_arn
    )
    @logger.info("Policy '#{policy_arn}' detached from user '#{user_name}'
 successfully.")
    true
  rescue Aws::IAM::Errors::NoSuchEntity
```

```
    @logger.error('Error detaching policy: Policy or user does not exist.')
    false
  rescue Aws::IAM::Errors::ServiceError => e
    @logger.error("Error detaching policy from user '#{user_name}': #{e.message}")
    false
  end
```

- For API details, see DetachUserPolicy in *AWS SDK for Ruby API Reference*.

`GetAccountPasswordPolicy`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
# Class to manage IAM account password policies
class PasswordPolicyManager
  attr_accessor :iam_client, :logger

  def initialize(iam_client, logger: Logger.new($stdout))
    @iam_client = iam_client
    @logger = logger
    @logger.progname = 'IAMPolicyManager'
  end

  # Retrieves and logs the account password policy
  def print_account_password_policy
    response = @iam_client.get_account_password_policy
    @logger.info("The account password policy is: #{response.password_policy.to_h}")
  rescue Aws::IAM::Errors::NoSuchEntity
    @logger.info('The account does not have a password policy.')
  rescue Aws::Errors::ServiceError => e
    @logger.error("Couldn't print the account password policy. Error: #{e.code} -
 #{e.message}")
```

```
    raise
  end
end
```

- For API details, see GetAccountPasswordPolicy in *AWS SDK for Ruby API Reference*.

`GetPolicy`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
 # Fetches an IAM policy by its ARN
 # @param policy_arn [String] the ARN of the IAM policy to retrieve
 # @return [Aws::IAM::Types::GetPolicyResponse] the policy object if found
 def get_policy(policy_arn)
   response = @iam_client.get_policy(policy_arn: policy_arn)
   policy = response.policy
   @logger.info("Got policy '#{policy.policy_name}'. Its ID is:
#{policy.policy_id}.")
   policy
 rescue Aws::IAM::Errors::NoSuchEntity
   @logger.error("Couldn't get policy '#{policy_arn}'. The policy does not exist.")
   raise
 rescue Aws::IAM::Errors::ServiceError => e
   @logger.error("Couldn't get policy '#{policy_arn}'. Here's why: #{e.code}:
#{e.message}")
   raise
 end
```

- For API details, see GetPolicy in *AWS SDK for Ruby API Reference*.

`GetRole`

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

SDK for Ruby

> **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 data about a role.
#
# @param name [String] The name of the role to look up.
# @return [Aws::IAM::Role] The retrieved role.
def get_role(name)
  role = @iam_client.get_role({
                               role_name: name
                             }).role
  puts("Got data for role '#{role.role_name}'. Its ARN is '#{role.arn}'.")
rescue Aws::Errors::ServiceError => e
  puts("Couldn't get data for role '#{name}' Here's why:")
  puts("\t#{e.code}: #{e.message}")
  raise
else
  role
end
```

- For API details, see GetRole in *AWS SDK for Ruby API Reference*.

`GetUser`

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

SDK for Ruby

> **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 a user's details
 #
 # @param user_name [String] The name of the user to retrieve
 # @return [Aws::IAM::Types::User, nil] The user object if found, or nil if an
error occurred
 def get_user(user_name)
   response = @iam_client.get_user(user_name: user_name)
   response.user
 rescue Aws::IAM::Errors::NoSuchEntity
   @logger.error("User '#{user_name}' not found.")
   nil
 rescue Aws::IAM::Errors::ServiceError => e
   @logger.error("Error retrieving user '#{user_name}': #{e.message}")
   nil
 end
```

- For API details, see GetUser in *AWS SDK for Ruby API Reference*.

`ListAccessKeys`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

This example module lists, creates, deactivates, and deletes access keys.

```
# Manages access keys for IAM users
class AccessKeyManager
  def initialize(iam_client, logger: Logger.new($stdout))
    @iam_client = iam_client
    @logger = logger
    @logger.progname = 'AccessKeyManager'
  end

  # Lists access keys for a user
  #
  # @param user_name [String] The name of the user.
  def list_access_keys(user_name)
    response = @iam_client.list_access_keys(user_name: user_name)
    if response.access_key_metadata.empty?
      @logger.info("No access keys found for user '#{user_name}'.")
    else
      response.access_key_metadata.map(&:access_key_id)
    end
  rescue Aws::IAM::Errors::NoSuchEntity
    @logger.error("Error listing access keys: cannot find user '#{user_name}'.")
    []
  rescue StandardError => e
    @logger.error("Error listing access keys: #{e.message}")
    []
  end

  # Creates an access key for a user
  #
  # @param user_name [String] The name of the user.
  # @return [Boolean]
  def create_access_key(user_name)
    response = @iam_client.create_access_key(user_name: user_name)
    access_key = response.access_key
    @logger.info("Access key created for user '#{user_name}':
 #{access_key.access_key_id}")
    access_key
  rescue Aws::IAM::Errors::LimitExceeded
    @logger.error('Error creating access key: limit exceeded. Cannot create more.')
    nil
  rescue StandardError => e
    @logger.error("Error creating access key: #{e.message}")
    nil
  end
```

```
  # Deactivates an access key
  #
  # @param user_name [String] The name of the user.
  # @param access_key_id [String] The ID for the access key.
  # @return [Boolean]
  def deactivate_access_key(user_name, access_key_id)
    @iam_client.update_access_key(
      user_name: user_name,
      access_key_id: access_key_id,
      status: 'Inactive'
    )
    true
  rescue StandardError => e
    @logger.error("Error deactivating access key: #{e.message}")
    false
  end

  # Deletes an access key
  #
  # @param user_name [String] The name of the user.
  # @param access_key_id [String] The ID for the access key.
  # @return [Boolean]
  def delete_access_key(user_name, access_key_id)
    @iam_client.delete_access_key(
      user_name: user_name,
      access_key_id: access_key_id
    )
    true
  rescue StandardError => e
    @logger.error("Error deleting access key: #{e.message}")
    false
  end
end
```

- For API details, see ListAccessKeys in *AWS SDK for Ruby API Reference*.

`ListAccountAliases`

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

SDK for Ruby

> **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, create, and delete account aliases.

```
class IAMAliasManager
  # Initializes the IAM client and logger
  #
  # @param iam_client [Aws::IAM::Client] An initialized IAM client.
  def initialize(iam_client, logger: Logger.new($stdout))
    @iam_client = iam_client
    @logger = logger
  end

  # Lists available AWS account aliases.
  def list_aliases
    response = @iam_client.list_account_aliases

    if response.account_aliases.count.positive?
      @logger.info('Account aliases are:')
      response.account_aliases.each { |account_alias| @logger.info("
 #{account_alias}") }
    else
      @logger.info('No account aliases found.')
    end
  rescue Aws::IAM::Errors::ServiceError => e
    @logger.error("Error listing account aliases: #{e.message}")
  end

  # Creates an AWS account alias.
  #
  # @param account_alias [String] The name of the account alias to create.
  # @return [Boolean] true if the account alias was created; otherwise, false.
  def create_account_alias(account_alias)
    @iam_client.create_account_alias(account_alias: account_alias)
    true
  rescue Aws::IAM::Errors::ServiceError => e
    @logger.error("Error creating account alias: #{e.message}")
```

```
    false
  end

  # Deletes an AWS account alias.
  #
  # @param account_alias [String] The name of the account alias to delete.
  # @return [Boolean] true if the account alias was deleted; otherwise, false.
  def delete_account_alias(account_alias)
    @iam_client.delete_account_alias(account_alias: account_alias)
    true
  rescue Aws::IAM::Errors::ServiceError => e
    @logger.error("Error deleting account alias: #{e.message}")
    false
  end
end
```

- For API details, see ListAccountAliases in *AWS SDK for Ruby API Reference*.

`ListAttachedRolePolicies`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

This example module lists, creates, attaches, and detaches role policies.

```
# Manages policies in AWS Identity and Access Management (IAM)
class RolePolicyManager
  # Initialize with an AWS IAM client
  #
  # @param iam_client [Aws::IAM::Client] An initialized IAM client
  def initialize(iam_client, logger: Logger.new($stdout))
    @iam_client = iam_client
    @logger = logger
    @logger.progname = 'PolicyManager'
```

```
  end

  # Creates a policy
  #
  # @param policy_name [String] The name of the policy
  # @param policy_document [Hash] The policy document
  # @return [String] The policy ARN if successful, otherwise nil
  def create_policy(policy_name, policy_document)
    response = @iam_client.create_policy(
      policy_name: policy_name,
      policy_document: policy_document.to_json
    )
    response.policy.arn
  rescue Aws::IAM::Errors::ServiceError => e
    @logger.error("Error creating policy: #{e.message}")
    nil
  end

  # Fetches an IAM policy by its ARN
  # @param policy_arn [String] the ARN of the IAM policy to retrieve
  # @return [Aws::IAM::Types::GetPolicyResponse] the policy object if found
  def get_policy(policy_arn)
    response = @iam_client.get_policy(policy_arn: policy_arn)
    policy = response.policy
    @logger.info("Got policy '#{policy.policy_name}'. Its ID is:
#{policy.policy_id}.")
    policy
  rescue Aws::IAM::Errors::NoSuchEntity
    @logger.error("Couldn't get policy '#{policy_arn}'. The policy does not exist.")
    raise
  rescue Aws::IAM::Errors::ServiceError => e
    @logger.error("Couldn't get policy '#{policy_arn}'. Here's why: #{e.code}:
#{e.message}")
    raise
  end

  # Attaches a policy to a role
  #
  # @param role_name [String] The name of the role
  # @param policy_arn [String] The policy ARN
  # @return [Boolean] true if successful, false otherwise
  def attach_policy_to_role(role_name, policy_arn)
    @iam_client.attach_role_policy(
      role_name: role_name,
```

```
      policy_arn: policy_arn
    )
    true
  rescue Aws::IAM::Errors::ServiceError => e
    @logger.error("Error attaching policy to role: #{e.message}")
    false
  end

  # Lists policy ARNs attached to a role
  #
  # @param role_name [String] The name of the role
  # @return [Array<String>] List of policy ARNs
  def list_attached_policy_arns(role_name)
    response = @iam_client.list_attached_role_policies(role_name: role_name)
    response.attached_policies.map(&:policy_arn)
  rescue Aws::IAM::Errors::ServiceError => e
    @logger.error("Error listing policies attached to role: #{e.message}")
    []
  end

  # Detaches a policy from a role
  #
  # @param role_name [String] The name of the role
  # @param policy_arn [String] The policy ARN
  # @return [Boolean] true if successful, false otherwise
  def detach_policy_from_role(role_name, policy_arn)
    @iam_client.detach_role_policy(
      role_name: role_name,
      policy_arn: policy_arn
    )
    true
  rescue Aws::IAM::Errors::ServiceError => e
    @logger.error("Error detaching policy from role: #{e.message}")
    false
  end
end
```

- For API details, see ListAttachedRolePolicies in *AWS SDK for Ruby API Reference*.

`ListGroups`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
# A class to manage IAM operations via the AWS SDK client
class IamGroupManager
  # Initializes the IamGroupManager class
  # @param iam_client [Aws::IAM::Client] An instance of the IAM client
  def initialize(iam_client, logger: Logger.new($stdout))
    @iam_client = iam_client
    @logger = logger
  end

  # Lists up to a specified number of groups for the account.
  # @param count [Integer] The maximum number of groups to list.
  # @return [Aws::IAM::Client::Response]
  def list_groups(count)
    response = @iam_client.list_groups(max_items: count)
    response.groups.each do |group|
      @logger.info("\t#{group.group_name}")
    end
    response
  rescue Aws::Errors::ServiceError => e
    @logger.error("Couldn't list groups for the account. Here's why:")
    @logger.error("\t#{e.code}: #{e.message}")
    raise
  end
end
```

- For API details, see ListGroups in *AWS SDK for Ruby API Reference*.

`ListPolicies`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

This example module lists, creates, attaches, and detaches role policies.

```
# Manages policies in AWS Identity and Access Management (IAM)
class RolePolicyManager
  # Initialize with an AWS IAM client
  #
  # @param iam_client [Aws::IAM::Client] An initialized IAM client
  def initialize(iam_client, logger: Logger.new($stdout))
    @iam_client = iam_client
    @logger = logger
    @logger.progname = 'PolicyManager'
  end

  # Creates a policy
  #
  # @param policy_name [String] The name of the policy
  # @param policy_document [Hash] The policy document
  # @return [String] The policy ARN if successful, otherwise nil
  def create_policy(policy_name, policy_document)
    response = @iam_client.create_policy(
      policy_name: policy_name,
      policy_document: policy_document.to_json
    )
    response.policy.arn
  rescue Aws::IAM::Errors::ServiceError => e
    @logger.error("Error creating policy: #{e.message}")
    nil
  end

  # Fetches an IAM policy by its ARN
  # @param policy_arn [String] the ARN of the IAM policy to retrieve
  # @return [Aws::IAM::Types::GetPolicyResponse] the policy object if found
  def get_policy(policy_arn)
    response = @iam_client.get_policy(policy_arn: policy_arn)
    policy = response.policy
```

```
    @logger.info("Got policy '#{policy.policy_name}'. Its ID is:
#{policy.policy_id}.")
    policy
  rescue Aws::IAM::Errors::NoSuchEntity
    @logger.error("Couldn't get policy '#{policy_arn}'. The policy does not exist.")
    raise
  rescue Aws::IAM::Errors::ServiceError => e
    @logger.error("Couldn't get policy '#{policy_arn}'. Here's why: #{e.code}:
#{e.message}")
    raise
  end

  # Attaches a policy to a role
  #
  # @param role_name [String] The name of the role
  # @param policy_arn [String] The policy ARN
  # @return [Boolean] true if successful, false otherwise
  def attach_policy_to_role(role_name, policy_arn)
    @iam_client.attach_role_policy(
      role_name: role_name,
      policy_arn: policy_arn
    )
    true
  rescue Aws::IAM::Errors::ServiceError => e
    @logger.error("Error attaching policy to role: #{e.message}")
    false
  end

  # Lists policy ARNs attached to a role
  #
  # @param role_name [String] The name of the role
  # @return [Array<String>] List of policy ARNs
  def list_attached_policy_arns(role_name)
    response = @iam_client.list_attached_role_policies(role_name: role_name)
    response.attached_policies.map(&:policy_arn)
  rescue Aws::IAM::Errors::ServiceError => e
    @logger.error("Error listing policies attached to role: #{e.message}")
    []
  end

  # Detaches a policy from a role
  #
  # @param role_name [String] The name of the role
  # @param policy_arn [String] The policy ARN
```

```
  # @return [Boolean] true if successful, false otherwise
  def detach_policy_from_role(role_name, policy_arn)
    @iam_client.detach_role_policy(
      role_name: role_name,
      policy_arn: policy_arn
    )
    true
  rescue Aws::IAM::Errors::ServiceError => e
    @logger.error("Error detaching policy from role: #{e.message}")
    false
  end
end
```

- For API details, see ListPolicies in *AWS SDK for Ruby API Reference*.

`ListRolePolicies`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
  # Lists policy ARNs attached to a role
  #
  # @param role_name [String] The name of the role
  # @return [Array<String>] List of policy ARNs
  def list_attached_policy_arns(role_name)
    response = @iam_client.list_attached_role_policies(role_name: role_name)
    response.attached_policies.map(&:policy_arn)
  rescue Aws::IAM::Errors::ServiceError => e
    @logger.error("Error listing policies attached to role: #{e.message}")
    []
  end
```

- For API details, see ListRolePolicies in *AWS SDK for Ruby API Reference*.

`ListRoles`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
# Lists IAM roles up to a specified count.
# @param count [Integer] the maximum number of roles to list.
# @return [Array<String>] the names of the roles.
def list_roles(count)
  role_names = []
  roles_counted = 0

  @iam_client.list_roles.each_page do |page|
    page.roles.each do |role|
      break if roles_counted >= count

      @logger.info("\t#{roles_counted + 1}: #{role.role_name}")
      role_names << role.role_name
      roles_counted += 1
    end
    break if roles_counted >= count
  end

  role_names
rescue Aws::IAM::Errors::ServiceError => e
  @logger.error("Couldn't list roles for the account. Here's why:")
  @logger.error("\t#{e.code}: #{e.message}")
  raise
end
```

- For API details, see ListRoles in *AWS SDK for Ruby API Reference*.

`ListSAMLProviders`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
class SamlProviderLister
  # Initializes the SamlProviderLister with IAM client and a logger.
  # @param iam_client [Aws::IAM::Client] The IAM client object.
  # @param logger [Logger] The logger object for logging output.
  def initialize(iam_client, logger = Logger.new($stdout))
    @iam_client = iam_client
    @logger = logger
  end

  # Lists up to a specified number of SAML providers for the account.
  # @param count [Integer] The maximum number of providers to list.
  # @return [Aws::IAM::Client::Response]
  def list_saml_providers(count)
    response = @iam_client.list_saml_providers
    response.saml_provider_list.take(count).each do |provider|
      @logger.info("\t#{provider.arn}")
    end
    response
  rescue Aws::Errors::ServiceError => e
    @logger.error("Couldn't list SAML providers. Here's why:")
    @logger.error("\t#{e.code}: #{e.message}")
    raise
  end
end
```

- For API details, see ListSAMLProviders in *AWS SDK for Ruby API Reference*.

`ListServerCertificates`

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

SDK for Ruby

> **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, update, and delete server certificates.

```
class ServerCertificateManager
  def initialize(iam_client, logger: Logger.new($stdout))
    @iam_client = iam_client
    @logger = logger
    @logger.progname = 'ServerCertificateManager'
  end

  # Creates a new server certificate.
  # @param name [String] the name of the server certificate
  # @param certificate_body [String] the contents of the certificate
  # @param private_key [String] the private key contents
  # @return [Boolean] returns true if the certificate was successfully created
  def create_server_certificate(name, certificate_body, private_key)
    @iam_client.upload_server_certificate({
                                            server_certificate_name: name,
                                            certificate_body: certificate_body,
                                            private_key: private_key
                                          })
    true
  rescue Aws::IAM::Errors::ServiceError => e
    puts "Failed to create server certificate: #{e.message}"
    false
  end

  # Lists available server certificate names.
  def list_server_certificate_names
    response = @iam_client.list_server_certificates

    if response.server_certificate_metadata_list.empty?
```

```
      @logger.info('No server certificates found.')
      return
    end

    response.server_certificate_metadata_list.each do |certificate_metadata|
      @logger.info("Certificate Name:
 #{certificate_metadata.server_certificate_name}")
    end
  rescue Aws::IAM::Errors::ServiceError => e
    @logger.error("Error listing server certificates: #{e.message}")
  end

  # Updates the name of a server certificate.
  def update_server_certificate_name(current_name, new_name)
    @iam_client.update_server_certificate(
      server_certificate_name: current_name,
      new_server_certificate_name: new_name
    )
    @logger.info("Server certificate name updated from '#{current_name}' to
 '#{new_name}'.")
    true
  rescue Aws::IAM::Errors::ServiceError => e
    @logger.error("Error updating server certificate name: #{e.message}")
    false
  end

  # Deletes a server certificate.
  def delete_server_certificate(name)
    @iam_client.delete_server_certificate(server_certificate_name: name)
    @logger.info("Server certificate '#{name}' deleted.")
    true
  rescue Aws::IAM::Errors::ServiceError => e
    @logger.error("Error deleting server certificate: #{e.message}")
    false
  end
end
```

- For API details, see ListServerCertificates in *AWS SDK for Ruby API Reference*.

`ListUsers`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
# Lists all users in the AWS account
#
# @return [Array<Aws::IAM::Types::User>] An array of user objects
def list_users
  users = []
  @iam_client.list_users.each_page do |page|
    page.users.each do |user|
      users << user
    end
  end
  users
rescue Aws::IAM::Errors::ServiceError => e
  @logger.error("Error listing users: #{e.message}")
  []
end
```

- For API details, see ListUsers in *AWS SDK for Ruby API Reference*.

`PutUserPolicy`

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

SDK for Ruby

> **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 inline policy for a specified user.
```

```
  # @param username [String] The name of the IAM user.
  # @param policy_name [String] The name of the policy to create.
  # @param policy_document [String] The JSON policy document.
  # @return [Boolean]
  def create_user_policy(username, policy_name, policy_document)
    @iam_client.put_user_policy({
                                  user_name: username,
                                  policy_name: policy_name,
                                  policy_document: policy_document
                                })
    @logger.info("Policy #{policy_name} created for user #{username}.")
    true
  rescue Aws::IAM::Errors::ServiceError => e
    @logger.error("Couldn't create policy #{policy_name} for user #{username}.
Here's why:")
    @logger.error("\t#{e.code}: #{e.message}")
    false
  end
```

- For API details, see PutUserPolicy in *AWS SDK for Ruby API Reference*.

`UpdateServerCertificate`

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

SDK for Ruby

> **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, update, and delete server certificates.

```
class ServerCertificateManager
  def initialize(iam_client, logger: Logger.new($stdout))
    @iam_client = iam_client
    @logger = logger
    @logger.progname = 'ServerCertificateManager'
  end
```

```
  # Creates a new server certificate.
  # @param name [String] the name of the server certificate
  # @param certificate_body [String] the contents of the certificate
  # @param private_key [String] the private key contents
  # @return [Boolean] returns true if the certificate was successfully created
  def create_server_certificate(name, certificate_body, private_key)
    @iam_client.upload_server_certificate({
                                            server_certificate_name: name,
                                            certificate_body: certificate_body,
                                            private_key: private_key
                                          })
    true
  rescue Aws::IAM::Errors::ServiceError => e
    puts "Failed to create server certificate: #{e.message}"
    false
  end

  # Lists available server certificate names.
  def list_server_certificate_names
    response = @iam_client.list_server_certificates

    if response.server_certificate_metadata_list.empty?
      @logger.info('No server certificates found.')
      return
    end

    response.server_certificate_metadata_list.each do |certificate_metadata|
      @logger.info("Certificate Name:
#{certificate_metadata.server_certificate_name}")
    end
  rescue Aws::IAM::Errors::ServiceError => e
    @logger.error("Error listing server certificates: #{e.message}")
  end

  # Updates the name of a server certificate.
  def update_server_certificate_name(current_name, new_name)
    @iam_client.update_server_certificate(
      server_certificate_name: current_name,
      new_server_certificate_name: new_name
    )
    @logger.info("Server certificate name updated from '#{current_name}' to
'#{new_name}'.")
    true
```

```
  rescue Aws::IAM::Errors::ServiceError => e
    @logger.error("Error updating server certificate name: #{e.message}")
    false
  end

  # Deletes a server certificate.
  def delete_server_certificate(name)
    @iam_client.delete_server_certificate(server_certificate_name: name)
    @logger.info("Server certificate '#{name}' deleted.")
    true
  rescue Aws::IAM::Errors::ServiceError => e
    @logger.error("Error deleting server certificate: #{e.message}")
    false
  end
end
```

- For API details, see UpdateServerCertificate in *AWS SDK for Ruby API Reference*.

`UpdateUser`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
  # Updates an IAM user's name
  #
  # @param current_name [String] The current name of the user
  # @param new_name [String] The new name of the user
  def update_user_name(current_name, new_name)
    @iam_client.update_user(user_name: current_name, new_user_name: new_name)
    true
  rescue StandardError => e
    @logger.error("Error updating user name from '#{current_name}' to '#{new_name}':
 #{e.message}")
    false
```

```
end
```

- For API details, see UpdateUser in *AWS SDK for Ruby API Reference*.

Kinesis examples using SDK for Ruby

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

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

- Serverless examples

Serverless examples

Invoke a Lambda function from a Kinesis trigger

The following code example shows how to implement a Lambda function that receives an event triggered by receiving records from a Kinesis stream. The function retrieves the Kinesis payload, decodes from Base64, and logs the record contents.

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the Serverless examples repository.

Consuming an Kinesis event with Lambda using Ruby.

```
# Copyright Amazon.com, Inc. or its affiliates. All Rights Reserved.
# SPDX-License-Identifier: Apache-2.0
require 'aws-sdk'

def lambda_handler(event:, context:)
```

```
  event['Records'].each do |record|
    begin
      puts "Processed Kinesis Event - EventID: #{record['eventID']}"
      record_data = get_record_data_async(record['kinesis'])
      puts "Record Data: #{record_data}"
      # TODO: Do interesting work based on the new data
    rescue => err
      $stderr.puts "An error occurred #{err}"
      raise err
    end
  end
  puts "Successfully processed #{event['Records'].length} records."
end

def get_record_data_async(payload)
  data = Base64.decode64(payload['data']).force_encoding('UTF-8')
  # Placeholder for actual async work
  # You can use Ruby's asynchronous programming tools like async/await or fibers
 here.
  return data
end
```

Reporting batch item failures for Lambda functions with a Kinesis trigger

The following code example shows how to implement partial batch response for Lambda functions that receive events from a Kinesis stream. The function reports the batch item failures in the response, signaling to Lambda to retry those messages later.

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the Serverless examples repository.

Reporting Kinesis batch item failures with Lambda using Ruby.

```
# Copyright Amazon.com, Inc. or its affiliates. All Rights Reserved.
# SPDX-License-Identifier: Apache-2.0
require 'aws-sdk'
```

```
def lambda_handler(event:, context:)
  batch_item_failures = []

  event['Records'].each do |record|
    begin
      puts "Processed Kinesis Event - EventID: #{record['eventID']}"
      record_data = get_record_data_async(record['kinesis'])
      puts "Record Data: #{record_data}"
      # TODO: Do interesting work based on the new data
    rescue StandardError => err
      puts "An error occurred #{err}"
      # Since we are working with streams, we can return the failed item
 immediately.
      # Lambda will immediately begin to retry processing from this failed item
 onwards.
      return { batchItemFailures: [{ itemIdentifier: record['kinesis']
['sequenceNumber'] }] }
    end
  end

  puts "Successfully processed #{event['Records'].length} records."
  { batchItemFailures: batch_item_failures }
end

def get_record_data_async(payload)
  data = Base64.decode64(payload['data']).force_encoding('utf-8')
  # Placeholder for actual async work
  sleep(1)
  data
end
```

AWS KMS examples using SDK for Ruby

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

`CreateKey`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
require 'aws-sdk-kms' # v2: require 'aws-sdk'

# Create a AWS KMS key.
# As long we are only encrypting small amounts of data (4 KiB or less) directly,
# a KMS key is fine for our purposes.
# For larger amounts of data,
# use the KMS key to encrypt a data encryption key (DEK).

client = Aws::KMS::Client.new

resp = client.create_key({
                           tags: [
                             {
                               tag_key: 'CreatedBy',
                               tag_value: 'ExampleUser'
                             }
                           ]
                         })

puts resp.key_metadata.key_id
```

- For API details, see CreateKey in *AWS SDK for Ruby API Reference*.

`Decrypt`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
require 'aws-sdk-kms' # v2: require 'aws-sdk'

# Decrypted blob

blob =
 '01020200785d68faeec386af1057904926253051eb2919d3c16078badf65b808b26dd057c101747cadf3593596
blob_packed = [blob].pack('H*')

client = Aws::KMS::Client.new(region: 'us-west-2')

resp = client.decrypt({
                        ciphertext_blob: blob_packed
                      })

puts 'Raw text: '
puts resp.plaintext
```

- For API details, see Decrypt in *AWS SDK for Ruby API Reference*.

`Encrypt`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
require 'aws-sdk-kms' # v2: require 'aws-sdk'

# ARN of the AWS KMS key.
#
# Replace the fictitious key ARN with a valid key ID

keyId = 'arn:aws:kms:us-
west-2:111122223333:key/1234abcd-12ab-34cd-56ef-1234567890ab'

text = '1234567890'

client = Aws::KMS::Client.new(region: 'us-west-2')

resp = client.encrypt({
                        key_id: keyId,
                        plaintext: text
                      })

# Display a readable version of the resulting encrypted blob.
puts 'Blob:'
puts resp.ciphertext_blob.unpack('H*')
```

- For API details, see Encrypt in *AWS SDK for Ruby API Reference*.

`ReEncrypt`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
require 'aws-sdk-kms' # v2: require 'aws-sdk'

# Human-readable version of the ciphertext of the data to reencrypt.

blob =
 '01020200785d68faeec386af1057904926253051eb2919d3c16078badf65b808b26dd057c101747cadf3593596
sourceCiphertextBlob = [blob].pack('H*')

# Replace the fictitious key ARN with a valid key ID

destinationKeyId = 'arn:aws:kms:us-west-2:111122223333:key/0987dcba-09fe-87dc-65ba-
ab0987654321'

client = Aws::KMS::Client.new(region: 'us-west-2')

resp = client.re_encrypt({
                           ciphertext_blob: sourceCiphertextBlob,
                           destination_key_id: destinationKeyId
                         })

# Display a readable version of the resulting re-encrypted blob.
puts 'Blob:'
puts resp.ciphertext_blob.unpack('H*')
```

- For API details, see ReEncrypt in *AWS SDK for Ruby API Reference*.

Lambda examples using SDK for Ruby

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

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

- Get started
- Basics
- Actions
- Scenarios
- Serverless examples

Get started

Hello Lambda

The following code example shows how to get started using Lambda.

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
require 'aws-sdk-lambda'

# Creates an AWS Lambda client using the default credentials and configuration
def lambda_client
```

```
  Aws::Lambda::Client.new
end

# Lists the Lambda functions in your AWS account, paginating the results if
 necessary
def list_lambda_functions
  lambda = lambda_client

  # Use a pagination iterator to list all functions
  functions = []
  lambda.list_functions.each_page do |page|
    functions.concat(page.functions)
  end

  # Print the name and ARN of each function
  functions.each do |function|
    puts "Function name: #{function.function_name}"
    puts "Function ARN: #{function.function_arn}"
    puts
  end

  puts "Total functions: #{functions.count}"
end

list_lambda_functions if __FILE__ == $PROGRAM_NAME
```

- For API details, see ListFunctions in *AWS SDK for Ruby API Reference*.

Basics

Learn the basics

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 Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

Set up pre-requisite IAM permissions for a Lambda function capable of writing logs.

```
# Get an AWS Identity and Access Management (IAM) role.
#
# @param iam_role_name: The name of the role to retrieve.
# @param action: Whether to create or destroy the IAM apparatus.
# @return: The IAM role.
def manage_iam(iam_role_name, action)
  case action
  when 'create'
    create_iam_role(iam_role_name)
  when 'destroy'
    destroy_iam_role(iam_role_name)
  else
    raise "Incorrect action provided. Must provide 'create' or 'destroy'"
  end
end

private

def create_iam_role(iam_role_name)
  role_policy = {
    'Version': '2012-10-17',
    'Statement': [
      {
        'Effect': 'Allow',
        'Principal': { 'Service': 'lambda.amazonaws.com' },
        'Action': 'sts:AssumeRole'
      }
    ]
  }
  role = @iam_client.create_role(
    role_name: iam_role_name,
```

```
      assume_role_policy_document: role_policy.to_json
    )
    @iam_client.attach_role_policy(
      {
        policy_arn: 'arn:aws:iam::aws:policy/service-role/
AWSLambdaBasicExecutionRole',
        role_name: iam_role_name
      }
    )
    wait_for_role_to_exist(iam_role_name)
    @logger.debug("Successfully created IAM role: #{role['role']['arn']}")
    sleep(10)
    [role, role_policy.to_json]
  end

  def destroy_iam_role(iam_role_name)
    @iam_client.detach_role_policy(
      {
        policy_arn: 'arn:aws:iam::aws:policy/service-role/
AWSLambdaBasicExecutionRole',
        role_name: iam_role_name
      }
    )
    @iam_client.delete_role(role_name: iam_role_name)
    @logger.debug("Detached policy & deleted IAM role: #{iam_role_name}")
  end

  def wait_for_role_to_exist(iam_role_name)
    @iam_client.wait_until(:role_exists, { role_name: iam_role_name }) do |w|
      w.max_attempts = 5
      w.delay = 5
    end
  end
```

Define a Lambda handler that increments a number provided as an invocation parameter.

```
require 'logger'

# A function that increments a whole number by one (1) and logs the result.
# Requires a manually-provided runtime parameter, 'number', which must be Int
#
# @param event [Hash] Parameters sent when the function is invoked
```

```
# @param context [Hash] Methods and properties that provide information
# about the invocation, function, and execution environment.
# @return incremented_number [String] The incremented number.
def lambda_handler(event:, context:)
  logger = Logger.new($stdout)
  log_level = ENV['LOG_LEVEL']
  logger.level = case log_level
                 when 'debug'
                   Logger::DEBUG
                 when 'info'
                   Logger::INFO
                 else
                   Logger::ERROR
                 end
  logger.debug('This is a debug log message.')
  logger.info('This is an info log message. Code executed successfully!')
  number = event['number'].to_i
  incremented_number = number + 1
  logger.info("You provided #{number.round} and it was incremented to
 #{incremented_number.round}")
  incremented_number.round.to_s
end
```

Zip your Lambda function into a deployment package.

```
  # Creates a Lambda deployment package in .zip format.
  #
  # @param source_file: The name of the object, without suffix, for the Lambda file
 and zip.
  # @return: The deployment package.
  def create_deployment_package(source_file)
    Dir.chdir(File.dirname(__FILE__))
    if File.exist?('lambda_function.zip')
      File.delete('lambda_function.zip')
      @logger.debug('Deleting old zip: lambda_function.zip')
    end
    Zip::File.open('lambda_function.zip', create: true) do |zipfile|
      zipfile.add('lambda_function.rb', "#{source_file}.rb")
    end
    @logger.debug("Zipping #{source_file}.rb into: lambda_function.zip.")
    File.read('lambda_function.zip').to_s
  rescue StandardError => e
```

```
    @logger.error("There was an error creating deployment package:\n #{e.message}")
  end
```

Create a new Lambda function.

```
  # Deploys a Lambda function.
  #
  # @param function_name: The name of the Lambda function.
  # @param handler_name: The fully qualified name of the handler function.
  # @param role_arn: The IAM role to use for the function.
  # @param deployment_package: The deployment package that contains the function
code in .zip format.
  # @return: The Amazon Resource Name (ARN) of the newly created function.
  def create_function(function_name, handler_name, role_arn, deployment_package)
    response = @lambda_client.create_function({
                                                role: role_arn.to_s,
                                                function_name: function_name,
                                                handler: handler_name,
                                                runtime: 'ruby2.7',
                                                code: {
                                                  zip_file: deployment_package
                                                },
                                                environment: {
                                                  variables: {
                                                    'LOG_LEVEL' => 'info'
                                                  }
                                                }
                                              })
    @lambda_client.wait_until(:function_active_v2, { function_name: function_name })
do |w|
      w.max_attempts = 5
      w.delay = 5
    end
    response
  rescue Aws::Lambda::Errors::ServiceException => e
    @logger.error("There was an error creating #{function_name}:\n #{e.message}")
  rescue Aws::Waiters::Errors::WaiterFailed => e
    @logger.error("Failed waiting for #{function_name} to activate:\n #{e.message}")
  end
```

Invoke your Lambda function with optional runtime parameters.

```
  # Invokes a Lambda function.
  # @param function_name [String] The name of the function to invoke.
  # @param payload [nil] Payload containing runtime parameters.
  # @return [Object] The response from the function invocation.
  def invoke_function(function_name, payload = nil)
    params = { function_name: function_name }
    params[:payload] = payload unless payload.nil?
    @lambda_client.invoke(params)
  rescue Aws::Lambda::Errors::ServiceException => e
    @logger.error("There was an error executing #{function_name}:\n #{e.message}")
  end
```

Update your Lambda function's configuration to inject a new environment variable.

```
  # Updates the environment variables for a Lambda function.
  # @param function_name: The name of the function to update.
  # @param log_level: The log level of the function.
  # @return: Data about the update, including the status.
  def update_function_configuration(function_name, log_level)
    @lambda_client.update_function_configuration({
                                                   function_name: function_name,
                                                   environment: {
                                                     variables: {
                                                       'LOG_LEVEL' => log_level
                                                     }
                                                   }
                                                 })
    @lambda_client.wait_until(:function_updated_v2, { function_name:
 function_name }) do |w|
      w.max_attempts = 5
      w.delay = 5
    end
  rescue Aws::Lambda::Errors::ServiceException => e
    @logger.error("There was an error updating configurations for #{function_name}:
\n #{e.message}")
  rescue Aws::Waiters::Errors::WaiterFailed => e
    @logger.error("Failed waiting for #{function_name} to activate:\n #{e.message}")
  end
```

Update your Lambda function's code with a different deployment package containing different code.

```
  # Updates the code for a Lambda function by submitting a .zip archive that
 contains
  # the code for the function.
  #
  # @param function_name: The name of the function to update.
  # @param deployment_package: The function code to update, packaged as bytes in
  #                            .zip format.
  # @return: Data about the update, including the status.
  def update_function_code(function_name, deployment_package)
    @lambda_client.update_function_code(
      function_name: function_name,
      zip_file: deployment_package
    )
    @lambda_client.wait_until(:function_updated_v2, { function_name:
 function_name }) do |w|
      w.max_attempts = 5
      w.delay = 5
    end
  rescue Aws::Lambda::Errors::ServiceException => e
    @logger.error("There was an error updating function code for: #{function_name}:
\n #{e.message}")
    nil
  rescue Aws::Waiters::Errors::WaiterFailed => e
    @logger.error("Failed waiting for #{function_name} to update:\n #{e.message}")
  end
```

List all existing Lambda functions using the built-in paginator.

```
  # Lists the Lambda functions for the current account.
  def list_functions
    functions = []
    @lambda_client.list_functions.each do |response|
      response['functions'].each do |function|
        functions.append(function['function_name'])
      end
    end
    functions
  rescue Aws::Lambda::Errors::ServiceException => e
    @logger.error("There was an error listing functions:\n #{e.message}")
```

```
end
```

Delete a specific Lambda function.

```
# Deletes a Lambda function.
# @param function_name: The name of the function to delete.
def delete_function(function_name)
  print "Deleting function: #{function_name}..."
  @lambda_client.delete_function(
    function_name: function_name
  )
  print 'Done!'.green
rescue Aws::Lambda::Errors::ServiceException => e
  @logger.error("There was an error deleting #{function_name}:\n #{e.message}")
end
```

- For API details, see the following topics in *AWS SDK for Ruby API Reference*.
  - CreateFunction
  - DeleteFunction
  - GetFunction
  - Invoke
  - ListFunctions
  - UpdateFunctionCode
  - UpdateFunctionConfiguration

Actions

`CreateFunction`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
class LambdaWrapper
  attr_accessor :lambda_client, :cloudwatch_client, :iam_client

  def initialize
    @lambda_client = Aws::Lambda::Client.new
    @cloudwatch_client = Aws::CloudWatchLogs::Client.new(region: 'us-east-1')
    @iam_client = Aws::IAM::Client.new(region: 'us-east-1')
    @logger = Logger.new($stdout)
    @logger.level = Logger::WARN
  end

  # Deploys a Lambda function.
  #
  # @param function_name: The name of the Lambda function.
  # @param handler_name: The fully qualified name of the handler function.
  # @param role_arn: The IAM role to use for the function.
  # @param deployment_package: The deployment package that contains the function
 code in .zip format.
  # @return: The Amazon Resource Name (ARN) of the newly created function.
  def create_function(function_name, handler_name, role_arn, deployment_package)
    response = @lambda_client.create_function({
                                                role: role_arn.to_s,
                                                function_name: function_name,
                                                handler: handler_name,
                                                runtime: 'ruby2.7',
                                                code: {
                                                  zip_file: deployment_package
                                                },
                                                environment: {
                                                  variables: {
                                                    'LOG_LEVEL' => 'info'
                                                  }
                                                }
                                              })
```

```
    @lambda_client.wait_until(:function_active_v2, { function_name: function_name })
 do |w|
      w.max_attempts = 5
      w.delay = 5
    end
    response
  rescue Aws::Lambda::Errors::ServiceException => e
    @logger.error("There was an error creating #{function_name}:\n #{e.message}")
  rescue Aws::Waiters::Errors::WaiterFailed => e
    @logger.error("Failed waiting for #{function_name} to activate:\n #{e.message}")
  end
```

- For API details, see CreateFunction in *AWS SDK for Ruby API Reference*.

`DeleteFunction`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
class LambdaWrapper
  attr_accessor :lambda_client, :cloudwatch_client, :iam_client

  def initialize
    @lambda_client = Aws::Lambda::Client.new
    @cloudwatch_client = Aws::CloudWatchLogs::Client.new(region: 'us-east-1')
    @iam_client = Aws::IAM::Client.new(region: 'us-east-1')
    @logger = Logger.new($stdout)
    @logger.level = Logger::WARN
  end

  # Deletes a Lambda function.
  # @param function_name: The name of the function to delete.
  def delete_function(function_name)
```

```
    print "Deleting function: #{function_name}..."
    @lambda_client.delete_function(
      function_name: function_name
    )
    print 'Done!'.green
  rescue Aws::Lambda::Errors::ServiceException => e
    @logger.error("There was an error deleting #{function_name}:\n #{e.message}")
  end
```

- For API details, see DeleteFunction in *AWS SDK for Ruby API Reference*.

`GetFunction`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
class LambdaWrapper
  attr_accessor :lambda_client, :cloudwatch_client, :iam_client

  def initialize
    @lambda_client = Aws::Lambda::Client.new
    @cloudwatch_client = Aws::CloudWatchLogs::Client.new(region: 'us-east-1')
    @iam_client = Aws::IAM::Client.new(region: 'us-east-1')
    @logger = Logger.new($stdout)
    @logger.level = Logger::WARN
  end

  # Gets data about a Lambda function.
  #
  # @param function_name: The name of the function.
  # @return response: The function data, or nil if no such function exists.
  def get_function(function_name)
    @lambda_client.get_function(
      {
```

```
        function_name: function_name
      }
    )
  rescue Aws::Lambda::Errors::ResourceNotFoundException => e
    @logger.debug("Could not find function: #{function_name}:\n #{e.message}")
    nil
  end
```

- For API details, see GetFunction in *AWS SDK for Ruby API Reference*.

Invoke

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
class LambdaWrapper
  attr_accessor :lambda_client, :cloudwatch_client, :iam_client

  def initialize
    @lambda_client = Aws::Lambda::Client.new
    @cloudwatch_client = Aws::CloudWatchLogs::Client.new(region: 'us-east-1')
    @iam_client = Aws::IAM::Client.new(region: 'us-east-1')
    @logger = Logger.new($stdout)
    @logger.level = Logger::WARN
  end

  # Invokes a Lambda function.
  # @param function_name [String] The name of the function to invoke.
  # @param payload [nil] Payload containing runtime parameters.
  # @return [Object] The response from the function invocation.
  def invoke_function(function_name, payload = nil)
    params = { function_name: function_name }
    params[:payload] = payload unless payload.nil?
    @lambda_client.invoke(params)
```

```
  rescue Aws::Lambda::Errors::ServiceException => e
    @logger.error("There was an error executing #{function_name}:\n #{e.message}")
  end
```

- For API details, see Invoke in *AWS SDK for Ruby API Reference*.

`ListFunctions`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
class LambdaWrapper
  attr_accessor :lambda_client, :cloudwatch_client, :iam_client

  def initialize
    @lambda_client = Aws::Lambda::Client.new
    @cloudwatch_client = Aws::CloudWatchLogs::Client.new(region: 'us-east-1')
    @iam_client = Aws::IAM::Client.new(region: 'us-east-1')
    @logger = Logger.new($stdout)
    @logger.level = Logger::WARN
  end

  # Lists the Lambda functions for the current account.
  def list_functions
    functions = []
    @lambda_client.list_functions.each do |response|
      response['functions'].each do |function|
        functions.append(function['function_name'])
      end
    end
    functions
  rescue Aws::Lambda::Errors::ServiceException => e
    @logger.error("There was an error listing functions:\n #{e.message}")
  end
```

- For API details, see ListFunctions in *AWS SDK for Ruby API Reference*.

`UpdateFunctionCode`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
class LambdaWrapper
  attr_accessor :lambda_client, :cloudwatch_client, :iam_client

  def initialize
    @lambda_client = Aws::Lambda::Client.new
    @cloudwatch_client = Aws::CloudWatchLogs::Client.new(region: 'us-east-1')
    @iam_client = Aws::IAM::Client.new(region: 'us-east-1')
    @logger = Logger.new($stdout)
    @logger.level = Logger::WARN
  end

  # Updates the code for a Lambda function by submitting a .zip archive that
 contains
  # the code for the function.
  #
  # @param function_name: The name of the function to update.
  # @param deployment_package: The function code to update, packaged as bytes in
  #                            .zip format.
  # @return: Data about the update, including the status.
  def update_function_code(function_name, deployment_package)
    @lambda_client.update_function_code(
      function_name: function_name,
      zip_file: deployment_package
    )
    @lambda_client.wait_until(:function_updated_v2, { function_name:
 function_name }) do |w|
```

```
      w.max_attempts = 5
      w.delay = 5
    end
  rescue Aws::Lambda::Errors::ServiceException => e
    @logger.error("There was an error updating function code for: #{function_name}:
\n #{e.message}")
    nil
  rescue Aws::Waiters::Errors::WaiterFailed => e
    @logger.error("Failed waiting for #{function_name} to update:\n #{e.message}")
  end
```

- For API details, see UpdateFunctionCode in *AWS SDK for Ruby API Reference*.

`UpdateFunctionConfiguration`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
class LambdaWrapper
  attr_accessor :lambda_client, :cloudwatch_client, :iam_client

  def initialize
    @lambda_client = Aws::Lambda::Client.new
    @cloudwatch_client = Aws::CloudWatchLogs::Client.new(region: 'us-east-1')
    @iam_client = Aws::IAM::Client.new(region: 'us-east-1')
    @logger = Logger.new($stdout)
    @logger.level = Logger::WARN
  end

  # Updates the environment variables for a Lambda function.
  # @param function_name: The name of the function to update.
  # @param log_level: The log level of the function.
  # @return: Data about the update, including the status.
  def update_function_configuration(function_name, log_level)
```

```
    @lambda_client.update_function_configuration({
                                                    function_name: function_name,
                                                    environment: {
                                                      variables: {
                                                        'LOG_LEVEL' => log_level
                                                      }
                                                    }
                                                  })
    @lambda_client.wait_until(:function_updated_v2, { function_name:
 function_name }) do |w|
      w.max_attempts = 5
      w.delay = 5
    end
  rescue Aws::Lambda::Errors::ServiceException => e
    @logger.error("There was an error updating configurations for #{function_name}:
\n #{e.message}")
  rescue Aws::Waiters::Errors::WaiterFailed => e
    @logger.error("Failed waiting for #{function_name} to activate:\n #{e.message}")
  end
```

- For API details, see UpdateFunctionConfiguration in *AWS SDK for Ruby API Reference*.

Scenarios

Create an application to analyze customer feedback

The following code example shows how to create an application that analyzes customer comment cards, translates them from their original language, determines their sentiment, and generates an audio file from the translated text.

SDK for Ruby

This example application analyzes and stores customer feedback cards. Specifically, it fulfills the need of a fictitious hotel in New York City. The hotel receives feedback from guests in various languages in the form of physical comment cards. That feedback is uploaded into the app through a web client. After an image of a comment card is uploaded, the following steps occur:

- Text is extracted from the image using Amazon Textract.
- Amazon Comprehend determines the sentiment of the extracted text and its language.
- The extracted text is translated to English using Amazon Translate.

- Amazon Polly synthesizes an audio file from the extracted text.

The full app can be deployed with the AWS CDK. For source code and deployment instructions, see the project in GitHub.

Services used in this example

- Amazon Comprehend
- Lambda
- Amazon Polly
- Amazon Textract
- Amazon Translate

Serverless examples

Connecting to an Amazon RDS database in a Lambda function

The following code example shows how to implement a Lambda function that connects to an RDS database. The function makes a simple database request and returns the result.

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the Serverless examples repository.

Connecting to an Amazon RDS database in a Lambda function using Ruby.

```
# Ruby code here.

require 'aws-sdk-rds'
require 'json'
require 'mysql2'

def lambda_handler(event:, context:)
  endpoint = ENV['DBEndpoint'] # Add the endpoint without https"
  port = ENV['Port']           # 3306
  user = ENV['DBUser']
```

```
  region = ENV['DBRegion']     # 'us-east-1'
  db_name = ENV['DBName']

  credentials = Aws::Credentials.new(
    ENV['AWS_ACCESS_KEY_ID'],
    ENV['AWS_SECRET_ACCESS_KEY'],
    ENV['AWS_SESSION_TOKEN']
  )
  rds_client = Aws::RDS::AuthTokenGenerator.new(
    region: region,
    credentials: credentials
  )

  token = rds_client.auth_token(
    endpoint: endpoint+ ':' + port,
    user_name: user,
    region: region
  )

  begin
    conn = Mysql2::Client.new(
      host: endpoint,
      username: user,
      password: token,
      port: port,
      database: db_name,
      sslca: '/var/task/global-bundle.pem',
      sslverify: true,
      enable_cleartext_plugin: true
    )
    a = 3
    b = 2
    result = conn.query("SELECT #{a} + #{b} AS sum").first['sum']
    puts result
    conn.close
    {
      statusCode: 200,
      body: result.to_json
    }
  rescue => e
    puts "Database connection failed due to #{e}"
  end
end
```

Invoke a Lambda function from a Kinesis trigger

The following code example shows how to implement a Lambda function that receives an event triggered by receiving records from a Kinesis stream. The function retrieves the Kinesis payload, decodes from Base64, and logs the record contents.

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the Serverless examples repository.

Consuming an Kinesis event with Lambda using Ruby.

```
# Copyright Amazon.com, Inc. or its affiliates. All Rights Reserved.
# SPDX-License-Identifier: Apache-2.0
require 'aws-sdk'

def lambda_handler(event:, context:)
  event['Records'].each do |record|
    begin
      puts "Processed Kinesis Event - EventID: #{record['eventID']}"
      record_data = get_record_data_async(record['kinesis'])
      puts "Record Data: #{record_data}"
      # TODO: Do interesting work based on the new data
    rescue => err
      $stderr.puts "An error occurred #{err}"
      raise err
    end
  end
  puts "Successfully processed #{event['Records'].length} records."
end

def get_record_data_async(payload)
  data = Base64.decode64(payload['data']).force_encoding('UTF-8')
  # Placeholder for actual async work
  # You can use Ruby's asynchronous programming tools like async/await or fibers
 here.
  return data
end
```

Invoke a Lambda function from a DynamoDB trigger

The following code example shows how to implement a Lambda function that receives an event triggered by receiving records from a DynamoDB stream. The function retrieves the DynamoDB payload and logs the record contents.

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the Serverless examples repository.

Consuming a DynamoDB event with Lambda using Ruby.

```
def lambda_handler(event:, context:)
    return 'received empty event' if event['Records'].empty?

    event['Records'].each do |record|
      log_dynamodb_record(record)
    end

    "Records processed: #{event['Records'].length}"
  end

  def log_dynamodb_record(record)
    puts record['eventID']
    puts record['eventName']
    puts "DynamoDB Record: #{JSON.generate(record['dynamodb'])}"
  end
```

Invoke a Lambda function from a Amazon DocumentDB trigger

The following code example shows how to implement a Lambda function that receives an event triggered by receiving records from a DocumentDB change stream. The function retrieves the DocumentDB payload and logs the record contents.

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the Serverless examples repository.

Consuming a Amazon DocumentDB event with Lambda using Ruby.

```
require 'json'

def lambda_handler(event:, context:)
  event['events'].each do |record|
    log_document_db_event(record)
  end
  'OK'
end

def log_document_db_event(record)
  event_data = record['event'] || {}
  operation_type = event_data['operationType'] || 'Unknown'
  db = event_data.dig('ns', 'db') || 'Unknown'
  collection = event_data.dig('ns', 'coll') || 'Unknown'
  full_document = event_data['fullDocument'] || {}

  puts "Operation type: #{operation_type}"
  puts "db: #{db}"
  puts "collection: #{collection}"
  puts "Full document: #{JSON.pretty_generate(full_document)}"
end
```

Invoke a Lambda function from an Amazon MSK trigger

The following code example shows how to implement a Lambda function that receives an event triggered by receiving records from an Amazon MSK cluster. The function retrieves the MSK payload and logs the record contents.

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the Serverless examples repository.

Consuming an Amazon MSK event with Lambda using Ruby.

```
require 'base64'

def lambda_handler(event:, context:)
  # Iterate through keys
  event['records'].each do |key, records|
    puts "Key: #{key}"

    # Iterate through records
    records.each do |record|
      puts "Record: #{record}"

      # Decode base64
      msg = Base64.decode64(record['value'])
      puts "Message: #{msg}"
    end
  end
end
```

Invoke a Lambda function from an Amazon S3 trigger

The following code example shows how to implement a Lambda function that receives an event triggered by uploading an object to an S3 bucket. The function retrieves the S3 bucket name and object key from the event parameter and calls the Amazon S3 API to retrieve and log the content type of the object.

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the Serverless examples repository.

Consuming an S3 event with Lambda using Ruby.

```
require 'json'
require 'uri'
require 'aws-sdk'

puts 'Loading function'

def lambda_handler(event:, context:)
  s3 = Aws::S3::Client.new(region: 'region') # Your AWS region
  # puts "Received event: #{JSON.dump(event)}"

  # Get the object from the event and show its content type
  bucket = event['Records'][0]['s3']['bucket']['name']
  key = URI.decode_www_form_component(event['Records'][0]['s3']['object']['key'],
 Encoding::UTF_8)
  begin
    response = s3.get_object(bucket: bucket, key: key)
    puts "CONTENT TYPE: #{response.content_type}"
    return response.content_type
  rescue StandardError => e
    puts e.message
    puts "Error getting object #{key} from bucket #{bucket}. Make sure they exist
 and your bucket is in the same region as this function."
    raise e
  end
end
```

Invoke a Lambda function from an Amazon SNS trigger

The following code example shows how to implement a Lambda function that receives an event triggered by receiving messages from an SNS topic. The function retrieves the messages from the event parameter and logs the content of each message.

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the Serverless examples repository.

Consuming an SNS event with Lambda using Ruby.

```
# Copyright Amazon.com, Inc. or its affiliates. All Rights Reserved.
# SPDX-License-Identifier: Apache-2.0
def lambda_handler(event:, context:)
  event['Records'].map { |record| process_message(record) }
end

def process_message(record)
  message = record['Sns']['Message']
  puts("Processing message: #{message}")
rescue StandardError => e
  puts("Error processing message: #{e}")
  raise
end
```

Invoke a Lambda function from an Amazon SQS trigger

The following code example shows how to implement a Lambda function that receives an event triggered by receiving messages from an SQS queue. The function retrieves the messages from the event parameter and logs the content of each message.

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the Serverless examples repository.

Consuming an SQS event with Lambda using Ruby.

```
# Copyright Amazon.com, Inc. or its affiliates. All Rights Reserved.
# SPDX-License-Identifier: Apache-2.0
def lambda_handler(event:, context:)
  event['Records'].each do |message|
    process_message(message)
  end
  puts "done"
end

def process_message(message)
  begin
    puts "Processed message #{message['body']}"
    # TODO: Do interesting work based on the new message
  rescue StandardError => err
    puts "An error occurred"
    raise err
  end
end
```

Reporting batch item failures for Lambda functions with a Kinesis trigger

The following code example shows how to implement partial batch response for Lambda functions that receive events from a Kinesis stream. The function reports the batch item failures in the response, signaling to Lambda to retry those messages later.

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the Serverless examples repository.

Reporting Kinesis batch item failures with Lambda using Ruby.

```
# Copyright Amazon.com, Inc. or its affiliates. All Rights Reserved.
# SPDX-License-Identifier: Apache-2.0
require 'aws-sdk'

def lambda_handler(event:, context:)
  batch_item_failures = []

  event['Records'].each do |record|
    begin
      puts "Processed Kinesis Event - EventID: #{record['eventID']}"
      record_data = get_record_data_async(record['kinesis'])
      puts "Record Data: #{record_data}"
      # TODO: Do interesting work based on the new data
    rescue StandardError => err
      puts "An error occurred #{err}"
      # Since we are working with streams, we can return the failed item
 immediately.
      # Lambda will immediately begin to retry processing from this failed item
 onwards.
      return { batchItemFailures: [{ itemIdentifier: record['kinesis']
['sequenceNumber'] }] }
    end
  end

  puts "Successfully processed #{event['Records'].length} records."
  { batchItemFailures: batch_item_failures }
end

def get_record_data_async(payload)
  data = Base64.decode64(payload['data']).force_encoding('utf-8')
  # Placeholder for actual async work
  sleep(1)
  data
```

```
end
```

Reporting batch item failures for Lambda functions with a DynamoDB trigger

The following code example shows how to implement partial batch response for Lambda functions that receive events from a DynamoDB stream. The function reports the batch item failures in the response, signaling to Lambda to retry those messages later.

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the Serverless examples repository.

Reporting DynamoDB batch item failures with Lambda using Ruby.

```
def lambda_handler(event:, context:)
    records = event["Records"]
    cur_record_sequence_number = ""

    records.each do |record|
      begin
        # Process your record
        cur_record_sequence_number = record["dynamodb"]["SequenceNumber"]
      rescue StandardError => e
        # Return failed record's sequence number
        return {"batchItemFailures" => [{"itemIdentifier" =>
 cur_record_sequence_number}]}
      end
    end

    {"batchItemFailures" => []}
  end
```

Reporting batch item failures for Lambda functions with an Amazon SQS trigger

The following code example shows how to implement partial batch response for Lambda functions that receive events from an SQS queue. The function reports the batch item failures in the response, signaling to Lambda to retry those messages later.

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the Serverless examples repository.

Reporting SQS batch item failures with Lambda using Ruby.

```
# Copyright Amazon.com, Inc. or its affiliates. All Rights Reserved.
# SPDX-License-Identifier: Apache-2.0
require 'json'

def lambda_handler(event:, context:)
  if event
    batch_item_failures = []
    sqs_batch_response = {}

    event["Records"].each do |record|
      begin
        # process message
      rescue StandardError => e
        batch_item_failures << {"itemIdentifier" => record['messageId']}
      end
    end

    sqs_batch_response["batchItemFailures"] = batch_item_failures
    return sqs_batch_response
  end
end
```

Amazon MSK examples using SDK for Ruby

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

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

- Serverless examples

Serverless examples

Invoke a Lambda function from an Amazon MSK trigger

The following code example shows how to implement a Lambda function that receives an event triggered by receiving records from an Amazon MSK cluster. The function retrieves the MSK payload and logs the record contents.

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the Serverless examples repository.

Consuming an Amazon MSK event with Lambda using Ruby.

```
require 'base64'

def lambda_handler(event:, context:)
  # Iterate through keys
  event['records'].each do |key, records|
    puts "Key: #{key}"

    # Iterate through records
    records.each do |record|
      puts "Record: #{record}"
```

```
      # Decode base64
      msg = Base64.decode64(record['value'])
      puts "Message: #{msg}"
    end
  end
end
```

Amazon Polly examples using SDK for Ruby

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

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

`DescribeVoices`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
require 'aws-sdk-polly' # In v2: require 'aws-sdk'

begin
  # Create an Amazon Polly client using
  # credentials from the shared credentials file ~/.aws/credentials
  # and the configuration (region) from the shared configuration file ~/.aws/config
  polly = Aws::Polly::Client.new

  # Get US English voices
  resp = polly.describe_voices(language_code: 'en-US')

  resp.voices.each do |v|
    puts v.name
    puts "  #{v.gender}"
    puts
  end
rescue StandardError => e
  puts 'Could not get voices'
  puts 'Error message:'
  puts e.message
end
```

- For API details, see DescribeVoices in *AWS SDK for Ruby API Reference*.

`ListLexicons`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
require 'aws-sdk-polly' # In v2: require 'aws-sdk'
```

```
begin
  # Create an Amazon Polly client using
  # credentials from the shared credentials file ~/.aws/credentials
  # and the configuration (region) from the shared configuration file ~/.aws/config
  polly = Aws::Polly::Client.new

  resp = polly.list_lexicons

  resp.lexicons.each do |l|
    puts l.name
    puts "  Alphabet:#{l.attributes.alphabet}"
    puts "  Language:#{l.attributes.language}"
    puts
  end
rescue StandardError => e
  puts 'Could not get lexicons'
  puts 'Error message:'
  puts e.message
end
```

- For API details, see ListLexicons in *AWS SDK for Ruby API Reference*.

`SynthesizeSpeech`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
require 'aws-sdk-polly' # In v2: require 'aws-sdk'

begin
  # Get the filename from the command line
  if ARGV.empty?
    puts 'You must supply a filename'
```

```
    exit 1
  end

  filename = ARGV[0]

  # Open file and get the contents as a string
  if File.exist?(filename)
    contents = IO.read(filename)
  else
    puts "No such file: #{filename}"
    exit 1
  end

  # Create an Amazon Polly client using
  # credentials from the shared credentials file ~/.aws/credentials
  # and the configuration (region) from the shared configuration file ~/.aws/config
  polly = Aws::Polly::Client.new

  resp = polly.synthesize_speech({
                                   output_format: 'mp3',
                                   text: contents,
                                   voice_id: 'Joanna'
                                 })

  # Save output
  # Get just the file name
  #  abc/xyz.txt -> xyx.txt
  name = File.basename(filename)

  # Split up name so we get just the xyz part
  parts = name.split('.')
  first_part = parts[0]
  mp3_file = "#{first_part}.mp3"

  IO.copy_stream(resp.audio_stream, mp3_file)

  puts "Wrote MP3 content to: #{mp3_file}"
rescue StandardError => e
  puts 'Got error:'
  puts 'Error message:'
  puts e.message
end
```

- For API details, see SynthesizeSpeech in *AWS SDK for Ruby API Reference*.

Scenarios

Create an application to analyze customer feedback

The following code example shows how to create an application that analyzes customer comment cards, translates them from their original language, determines their sentiment, and generates an audio file from the translated text.

SDK for Ruby

This example application analyzes and stores customer feedback cards. Specifically, it fulfills the need of a fictitious hotel in New York City. The hotel receives feedback from guests in various languages in the form of physical comment cards. That feedback is uploaded into the app through a web client. After an image of a comment card is uploaded, the following steps occur:

- Text is extracted from the image using Amazon Textract.
- Amazon Comprehend determines the sentiment of the extracted text and its language.
- The extracted text is translated to English using Amazon Translate.
- Amazon Polly synthesizes an audio file from the extracted text.

The full app can be deployed with the AWS CDK. For source code and deployment instructions, see the project in GitHub.

Services used in this example

- Amazon Comprehend
- Lambda
- Amazon Polly
- Amazon Textract
- Amazon Translate

Amazon RDS examples using SDK for Ruby

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

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

- Get started
- Actions
- Serverless examples

Get started

Hello Amazon RDS

The following code example shows how to get started using Amazon RDS.

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
require 'aws-sdk-rds'
require 'logger'

# RDSManager is a class responsible for managing RDS operations
# such as listing all RDS DB instances in the current AWS account.
class RDSManager
  def initialize(client)
    @client = client
    @logger = Logger.new($stdout)
  end

  # Lists and prints all RDS DB instances in the current AWS account.
  def list_db_instances
```

```
    @logger.info('Listing RDS DB instances')

    paginator = @client.describe_db_instances
    instances = []

    paginator.each_page do |page|
      instances.concat(page.db_instances)
    end

    if instances.empty?
      @logger.info('No instances found.')
    else
      @logger.info("Found #{instances.count} instance(s):")
      instances.each do |instance|
        @logger.info(" * #{instance.db_instance_identifier}
 (#{instance.db_instance_status})")
      end
    end
  end
end

if $PROGRAM_NAME == __FILE__
  rds_client = Aws::RDS::Client.new(region: 'us-west-2')
  manager = RDSManager.new(rds_client)
  manager.list_db_instances
end
```

- For API details, see DescribeDBInstances in *AWS SDK for Ruby API Reference*.

Actions

`CreateDBSnapshot`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
require 'aws-sdk-rds' # v2: require 'aws-sdk'

# Create a snapshot for an Amazon Relational Database Service (Amazon RDS)
# DB instance.
#
# @param rds_resource [Aws::RDS::Resource] The resource containing SDK logic.
# @param db_instance_name [String] The name of the Amazon RDS DB instance.
# @return [Aws::RDS::DBSnapshot, nil] The snapshot created, or nil if error.
def create_snapshot(rds_resource, db_instance_name)
  id = "snapshot-#{rand(10**6)}"
  db_instance = rds_resource.db_instance(db_instance_name)
  db_instance.create_snapshot({
                                db_snapshot_identifier: id
                              })
rescue Aws::Errors::ServiceError => e
  puts "Couldn't create DB instance snapshot #{id}:\n #{e.message}"
end
```

- For API details, see CreateDBSnapshot in *AWS SDK for Ruby API Reference*.

`DescribeDBInstances`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
require 'aws-sdk-rds' # v2: require 'aws-sdk'

# List all Amazon Relational Database Service (Amazon RDS) DB instances.
#
# @param rds_resource [Aws::RDS::Resource] An SDK for Ruby Amazon RDS resource.
# @return [Array, nil] List of all DB instances, or nil if error.
def list_instances(rds_resource)
  db_instances = []
  rds_resource.db_instances.each do |i|
    db_instances.append({
                          "name": i.id,
                          "status": i.db_instance_status
                        })
  end
  db_instances
rescue Aws::Errors::ServiceError => e
  puts "Couldn't list instances:\n#{e.message}"
end
```

- For API details, see DescribeDBInstances in *AWS SDK for Ruby API Reference*.

`DescribeDBParameterGroups`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
require 'aws-sdk-rds' # v2: require 'aws-sdk'

# List all Amazon Relational Database Service (Amazon RDS) parameter groups.
#
# @param rds_resource [Aws::RDS::Resource] An SDK for Ruby Amazon RDS resource.
# @return [Array, nil] List of all parameter groups, or nil if error.
def list_parameter_groups(rds_resource)
```

```
  parameter_groups = []
  rds_resource.db_parameter_groups.each do |p|
    parameter_groups.append({
                              "name": p.db_parameter_group_name,
                              "description": p.description
                            })
  end
  parameter_groups
rescue Aws::Errors::ServiceError => e
  puts "Couldn't list parameter groups:\n #{e.message}"
end
```

- For API details, see DescribeDBParameterGroups in *AWS SDK for Ruby API Reference*.

`DescribeDBParameters`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
require 'aws-sdk-rds' # v2: require 'aws-sdk'

# List all Amazon Relational Database Service (Amazon RDS) parameter groups.
#
# @param rds_resource [Aws::RDS::Resource] An SDK for Ruby Amazon RDS resource.
# @return [Array, nil] List of all parameter groups, or nil if error.
def list_parameter_groups(rds_resource)
  parameter_groups = []
  rds_resource.db_parameter_groups.each do |p|
    parameter_groups.append({
                              "name": p.db_parameter_group_name,
                              "description": p.description
                            })
  end
```

```
  parameter_groups
rescue Aws::Errors::ServiceError => e
  puts "Couldn't list parameter groups:\n #{e.message}"
end
```

- For API details, see DescribeDBParameters in *AWS SDK for Ruby API Reference*.

`DescribeDBSnapshots`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
require 'aws-sdk-rds' # v2: require 'aws-sdk'

# List all Amazon Relational Database Service (Amazon RDS) DB instance
# snapshots.
#
# @param rds_resource [Aws::RDS::Resource] An SDK for Ruby Amazon RDS resource.
# @return instance_snapshots [Array, nil] All instance snapshots, or nil if error.
def list_instance_snapshots(rds_resource)
  instance_snapshots = []
  rds_resource.db_snapshots.each do |s|
    instance_snapshots.append({
                                "id": s.snapshot_id,
                                "status": s.status
                              })
  end
  instance_snapshots
rescue Aws::Errors::ServiceError => e
  puts "Couldn't list instance snapshots:\n #{e.message}"
end
```

- For API details, see DescribeDBSnapshots in *AWS SDK for Ruby API Reference*.

Serverless examples

Connecting to an Amazon RDS database in a Lambda function

The following code example shows how to implement a Lambda function that connects to an RDS database. The function makes a simple database request and returns the result.

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the Serverless examples repository.

Connecting to an Amazon RDS database in a Lambda function using Ruby.

```
# Ruby code here.

require 'aws-sdk-rds'
require 'json'
require 'mysql2'

def lambda_handler(event:, context:)
  endpoint = ENV['DBEndpoint'] # Add the endpoint without https"
  port = ENV['Port']           # 3306
  user = ENV['DBUser']
  region = ENV['DBRegion']     # 'us-east-1'
  db_name = ENV['DBName']

  credentials = Aws::Credentials.new(
    ENV['AWS_ACCESS_KEY_ID'],
    ENV['AWS_SECRET_ACCESS_KEY'],
    ENV['AWS_SESSION_TOKEN']
  )
  rds_client = Aws::RDS::AuthTokenGenerator.new(
    region: region,
    credentials: credentials
  )
```

```
  token = rds_client.auth_token(
    endpoint: endpoint+ ':' + port,
    user_name: user,
    region: region
  )

  begin
    conn = Mysql2::Client.new(
      host: endpoint,
      username: user,
      password: token,
      port: port,
      database: db_name,
      sslca: '/var/task/global-bundle.pem',
      sslverify: true,
      enable_cleartext_plugin: true
    )
    a = 3
    b = 2
    result = conn.query("SELECT #{a} + #{b} AS sum").first['sum']
    puts result
    conn.close
    {
      statusCode: 200,
      body: result.to_json
    }
  rescue => e
    puts "Database connection failed due to #{e}"
  end
end
```

Amazon S3 examples using SDK for Ruby

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

- Get started
- Basics
- Actions
- Scenarios
- Serverless examples

Get started

Hello Amazon S3

The following code example shows how to get started using Amazon S3.

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
# frozen_string_literal: true

# S3Manager is a class responsible for managing S3 operations
# such as listing all S3 buckets in the current AWS account.
class S3Manager
  def initialize(client)
    @client = client
    @logger = Logger.new($stdout)
  end
```

```
  # Lists and prints all S3 buckets in the current AWS account.
  def list_buckets
    @logger.info('Here are the buckets in your account:')

    response = @client.list_buckets

    if response.buckets.empty?
      @logger.info("You don't have any S3 buckets yet.")
    else
      response.buckets.each do |bucket|
        @logger.info("- #{bucket.name}")
      end
    end
  rescue Aws::Errors::ServiceError => e
    @logger.error("Encountered an error while listing buckets: #{e.message}")
  end
end

if $PROGRAM_NAME == __FILE__
  s3_client = Aws::S3::Client.new
  manager = S3Manager.new(s3_client)
  manager.list_buckets
end
```

- For API details, see ListBuckets in *AWS SDK for Ruby API Reference*.

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 Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
require 'aws-sdk-s3'

# Wraps the getting started scenario actions.
class ScenarioGettingStarted
  attr_reader :s3_resource

  # @param s3_resource [Aws::S3::Resource] An Amazon S3 resource.
  def initialize(s3_resource)
    @s3_resource = s3_resource
  end

  # Creates a bucket with a random name in the currently configured account and
  # AWS Region.
  #
  # @return [Aws::S3::Bucket] The newly created bucket.
  def create_bucket
    bucket = @s3_resource.create_bucket(
      bucket: "amzn-s3-demo-bucket-#{Random.uuid}",
      create_bucket_configuration: {
        location_constraint: 'us-east-1' # NOTE: only certain regions permitted
      }
    )
    puts("Created demo bucket named #{bucket.name}.")
  rescue Aws::Errors::ServiceError => e
    puts('Tried and failed to create demo bucket.')
    puts("\t#{e.code}: #{e.message}")
    puts("\nCan't continue the demo without a bucket!")
    raise
  else
    bucket
  end

  # Requests a file name from the user.
  #
```

```
  # @return The name of the file.
  def create_file
    File.open('demo.txt', w) { |f| f.write('This is a demo file.') }
  end

  # Uploads a file to an Amazon S3 bucket.
  #
  # @param bucket [Aws::S3::Bucket] The bucket object representing the upload
destination
  # @return [Aws::S3::Object] The Amazon S3 object that contains the uploaded file.
  def upload_file(bucket)
    File.open('demo.txt', 'w+') { |f| f.write('This is a demo file.') }
    s3_object = bucket.object(File.basename('demo.txt'))
    s3_object.upload_file('demo.txt')
    puts("Uploaded file demo.txt into bucket #{bucket.name} with key
#{s3_object.key}.")
  rescue Aws::Errors::ServiceError => e
    puts("Couldn't upload file demo.txt to #{bucket.name}.")
    puts("\t#{e.code}: #{e.message}")
    raise
  else
    s3_object
  end

  # Downloads an Amazon S3 object to a file.
  #
  # @param s3_object [Aws::S3::Object] The object to download.
  def download_file(s3_object)
    puts("\nDo you want to download #{s3_object.key} to a local file (y/n)? ")
    answer = gets.chomp.downcase
    if answer == 'y'
      puts('Enter a name for the downloaded file: ')
      file_name = gets.chomp
      s3_object.download_file(file_name)
      puts("Object #{s3_object.key} successfully downloaded to #{file_name}.")
    end
  rescue Aws::Errors::ServiceError => e
    puts("Couldn't download #{s3_object.key}.")
    puts("\t#{e.code}: #{e.message}")
    raise
  end

  # Copies an Amazon S3 object to a subfolder within the same bucket.
  #
```

```
  # @param source_object [Aws::S3::Object] The source object to copy.
  # @return [Aws::S3::Object, nil] The destination object.
  def copy_object(source_object)
    dest_object = nil
    puts("\nDo you want to copy #{source_object.key} to a subfolder in your bucket
(y/n)? ")
    answer = gets.chomp.downcase
    if answer == 'y'
      dest_object = source_object.bucket.object("demo-folder/#{source_object.key}")
      dest_object.copy_from(source_object)
      puts("Copied #{source_object.key} to #{dest_object.key}.")
    end
  rescue Aws::Errors::ServiceError => e
    puts("Couldn't copy #{source_object.key}.")
    puts("\t#{e.code}: #{e.message}")
    raise
  else
    dest_object
  end

  # Lists the objects in an Amazon S3 bucket.
  #
  # @param bucket [Aws::S3::Bucket] The bucket to query.
  def list_objects(bucket)
    puts("\nYour bucket contains the following objects:")
    bucket.objects.each do |obj|
      puts("\t#{obj.key}")
    end
  rescue Aws::Errors::ServiceError => e
    puts("Couldn't list the objects in bucket #{bucket.name}.")
    puts("\t#{e.code}: #{e.message}")
    raise
  end

  # Deletes the objects in an Amazon S3 bucket and deletes the bucket.
  #
  # @param bucket [Aws::S3::Bucket] The bucket to empty and delete.
  def delete_bucket(bucket)
    puts("\nDo you want to delete all of the objects as well as the bucket (y/n)? ")
    answer = gets.chomp.downcase
    if answer == 'y'
      bucket.objects.batch_delete!
      bucket.delete
      puts("Emptied and deleted bucket #{bucket.name}.\n")
```

```
    end
  rescue Aws::Errors::ServiceError => e
    puts("Couldn't empty and delete bucket #{bucket.name}.")
    puts("\t#{e.code}: #{e.message}")
    raise
  end
end

# Runs the Amazon S3 getting started scenario.
def run_scenario(scenario)
  puts('-' * 88)
  puts('Welcome to the Amazon S3 getting started demo!')
  puts('-' * 88)

  bucket = scenario.create_bucket
  s3_object = scenario.upload_file(bucket)
  scenario.download_file(s3_object)
  scenario.copy_object(s3_object)
  scenario.list_objects(bucket)
  scenario.delete_bucket(bucket)

  puts('Thanks for watching!')
  puts('-' * 88)
rescue Aws::Errors::ServiceError
  puts('Something went wrong with the demo!')
end

run_scenario(ScenarioGettingStarted.new(Aws::S3::Resource.new)) if $PROGRAM_NAME ==
 __FILE__
```

- For API details, see the following topics in *AWS SDK for Ruby API Reference*.
  - CopyObject
  - CreateBucket
  - DeleteBucket
  - DeleteObjects
  - GetObject
  - ListObjectsV2
  - PutObject

Actions

`CopyObject`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

Copy an object.

```
require 'aws-sdk-s3'

# Wraps Amazon S3 object actions.
class ObjectCopyWrapper
  attr_reader :source_object

  # @param source_object [Aws::S3::Object] An existing Amazon S3 object. This is
 used as the source object for
  #                                        copy actions.
  def initialize(source_object)
    @source_object = source_object
  end

  # Copy the source object to the specified target bucket and rename it with the
 target key.
  #
  # @param target_bucket [Aws::S3::Bucket] An existing Amazon S3 bucket where the
 object is copied.
  # @param target_object_key [String] The key to give the copy of the object.
  # @return [Aws::S3::Object, nil] The copied object when successful; otherwise,
 nil.
  def copy_object(target_bucket, target_object_key)
    @source_object.copy_to(bucket: target_bucket.name, key: target_object_key)
    target_bucket.object(target_object_key)
  rescue Aws::Errors::ServiceError => e
    puts "Couldn't copy #{@source_object.key} to #{target_object_key}. Here's why:
 #{e.message}"
```

```
  end
end

# Example usage:
def run_demo
  source_bucket_name = "amzn-s3-demo-bucket1"
  source_key = "my-source-file.txt"
  target_bucket_name = "amzn-s3-demo-bucket2"
  target_key = "my-target-file.txt"

  source_bucket = Aws::S3::Bucket.new(source_bucket_name)
  wrapper = ObjectCopyWrapper.new(source_bucket.object(source_key))
  target_bucket = Aws::S3::Bucket.new(target_bucket_name)
  target_object = wrapper.copy_object(target_bucket, target_key)
  return unless target_object

  puts "Copied #{source_key} from #{source_bucket_name} to
 #{target_object.bucket_name}:#{target_object.key}."
end

run_demo if $PROGRAM_NAME == __FILE__
```

Copy an object and add server-side encryption to the destination object.

```
require 'aws-sdk-s3'

# Wraps Amazon S3 object actions.
class ObjectCopyEncryptWrapper
  attr_reader :source_object

  # @param source_object [Aws::S3::Object] An existing Amazon S3 object. This is
 used as the source object for
  #                                        copy actions.
  def initialize(source_object)
    @source_object = source_object
  end

  # Copy the source object to the specified target bucket, rename it with the target
 key, and encrypt it.
  #
  # @param target_bucket [Aws::S3::Bucket] An existing Amazon S3 bucket where the
 object is copied.
```

```
  # @param target_object_key [String] The key to give the copy of the object.
  # @return [Aws::S3::Object, nil] The copied object when successful; otherwise,
 nil.
  def copy_object(target_bucket, target_object_key, encryption)
    @source_object.copy_to(bucket: target_bucket.name, key: target_object_key,
 server_side_encryption: encryption)
    target_bucket.object(target_object_key)
  rescue Aws::Errors::ServiceError => e
    puts "Couldn't copy #{@source_object.key} to #{target_object_key}. Here's why:
 #{e.message}"
  end
end

# Example usage:
def run_demo
  source_bucket_name = "amzn-s3-demo-bucket1"
  source_key = "my-source-file.txt"
  target_bucket_name = "amzn-s3-demo-bucket2"
  target_key = "my-target-file.txt"
  target_encryption = "AES256"

  source_bucket = Aws::S3::Bucket.new(source_bucket_name)
  wrapper = ObjectCopyEncryptWrapper.new(source_bucket.object(source_key))
  target_bucket = Aws::S3::Bucket.new(target_bucket_name)
  target_object = wrapper.copy_object(target_bucket, target_key, target_encryption)
  return unless target_object

  puts "Copied #{source_key} from #{source_bucket_name} to
 #{target_object.bucket_name}:#{target_object.key} and "\
       "encrypted the target with #{target_object.server_side_encryption}
 encryption."
end

run_demo if $PROGRAM_NAME == __FILE__
```

- For API details, see CopyObject in *AWS SDK for Ruby API Reference*.

`CreateBucket`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
require 'aws-sdk-s3'

# Wraps Amazon S3 bucket actions.
class BucketCreateWrapper
  attr_reader :bucket

  # @param bucket [Aws::S3::Bucket] An Amazon S3 bucket initialized with a name.
 This is a client-side object until
  #                                 create is called.
  def initialize(bucket)
    @bucket = bucket
  end

  # Creates an Amazon S3 bucket in the specified AWS Region.
  #
  # @param region [String] The Region where the bucket is created.
  # @return [Boolean] True when the bucket is created; otherwise, false.
  def create?(region)
    @bucket.create(create_bucket_configuration: { location_constraint: region })
    true
  rescue Aws::Errors::ServiceError => e
    puts "Couldn't create bucket. Here's why: #{e.message}"
    false
  end

  # Gets the Region where the bucket is located.
  #
  # @return [String] The location of the bucket.
  def location
    if @bucket.nil?
      'None. You must create a bucket before you can get its location!'
    else
      @bucket.client.get_bucket_location(bucket: @bucket.name).location_constraint
    end
```

```
  rescue Aws::Errors::ServiceError => e
    "Couldn't get the location of #{@bucket.name}. Here's why: #{e.message}"
  end
end

# Example usage:
def run_demo
  region = "us-west-2"
  wrapper = BucketCreateWrapper.new(Aws::S3::Bucket.new("amzn-s3-demo-bucket-
#{Random.uuid}"))
  return unless wrapper.create?(region)

  puts "Created bucket #{wrapper.bucket.name}."
  puts "Your bucket's region is: #{wrapper.location}"
end

run_demo if $PROGRAM_NAME == __FILE__
```

- For API details, see CreateBucket in *AWS SDK for Ruby API Reference*.

`DeleteBucket`

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

SDK for Ruby

> **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 the objects in an Amazon S3 bucket and deletes the bucket.
  #
  # @param bucket [Aws::S3::Bucket] The bucket to empty and delete.
  def delete_bucket(bucket)
    puts("\nDo you want to delete all of the objects as well as the bucket (y/n)? ")
    answer = gets.chomp.downcase
    if answer == 'y'
      bucket.objects.batch_delete!
```

```
      bucket.delete
      puts("Emptied and deleted bucket #{bucket.name}.\n")
    end
  rescue Aws::Errors::ServiceError => e
    puts("Couldn't empty and delete bucket #{bucket.name}.")
    puts("\t#{e.code}: #{e.message}")
    raise
  end
```

- For API details, see DeleteBucket in *AWS SDK for Ruby API Reference*.

`DeleteBucketCors`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
require 'aws-sdk-s3'

# Wraps Amazon S3 bucket CORS configuration.
class BucketCorsWrapper
  attr_reader :bucket_cors

  # @param bucket_cors [Aws::S3::BucketCors] A bucket CORS object configured with an
 existing bucket.
  def initialize(bucket_cors)
    @bucket_cors = bucket_cors
  end

  # Deletes the CORS configuration of a bucket.
  #
  # @return [Boolean] True if the CORS rules were deleted; otherwise, false.
  def delete_cors
    @bucket_cors.delete
    true
```

```
  rescue Aws::Errors::ServiceError => e
    puts "Couldn't delete CORS rules for #{@bucket_cors.bucket.name}. Here's why:
 #{e.message}"
    false
  end

end
```

- For API details, see DeleteBucketCors in *AWS SDK for Ruby API Reference*.

`DeleteBucketPolicy`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
# Wraps an Amazon S3 bucket policy.
class BucketPolicyWrapper
  attr_reader :bucket_policy

  # @param bucket_policy [Aws::S3::BucketPolicy] A bucket policy object configured
 with an existing bucket.
  def initialize(bucket_policy)
    @bucket_policy = bucket_policy
  end

  def delete_policy
    @bucket_policy.delete
    true
  rescue Aws::Errors::ServiceError => e
    puts "Couldn't delete the policy from #{@bucket_policy.bucket.name}. Here's why:
 #{e.message}"
    false
  end
```

```
end
```

- For API details, see DeleteBucketPolicy in *AWS SDK for Ruby API Reference*.

`DeleteObjects`

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

SDK for Ruby

> **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 the objects in an Amazon S3 bucket and deletes the bucket.
#
# @param bucket [Aws::S3::Bucket] The bucket to empty and delete.
def delete_bucket(bucket)
  puts("\nDo you want to delete all of the objects as well as the bucket (y/n)? ")
  answer = gets.chomp.downcase
  if answer == 'y'
    bucket.objects.batch_delete!
    bucket.delete
    puts("Emptied and deleted bucket #{bucket.name}.\n")
  end
rescue Aws::Errors::ServiceError => e
  puts("Couldn't empty and delete bucket #{bucket.name}.")
  puts("\t#{e.code}: #{e.message}")
  raise
end
```

- For API details, see DeleteObjects in *AWS SDK for Ruby API Reference*.

`GetBucketCors`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
require 'aws-sdk-s3'

# Wraps Amazon S3 bucket CORS configuration.
class BucketCorsWrapper
  attr_reader :bucket_cors

  # @param bucket_cors [Aws::S3::BucketCors] A bucket CORS object configured with an
 existing bucket.
  def initialize(bucket_cors)
    @bucket_cors = bucket_cors
  end

  # Gets the CORS configuration of a bucket.
  #
  # @return [Aws::S3::Type::GetBucketCorsOutput, nil] The current CORS configuration
 for the bucket.
  def cors
    @bucket_cors.data
  rescue Aws::Errors::ServiceError => e
    puts "Couldn't get CORS configuration for #{@bucket_cors.bucket.name}. Here's
 why: #{e.message}"
    nil
  end

end
```

- For API details, see GetBucketCors in *AWS SDK for Ruby API Reference*.

`GetBucketPolicy`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
# Wraps an Amazon S3 bucket policy.
class BucketPolicyWrapper
  attr_reader :bucket_policy

  # @param bucket_policy [Aws::S3::BucketPolicy] A bucket policy object configured
 with an existing bucket.
  def initialize(bucket_policy)
    @bucket_policy = bucket_policy
  end

  # Gets the policy of a bucket.
  #
  # @return [Aws::S3::GetBucketPolicyOutput, nil] The current bucket policy.
  def policy
    policy = @bucket_policy.data.policy
    policy.respond_to?(:read) ? policy.read : policy
  rescue Aws::Errors::ServiceError => e
    puts "Couldn't get the policy for #{@bucket_policy.bucket.name}. Here's why:
 #{e.message}"
    nil
  end

end
```

- For API details, see GetBucketPolicy in *AWS SDK for Ruby API Reference*.

`GetObject`

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

SDK for Ruby

> **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 an object.

```
require 'aws-sdk-s3'

# Wraps Amazon S3 object actions.
class ObjectGetWrapper
  attr_reader :object

  # @param object [Aws::S3::Object] An existing Amazon S3 object.
  def initialize(object)
    @object = object
  end

  # Gets the object directly to a file.
  #
  # @param target_path [String] The path to the file where the object is downloaded.
  # @return [Aws::S3::Types::GetObjectOutput, nil] The retrieved object data if
 successful; otherwise nil.
  def get_object(target_path)
    @object.get(response_target: target_path)
  rescue Aws::Errors::ServiceError => e
    puts "Couldn't get object #{@object.key}. Here's why: #{e.message}"
  end
end

# Example usage:
def run_demo
  bucket_name = "amzn-s3-demo-bucket"
  object_key = "my-object.txt"
  target_path = "my-object-as-file.txt"

  wrapper = ObjectGetWrapper.new(Aws::S3::Object.new(bucket_name, object_key))
  obj_data = wrapper.get_object(target_path)
  return unless obj_data
```

```
  puts "Object #{object_key} (#{obj_data.content_length} bytes} downloaded to
 #{target_path}."
end

run_demo if $PROGRAM_NAME == __FILE__
```

Get an object and report its server-side encryption state.

```
require 'aws-sdk-s3'

# Wraps Amazon S3 object actions.
class ObjectGetEncryptionWrapper
  attr_reader :object

  # @param object [Aws::S3::Object] An existing Amazon S3 object.
  def initialize(object)
    @object = object
  end

  # Gets the object into memory.
  #
  # @return [Aws::S3::Types::GetObjectOutput, nil] The retrieved object data if
 successful; otherwise nil.
  def object
    @object.get
  rescue Aws::Errors::ServiceError => e
    puts "Couldn't get object #{@object.key}. Here's why: #{e.message}"
  end
end

# Example usage:
def run_demo
  bucket_name = "amzn-s3-demo-bucket"
  object_key = "my-object.txt"

  wrapper = ObjectGetEncryptionWrapper.new(Aws::S3::Object.new(bucket_name,
 object_key))
  obj_data = wrapper.get_object
  return unless obj_data

  encryption = obj_data.server_side_encryption.nil? ? 'no' :
 obj_data.server_side_encryption
```

```
  puts "Object #{object_key} uses #{encryption} encryption."
end

run_demo if $PROGRAM_NAME == __FILE__
```

- For API details, see GetObject in *AWS SDK for Ruby API Reference*.

`HeadObject`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
require 'aws-sdk-s3'

# Wraps Amazon S3 object actions.
class ObjectExistsWrapper
  attr_reader :object

  # @param object [Aws::S3::Object] An Amazon S3 object.
  def initialize(object)
    @object = object
  end

  # Checks whether the object exists.
  #
  # @return [Boolean] True if the object exists; otherwise false.
  def exists?
    @object.exists?
  rescue Aws::Errors::ServiceError => e
    puts "Couldn't check existence of object #{@object.bucket.name}:#{@object.key}.
 Here's why: #{e.message}"
    false
  end
end
```

```
# Example usage:
def run_demo
  bucket_name = "amzn-s3-demo-bucket"
  object_key = "my-object.txt"

  wrapper = ObjectExistsWrapper.new(Aws::S3::Object.new(bucket_name, object_key))
  exists = wrapper.exists?

  puts "Object #{object_key} #{exists ? 'does' : 'does not'} exist."
end

run_demo if $PROGRAM_NAME == __FILE__
```

- For API details, see HeadObject in *AWS SDK for Ruby API Reference*.

`ListBuckets`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
require 'aws-sdk-s3'

# Wraps Amazon S3 resource actions.
class BucketListWrapper
  attr_reader :s3_resource

  # @param s3_resource [Aws::S3::Resource] An Amazon S3 resource.
  def initialize(s3_resource)
    @s3_resource = s3_resource
  end

  # Lists buckets for the current account.
  #
```

```
  # @param count [Integer] The maximum number of buckets to list.
  def list_buckets(count)
    puts 'Found these buckets:'
    @s3_resource.buckets.each do |bucket|
      puts "\t#{bucket.name}"
      count -= 1
      break if count.zero?
    end
    true
  rescue Aws::Errors::ServiceError => e
    puts "Couldn't list buckets. Here's why: #{e.message}"
    false
  end
end

# Example usage:
def run_demo
  wrapper = BucketListWrapper.new(Aws::S3::Resource.new)
  wrapper.list_buckets(25)
end

run_demo if $PROGRAM_NAME == __FILE__
```

- For API details, see ListBuckets in *AWS SDK for Ruby API Reference*.

`ListObjectsV2`

The following code example shows how to use `ListObjectsV2`.

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
require 'aws-sdk-s3'

# Wraps Amazon S3 bucket actions.
class BucketListObjectsWrapper
```

```
  attr_reader :bucket

  # @param bucket [Aws::S3::Bucket] An existing Amazon S3 bucket.
  def initialize(bucket)
    @bucket = bucket
  end

  # Lists object in a bucket.
  #
  # @param max_objects [Integer] The maximum number of objects to list.
  # @return [Integer] The number of objects listed.
  def list_objects(max_objects)
    count = 0
    puts "The objects in #{@bucket.name} are:"
    @bucket.objects.each do |obj|
      puts "\t#{obj.key}"
      count += 1
      break if count == max_objects
    end
    count
  rescue Aws::Errors::ServiceError => e
    puts "Couldn't list objects in bucket #{bucket.name}. Here's why: #{e.message}"
    0
  end
end

# Example usage:
def run_demo
  bucket_name = "amzn-s3-demo-bucket"

  wrapper = BucketListObjectsWrapper.new(Aws::S3::Bucket.new(bucket_name))
  count = wrapper.list_objects(25)
  puts "Listed #{count} objects."
end

run_demo if $PROGRAM_NAME == __FILE__
```

- For API details, see ListObjectsV2 in *AWS SDK for Ruby API Reference*.

`PutBucketCors`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
require 'aws-sdk-s3'

# Wraps Amazon S3 bucket CORS configuration.
class BucketCorsWrapper
  attr_reader :bucket_cors

  # @param bucket_cors [Aws::S3::BucketCors] A bucket CORS object configured with an
 existing bucket.
  def initialize(bucket_cors)
    @bucket_cors = bucket_cors
  end

  # Sets CORS rules on a bucket.
  #
  # @param allowed_methods [Array<String>] The types of HTTP requests to allow.
  # @param allowed_origins [Array<String>] The origins to allow.
  # @returns [Boolean] True if the CORS rules were set; otherwise, false.
  def set_cors(allowed_methods, allowed_origins)
    @bucket_cors.put(
      cors_configuration: {
        cors_rules: [
          {
            allowed_methods: allowed_methods,
            allowed_origins: allowed_origins,
            allowed_headers: %w[*],
            max_age_seconds: 3600
          }
        ]
      }
    )
    true
  rescue Aws::Errors::ServiceError => e
    puts "Couldn't set CORS rules for #{@bucket_cors.bucket.name}. Here's why:
 #{e.message}"
```

```
    false
  end

end
```

- For API details, see PutBucketCors in *AWS SDK for Ruby API Reference*.

`PutBucketPolicy`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
# Wraps an Amazon S3 bucket policy.
class BucketPolicyWrapper
  attr_reader :bucket_policy

  # @param bucket_policy [Aws::S3::BucketPolicy] A bucket policy object configured
 with an existing bucket.
  def initialize(bucket_policy)
    @bucket_policy = bucket_policy
  end

  # Sets a policy on a bucket.
  #
  def policy(policy)
    @bucket_policy.put(policy: policy)
    true
  rescue Aws::Errors::ServiceError => e
    puts "Couldn't set the policy for #{@bucket_policy.bucket.name}. Here's why:
 #{e.message}"
    false
  end

end
```

- For API details, see PutBucketPolicy in *AWS SDK for Ruby API Reference*.

`PutBucketWebsite`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
require 'aws-sdk-s3'

# Wraps Amazon S3 bucket website actions.
class BucketWebsiteWrapper
  attr_reader :bucket_website

  # @param bucket_website [Aws::S3::BucketWebsite] A bucket website object
 configured with an existing bucket.
  def initialize(bucket_website)
    @bucket_website = bucket_website
  end

  # Sets a bucket as a static website.
  #
  # @param index_document [String] The name of the index document for the website.
  # @param error_document [String] The name of the error document to show for 4XX
 errors.
  # @return [Boolean] True when the bucket is configured as a website; otherwise,
 false.
  def set_website(index_document, error_document)
    @bucket_website.put(
      website_configuration: {
        index_document: { suffix: index_document },
        error_document: { key: error_document }
      }
    )
```

```
    true
  rescue Aws::Errors::ServiceError => e
    puts "Couldn't configure #{@bucket_website.bucket.name} as a website. Here's
 why: #{e.message}"
    false
  end
end

# Example usage:
def run_demo
  bucket_name = "amzn-s3-demo-bucket"
  index_document = "index.html"
  error_document = "404.html"

  wrapper = BucketWebsiteWrapper.new(Aws::S3::BucketWebsite.new(bucket_name))
  return unless wrapper.set_website(index_document, error_document)

  puts "Successfully configured bucket #{bucket_name} as a static website."
end

run_demo if $PROGRAM_NAME == __FILE__
```

- For API details, see PutBucketWebsite in *AWS SDK for Ruby API Reference*.

`PutObject`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

Upload a file using a managed uploader (Object.upload_file).

```
require 'aws-sdk-s3'

# Wraps Amazon S3 object actions.
```

```
class ObjectUploadFileWrapper
  attr_reader :object

  # @param object [Aws::S3::Object] An existing Amazon S3 object.
  def initialize(object)
    @object = object
  end

  # Uploads a file to an Amazon S3 object by using a managed uploader.
  #
  # @param file_path [String] The path to the file to upload.
  # @return [Boolean] True when the file is uploaded; otherwise false.
  def upload_file(file_path)
    @object.upload_file(file_path)
    true
  rescue Aws::Errors::ServiceError => e
    puts "Couldn't upload file #{file_path} to #{@object.key}. Here's why:
 #{e.message}"
    false
  end
end

# Example usage:
def run_demo
  bucket_name = "amzn-s3-demo-bucket"
  object_key = "my-uploaded-file"
  file_path = "object_upload_file.rb"

  wrapper = ObjectUploadFileWrapper.new(Aws::S3::Object.new(bucket_name,
 object_key))
  return unless wrapper.upload_file(file_path)

  puts "File #{file_path} successfully uploaded to #{bucket_name}:#{object_key}."
end

run_demo if $PROGRAM_NAME == __FILE__
```

Upload a file using Object.put.

```
require 'aws-sdk-s3'

# Wraps Amazon S3 object actions.
```

```
class ObjectPutWrapper
  attr_reader :object

  # @param object [Aws::S3::Object] An existing Amazon S3 object.
  def initialize(object)
    @object = object
  end

  def put_object(source_file_path)
    File.open(source_file_path, 'rb') do |file|
      @object.put(body: file)
    end
    true
  rescue Aws::Errors::ServiceError => e
    puts "Couldn't put #{source_file_path} to #{object.key}. Here's why:
 #{e.message}"
    false
  end
end

# Example usage:
def run_demo
  bucket_name = "amzn-s3-demo-bucket"
  object_key = "my-object-key"
  file_path = "my-local-file.txt"

  wrapper = ObjectPutWrapper.new(Aws::S3::Object.new(bucket_name, object_key))
  success = wrapper.put_object(file_path)
  return unless success

  puts "Put file #{file_path} into #{object_key} in #{bucket_name}."
end

run_demo if $PROGRAM_NAME == __FILE__
```

Upload a file using Object.put and add server-side encryption.

```
require 'aws-sdk-s3'

# Wraps Amazon S3 object actions.
class ObjectPutSseWrapper
  attr_reader :object
```

```
  # @param object [Aws::S3::Object] An existing Amazon S3 object.
  def initialize(object)
    @object = object
  end

  def put_object_encrypted(object_content, encryption)
    @object.put(body: object_content, server_side_encryption: encryption)
    true
  rescue Aws::Errors::ServiceError => e
    puts "Couldn't put your content to #{object.key}. Here's why: #{e.message}"
    false
  end
end

# Example usage:
def run_demo
  bucket_name = "amzn-s3-demo-bucket"
  object_key = "my-encrypted-content"
  object_content = "This is my super-secret content."
  encryption = "AES256"

  wrapper = ObjectPutSseWrapper.new(Aws::S3::Object.new(bucket_name,
 object_content))
  return unless wrapper.put_object_encrypted(object_content, encryption)

  puts "Put your content into #{bucket_name}:#{object_key} and encrypted it with
 #{encryption}."
end

run_demo if $PROGRAM_NAME == __FILE__
```

- For API details, see PutObject in *AWS SDK for Ruby 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 Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
require 'aws-sdk-s3'
require 'net/http'

# Creates a presigned URL that can be used to upload content to an object.
#
# @param bucket [Aws::S3::Bucket] An existing Amazon S3 bucket.
# @param object_key [String] The key to give the uploaded object.
# @return [URI, nil] The parsed URI if successful; otherwise nil.
def get_presigned_url(bucket, object_key)
  url = bucket.object(object_key).presigned_url(:put)
  puts "Created presigned URL: #{url}"
  URI(url)
rescue Aws::Errors::ServiceError => e
  puts "Couldn't create presigned URL for #{bucket.name}:#{object_key}. Here's why:
 #{e.message}"
end

# Example usage:
def run_demo
  bucket_name = "amzn-s3-demo-bucket"
  object_key = "my-file.txt"
  object_content = "This is the content of my-file.txt."

  bucket = Aws::S3::Bucket.new(bucket_name)
  presigned_url = get_presigned_url(bucket, object_key)
  return unless presigned_url

  response = Net::HTTP.start(presigned_url.host) do |http|
    http.send_request('PUT', presigned_url.request_uri, object_content,
 'content_type' => '')
  end

  case response
  when Net::HTTPSuccess
```

```
    puts 'Content uploaded!'
  else
    puts response.value
  end
end

run_demo if $PROGRAM_NAME == __FILE__
```

Serverless examples

Invoke a Lambda function from an Amazon S3 trigger

The following code example shows how to implement a Lambda function that receives an event triggered by uploading an object to an S3 bucket. The function retrieves the S3 bucket name and object key from the event parameter and calls the Amazon S3 API to retrieve and log the content type of the object.

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the Serverless examples repository.

Consuming an S3 event with Lambda using Ruby.

```
require 'json'
require 'uri'
require 'aws-sdk'

puts 'Loading function'

def lambda_handler(event:, context:)
  s3 = Aws::S3::Client.new(region: 'region') # Your AWS region
  # puts "Received event: #{JSON.dump(event)}"

  # Get the object from the event and show its content type
  bucket = event['Records'][0]['s3']['bucket']['name']
```

```
  key = URI.decode_www_form_component(event['Records'][0]['s3']['object']['key'],
 Encoding::UTF_8)
  begin
    response = s3.get_object(bucket: bucket, key: key)
    puts "CONTENT TYPE: #{response.content_type}"
    return response.content_type
  rescue StandardError => e
    puts e.message
    puts "Error getting object #{key} from bucket #{bucket}. Make sure they exist
 and your bucket is in the same region as this function."
    raise e
  end
end
```

Amazon SES examples using SDK for Ruby

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

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

`GetIdentityVerificationAttributes`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
require 'aws-sdk-ses' # v2: require 'aws-sdk'

# Create client in us-west-2 region
# Replace us-west-2 with the AWS Region you're using for Amazon SES.
client = Aws::SES::Client.new(region: 'us-west-2')

# Get up to 1000 identities
ids = client.list_identities({
                               identity_type: 'EmailAddress'
                             })

ids.identities.each do |email|
  attrs = client.get_identity_verification_attributes({
                                                        identities: [email]
                                                      })

  status = attrs.verification_attributes[email].verification_status

  # Display email addresses that have been verified
  puts email if status == 'Success'
end
```

- For API details, see GetIdentityVerificationAttributes in *AWS SDK for Ruby API Reference*.

`ListIdentities`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
require 'aws-sdk-ses' # v2: require 'aws-sdk'

# Create client in us-west-2 region
# Replace us-west-2 with the AWS Region you're using for Amazon SES.
client = Aws::SES::Client.new(region: 'us-west-2')

# Get up to 1000 identities
ids = client.list_identities({
                               identity_type: 'EmailAddress'
                             })

ids.identities.each do |email|
  attrs = client.get_identity_verification_attributes({
                                                        identities: [email]
                                                      })

  status = attrs.verification_attributes[email].verification_status

  # Display email addresses that have been verified
  puts email if status == 'Success'
end
```

- For API details, see ListIdentities in *AWS SDK for Ruby API Reference*.

`SendEmail`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
require 'aws-sdk-ses' # v2: require 'aws-sdk'

# Replace sender@example.com with your "From" address.
# This address must be verified with Amazon SES.
sender = 'sender@example.com'

# Replace recipient@example.com with a "To" address. If your account
# is still in the sandbox, this address must be verified.
recipient = 'recipient@example.com'

# Specify a configuration set. To use a configuration
# set, uncomment the next line and line 74.
#   configsetname = "ConfigSet"

# The subject line for the email.
subject = 'Amazon SES test (AWS SDK for Ruby)'

# The HTML body of the email.
htmlbody =
  '<h1>Amazon SES test (AWS SDK for Ruby)</h1>'\
  '<p>This email was sent with <a href="https://aws.amazon.com/ses/">'\
  'Amazon SES</a> using the <a href="https://aws.amazon.com/sdk-for-ruby/">'\
  'AWS SDK for Ruby</a>.'

# The email body for recipients with non-HTML email clients.
textbody = 'This email was sent with Amazon SES using the AWS SDK for Ruby.'

# Specify the text encoding scheme.
encoding = 'UTF-8'

# Create a new SES client in the us-west-2 region.
# Replace us-west-2 with the AWS Region you're using for Amazon SES.
ses = Aws::SES::Client.new(region: 'us-west-2')
```

```
# Try to send the email.
begin
  # Provide the contents of the email.
  ses.send_email(
    destination: {
      to_addresses: [
        recipient
      ]
    },
    message: {
      body: {
        html: {
          charset: encoding,
          data: htmlbody
        },
        text: {
          charset: encoding,
          data: textbody
        }
      },
      subject: {
        charset: encoding,
        data: subject
      }
    },
    source: sender
    # Uncomment the following line to use a configuration set.
    # configuration_set_name: configsetname,
  )

  puts "Email sent to #{recipient}"

# If something goes wrong, display an error message.
rescue Aws::SES::Errors::ServiceError => e
  puts "Email not sent. Error message: #{e}"
end
```

- For API details, see SendEmail in *AWS SDK for Ruby API Reference*.

`VerifyEmailIdentity`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
require 'aws-sdk-ses' # v2: require 'aws-sdk'

# Replace recipient@example.com with a "To" address.
recipient = 'recipient@example.com'

# Create a new SES resource in the us-west-2 region.
# Replace us-west-2 with the AWS Region you're using for Amazon SES.
ses = Aws::SES::Client.new(region: 'us-west-2')

# Try to verify email address.
begin
  ses.verify_email_identity({
                              email_address: recipient
                            })

  puts "Email sent to #{recipient}"

# If something goes wrong, display an error message.
rescue Aws::SES::Errors::ServiceError => e
  puts "Email not sent. Error message: #{e}"
end
```

- For API details, see VerifyEmailIdentity in *AWS SDK for Ruby API Reference*.

Amazon SES API v2 examples using SDK for Ruby

The following code examples show you how to perform actions and implement common scenarios by using the AWS SDK for Ruby with Amazon SES API v2.

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

`SendEmail`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
require 'aws-sdk-sesv2'
require_relative 'config' # Recipient and sender email addresses.

# Set up the SESv2 client.
client = Aws::SESV2::Client.new(region: AWS_REGION)

def send_email(client, sender_email, recipient_email)
  response = client.send_email(
    {
      from_email_address: sender_email,
      destination: {
```

```
        to_addresses: [recipient_email]
      },
      content: {
        simple: {
          subject: {
            data: 'Test email subject'
          },
          body: {
            text: {
              data: 'Test email body'
            }
          }
        }
      }
    )
    puts "Email sent from #{SENDER_EMAIL} to #{RECIPIENT_EMAIL} with message ID:
 #{response.message_id}"
end

send_email(client, SENDER_EMAIL, RECIPIENT_EMAIL)
```

- For API details, see SendEmail in *AWS SDK for Ruby API Reference*.

Amazon SNS examples using SDK for Ruby

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

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
- Serverless examples

Actions

`CreateTopic`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
# This class demonstrates how to create an Amazon Simple Notification Service (SNS)
 topic.
class SNSTopicCreator
  # Initializes an SNS client.
  #
  # Utilizes the default AWS configuration for region and credentials.
  def initialize
    @sns_client = Aws::SNS::Client.new
  end

  # Attempts to create an SNS topic with the specified name.
  #
  # @param topic_name [String] The name of the SNS topic to create.
  # @return [Boolean] true if the topic was successfully created, false otherwise.
  def create_topic(topic_name)
    @sns_client.create_topic(name: topic_name)
    puts "The topic '#{topic_name}' was successfully created."
    true
  rescue Aws::SNS::Errors::ServiceError => e
    # Handles SNS service errors gracefully.
    puts "Error while creating the topic named '#{topic_name}': #{e.message}"
    false
  end
end

# Example usage:
if $PROGRAM_NAME == __FILE__
  topic_name = 'YourTopicName' # Replace with your topic name
```

```
  sns_topic_creator = SNSTopicCreator.new

  puts "Creating the topic '#{topic_name}'..."
  unless sns_topic_creator.create_topic(topic_name)
    puts 'The topic was not created. Stopping program.'
    exit 1
  end
end
```

- For more information, see AWS SDK for Ruby Developer Guide.
- For API details, see CreateTopic in *AWS SDK for Ruby API Reference*.

`ListSubscriptions`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
# This class demonstrates how to list subscriptions to an Amazon Simple Notification
 Service (SNS) topic
class SnsSubscriptionLister
  def initialize(sns_client)
    @sns_client = sns_client
    @logger = Logger.new($stdout)
  end

  # Lists subscriptions for a given SNS topic
  # @param topic_arn [String] The ARN of the SNS topic
  # @return [Types::ListSubscriptionsResponse] subscriptions: The response object
  def list_subscriptions(topic_arn)
    @logger.info("Listing subscriptions for topic: #{topic_arn}")
    subscriptions = @sns_client.list_subscriptions_by_topic(topic_arn: topic_arn)
    subscriptions.subscriptions.each do |subscription|
      @logger.info("Subscription endpoint: #{subscription.endpoint}")
```

```
    end
    subscriptions
  rescue Aws::SNS::Errors::ServiceError => e
    @logger.error("Error listing subscriptions: #{e.message}")
    raise
  end
end

# Example usage:
if $PROGRAM_NAME == __FILE__
  sns_client = Aws::SNS::Client.new
  topic_arn = 'SNS_TOPIC_ARN' # Replace with your SNS topic ARN
  lister = SnsSubscriptionLister.new(sns_client)

  begin
    lister.list_subscriptions(topic_arn)
  rescue StandardError => e
    puts "Failed to list subscriptions: #{e.message}"
    exit 1
  end
end
```

- For more information, see AWS SDK for Ruby Developer Guide.
- For API details, see ListSubscriptions in *AWS SDK for Ruby API Reference*.

`ListTopics`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
require 'aws-sdk-sns' # v2: require 'aws-sdk'
```

```
def list_topics?(sns_client)
  sns_client.topics.each do |topic|
    puts topic.arn
  rescue StandardError => e
    puts "Error while listing the topics: #{e.message}"
  end
end

def run_me
  region = 'REGION'
  sns_client = Aws::SNS::Resource.new(region: region)

  puts 'Listing the topics.'

  return if list_topics?(sns_client)

  puts 'The bucket was not created. Stopping program.'
  exit 1
end

# Example usage:
run_me if $PROGRAM_NAME == __FILE__
```

- For more information, see AWS SDK for Ruby Developer Guide.
- For API details, see ListTopics in *AWS SDK for Ruby API Reference*.

`Publish`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
# Service class for sending messages using Amazon Simple Notification Service (SNS)
```

```
class SnsMessageSender
  # Initializes the SnsMessageSender with an SNS client
  #
  # @param sns_client [Aws::SNS::Client] The SNS client
  def initialize(sns_client)
    @sns_client = sns_client
    @logger = Logger.new($stdout)
  end

  # Sends a message to a specified SNS topic
  #
  # @param topic_arn [String] The ARN of the SNS topic
  # @param message [String] The message to send
  # @return [Boolean] true if message was successfully sent, false otherwise
  def send_message(topic_arn, message)
    @sns_client.publish(topic_arn: topic_arn, message: message)
    @logger.info("Message sent successfully to #{topic_arn}.")
    true
  rescue Aws::SNS::Errors::ServiceError => e
    @logger.error("Error while sending the message: #{e.message}")
    false
  end
end

# Example usage:
if $PROGRAM_NAME == __FILE__
  topic_arn = 'SNS_TOPIC_ARN' # Should be replaced with a real topic ARN
  message = 'MESSAGE'         # Should be replaced with the actual message content

  sns_client = Aws::SNS::Client.new
  message_sender = SnsMessageSender.new(sns_client)

  @logger.info('Sending message.')
  unless message_sender.send_message(topic_arn, message)
    @logger.error('Message sending failed. Stopping program.')
    exit 1
  end
end
```

- For more information, see AWS SDK for Ruby Developer Guide.
- For API details, see Publish in *AWS SDK for Ruby API Reference*.

`SetTopicAttributes`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
# Service class to enable an SNS resource with a specified policy
class SnsResourceEnabler
  # Initializes the SnsResourceEnabler with an SNS resource client
  #
  # @param sns_resource [Aws::SNS::Resource] The SNS resource client
  def initialize(sns_resource)
    @sns_resource = sns_resource
    @logger = Logger.new($stdout)
  end

  # Sets a policy on a specified SNS topic
  #
  # @param topic_arn [String] The ARN of the SNS topic
  # @param resource_arn [String] The ARN of the resource to include in the policy
  # @param policy_name [String] The name of the policy attribute to set
  def enable_resource(topic_arn, resource_arn, policy_name)
    policy = generate_policy(topic_arn, resource_arn)
    topic = @sns_resource.topic(topic_arn)

    topic.set_attributes({
                           attribute_name: policy_name,
                           attribute_value: policy
                         })
    @logger.info("Policy #{policy_name} set successfully for topic #{topic_arn}.")
  rescue Aws::SNS::Errors::ServiceError => e
    @logger.error("Failed to set policy: #{e.message}")
  end

  private

  # Generates a policy string with dynamic resource ARNs
```

```
  #
  # @param topic_arn [String] The ARN of the SNS topic
  # @param resource_arn [String] The ARN of the resource
  # @return [String] The policy as a JSON string
  def generate_policy(topic_arn, resource_arn)
    {
      Version: '2008-10-17',
      Id: '__default_policy_ID',
      Statement: [{
        Sid: '__default_statement_ID',
        Effect: 'Allow',
        Principal: { "AWS": '*' },
        Action: ['SNS:Publish'],
        Resource: topic_arn,
        Condition: {
          ArnEquals: {
            "AWS:SourceArn": resource_arn
          }
        }
      }]
    }.to_json
  end
end

# Example usage:
if $PROGRAM_NAME == __FILE__
  topic_arn = 'MY_TOPIC_ARN' # Should be replaced with a real topic ARN
  resource_arn = 'MY_RESOURCE_ARN' # Should be replaced with a real resource ARN
  policy_name = 'POLICY_NAME' # Typically, this is "Policy"

  sns_resource = Aws::SNS::Resource.new
  enabler = SnsResourceEnabler.new(sns_resource)

  enabler.enable_resource(topic_arn, resource_arn, policy_name)
end
```

- For more information, see AWS SDK for Ruby Developer Guide.
- For API details, see SetTopicAttributes in *AWS SDK for Ruby API Reference*.

`Subscribe`

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

SDK for Ruby

> **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.

```
require 'aws-sdk-sns'
require 'logger'

# Represents a service for creating subscriptions in Amazon Simple Notification
 Service (SNS)
class SubscriptionService
  # Initializes the SubscriptionService with an SNS client
  #
  # @param sns_client [Aws::SNS::Client] The SNS client
  def initialize(sns_client)
    @sns_client = sns_client
    @logger = Logger.new($stdout)
  end

  # Attempts to create a subscription to a topic
  #
  # @param topic_arn [String] The ARN of the SNS topic
  # @param protocol [String] The subscription protocol (e.g., email)
  # @param endpoint [String] The endpoint that receives the notifications (email
 address)
  # @return [Boolean] true if subscription was successfully created, false otherwise
  def create_subscription(topic_arn, protocol, endpoint)
    @sns_client.subscribe(topic_arn: topic_arn, protocol: protocol, endpoint:
 endpoint)
    @logger.info('Subscription created successfully.')
    true
  rescue Aws::SNS::Errors::ServiceError => e
    @logger.error("Error while creating the subscription: #{e.message}")
    false
```

```
  end
end

# Main execution if the script is run directly
if $PROGRAM_NAME == __FILE__
  protocol = 'email'
  endpoint = 'EMAIL_ADDRESS' # Should be replaced with a real email address
  topic_arn = 'TOPIC_ARN'    # Should be replaced with a real topic ARN

  sns_client = Aws::SNS::Client.new
  subscription_service = SubscriptionService.new(sns_client)

  @logger.info('Creating the subscription.')
  unless subscription_service.create_subscription(topic_arn, protocol, endpoint)
    @logger.error('Subscription creation failed. Stopping program.')
    exit 1
  end
end
```

- For more information, see AWS SDK for Ruby Developer Guide.
- For API details, see Subscribe in *AWS SDK for Ruby API Reference*.

Serverless examples

Invoke a Lambda function from an Amazon SNS trigger

The following code example shows how to implement a Lambda function that receives an event triggered by receiving messages from an SNS topic. The function retrieves the messages from the event parameter and logs the content of each message.

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the Serverless examples repository.

Consuming an SNS event with Lambda using Ruby.

```
# Copyright Amazon.com, Inc. or its affiliates. All Rights Reserved.
# SPDX-License-Identifier: Apache-2.0
def lambda_handler(event:, context:)
  event['Records'].map { |record| process_message(record) }
end

def process_message(record)
  message = record['Sns']['Message']
  puts("Processing message: #{message}")
rescue StandardError => e
  puts("Error processing message: #{e}")
  raise
end
```

Amazon SQS examples using SDK for Ruby

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

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
- Serverless examples

Actions

`ChangeMessageVisibility`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
require 'aws-sdk-sqs' # v2: require 'aws-sdk'
# Replace us-west-2 with the AWS Region you're using for Amazon SQS.
sqs = Aws::SQS::Client.new(region: 'us-west-2')

begin
  queue_name = 'my-queue'
  queue_url = sqs.get_queue_url(queue_name: queue_name).queue_url

  # Receive up to 10 messages
  receive_message_result_before = sqs.receive_message({
                                                        queue_url: queue_url,
                                                        max_number_of_messages: 10
                                                      })

  puts "Before attempting to change message visibility timeout: received
 #{receive_message_result_before.messages.count} message(s)."

  receive_message_result_before.messages.each do |message|
    sqs.change_message_visibility({
                                    queue_url: queue_url,
                                    receipt_handle: message.receipt_handle,
                                    visibility_timeout: 30 # This message will not
 be visible for 30 seconds after first receipt.
                                  })
  end

  # Try to retrieve the original messages after setting their visibility timeout.
  receive_message_result_after = sqs.receive_message({
                                                       queue_url: queue_url,
                                                       max_number_of_messages: 10
                                                     })
```

```
  puts "\nAfter attempting to change message visibility timeout: received
 #{receive_message_result_after.messages.count} message(s)."
rescue Aws::SQS::Errors::NonExistentQueue
  puts "Cannot receive messages for a queue named '#{queue_name}', as it does not
 exist."
end
```

- For API details, see ChangeMessageVisibility in *AWS SDK for Ruby API Reference*.

`CreateQueue`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
# This code example demonstrates how to create a queue in Amazon Simple Queue
 Service (Amazon SQS).

require 'aws-sdk-sqs'

# @param sqs_client [Aws::SQS::Client] An initialized Amazon SQS client.
# @param queue_name [String] The name of the queue.
# @return [Boolean] true if the queue was created; otherwise, false.
# @example
#   exit 1 unless queue_created?(
#     Aws::SQS::Client.new(region: 'us-west-2'),
#     'my-queue'
#   )
def queue_created?(sqs_client, queue_name)
  sqs_client.create_queue(queue_name: queue_name)
  true
rescue StandardError => e
  puts "Error creating queue: #{e.message}"
  false
```

```
end

# Full example call:
# Replace us-west-2 with the AWS Region you're using for Amazon SQS.
def run_me
  region = 'us-west-2'
  queue_name = 'my-queue'
  sqs_client = Aws::SQS::Client.new(region: region)

  puts "Creating the queue named '#{queue_name}'..."

  if queue_created?(sqs_client, queue_name)
    puts 'Queue created.'
  else
    puts 'Queue not created.'
  end
end

# Example usage:
run_me if $PROGRAM_NAME == __FILE__
```

- For API details, see CreateQueue in *AWS SDK for Ruby API Reference*.

`DeleteQueue`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
require 'aws-sdk-sqs' # v2: require 'aws-sdk'
# Replace us-west-2 with the AWS Region you're using for Amazon SQS.
sqs = Aws::SQS::Client.new(region: 'us-west-2')

sqs.delete_queue(queue_url: URL)
```

- For API details, see DeleteQueue in *AWS SDK for Ruby API Reference*.

`ListQueues`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
require 'aws-sdk-sqs'
require 'aws-sdk-sts'

# @param sqs_client [Aws::SQS::Client] An initialized Amazon SQS client.
# @example
#   list_queue_urls(Aws::SQS::Client.new(region: 'us-west-2'))
def list_queue_urls(sqs_client)
  queues = sqs_client.list_queues

  queues.queue_urls.each do |url|
    puts url
  end
rescue StandardError => e
  puts "Error listing queue URLs: #{e.message}"
end

# Lists the attributes of a queue in Amazon Simple Queue Service (Amazon SQS).
#
# @param sqs_client [Aws::SQS::Client] An initialized Amazon SQS client.
# @param queue_url [String] The URL of the queue.
# @example
#   list_queue_attributes(
#     Aws::SQS::Client.new(region: 'us-west-2'),
#     'https://sqs.us-west-2.amazonaws.com/111111111111/my-queue'
```

```
#   )
def list_queue_attributes(sqs_client, queue_url)
  attributes = sqs_client.get_queue_attributes(
    queue_url: queue_url,
    attribute_names: ['All']
  )

  attributes.attributes.each do |key, value|
    puts "#{key}: #{value}"
  end
rescue StandardError => e
  puts "Error getting queue attributes: #{e.message}"
end

# Full example call:
# Replace us-west-2 with the AWS Region you're using for Amazon SQS.
def run_me
  region = 'us-west-2'
  queue_name = 'my-queue'

  sqs_client = Aws::SQS::Client.new(region: region)

  puts 'Listing available queue URLs...'
  list_queue_urls(sqs_client)

  sts_client = Aws::STS::Client.new(region: region)

  # For example:
  # 'https://sqs.us-west-2.amazonaws.com/111111111111/my-queue'
  queue_url = "https://sqs.#{region}.amazonaws.com/
#{sts_client.get_caller_identity.account}/#{queue_name}"

  puts "\nGetting information about queue '#{queue_name}'..."
  list_queue_attributes(sqs_client, queue_url)
end
```

- For API details, see ListQueues in *AWS SDK for Ruby API Reference*.

`ReceiveMessage`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
require 'aws-sdk-sqs'
require 'aws-sdk-sts'

# Receives messages in a queue in Amazon Simple Queue Service (Amazon SQS).
#
# @param sqs_client [Aws::SQS::Client] An initialized Amazon SQS client.
# @param queue_url [String] The URL of the queue.
# @param max_number_of_messages [Integer] The maximum number of messages
#   to receive. This number must be 10 or less. The default is 10.
# @example
#   receive_messages(
#     Aws::SQS::Client.new(region: 'us-west-2'),
#     'https://sqs.us-west-2.amazonaws.com/111111111111/my-queue',
#     10
#   )
def receive_messages(sqs_client, queue_url, max_number_of_messages = 10)
  if max_number_of_messages > 10
    puts 'Maximum number of messages to receive must be 10 or less. ' \
      'Stopping program.'
    return
  end

  response = sqs_client.receive_message(
    queue_url: queue_url,
    max_number_of_messages: max_number_of_messages
  )

  if response.messages.count.zero?
    puts 'No messages to receive, or all messages have already ' \
      'been previously received.'
    return
  end
```

```
  response.messages.each do |message|
    puts '-' * 20
    puts "Message body: #{message.body}"
    puts "Message ID:   #{message.message_id}"
  end
rescue StandardError => e
  puts "Error receiving messages: #{e.message}"
end

# Full example call:
# Replace us-west-2 with the AWS Region you're using for Amazon SQS.
def run_me
  region = 'us-west-2'
  queue_name = 'my-queue'
  max_number_of_messages = 10

  sts_client = Aws::STS::Client.new(region: region)

  # For example:
  # 'https://sqs.us-west-2.amazonaws.com/111111111111/my-queue'
  queue_url = "https://sqs.#{region}.amazonaws.com/
#{sts_client.get_caller_identity.account}/#{queue_name}"

  sqs_client = Aws::SQS::Client.new(region: region)

  puts "Receiving messages from queue '#{queue_name}'..."

  receive_messages(sqs_client, queue_url, max_number_of_messages)
end

# Example usage:
run_me if $PROGRAM_NAME == __FILE__
```

- For API details, see ReceiveMessage in *AWS SDK for Ruby API Reference*.

`SendMessage`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
require 'aws-sdk-sqs'
require 'aws-sdk-sts'

# @param sqs_client [Aws::SQS::Client] An initialized Amazon SQS client.
# @param queue_url [String] The URL of the queue.
# @param message_body [String] The contents of the message to be sent.
# @return [Boolean] true if the message was sent; otherwise, false.
# @example
#   exit 1 unless message_sent?(
#     Aws::SQS::Client.new(region: 'us-west-2'),
#     'https://sqs.us-west-2.amazonaws.com/111111111111/my-queue',
#     'This is my message.'
#   )
def message_sent?(sqs_client, queue_url, message_body)
  sqs_client.send_message(
    queue_url: queue_url,
    message_body: message_body
  )
  true
rescue StandardError => e
  puts "Error sending message: #{e.message}"
  false
end

# Full example call:
# Replace us-west-2 with the AWS Region you're using for Amazon SQS.
def run_me
  region = 'us-west-2'
  queue_name = 'my-queue'
  message_body = 'This is my message.'

  sts_client = Aws::STS::Client.new(region: region)
```

```
  # For example:
  # 'https://sqs.us-west-2.amazonaws.com/111111111111/my-queue'
  queue_url = "https://sqs.#{region}.amazonaws.com/
#{sts_client.get_caller_identity.account}/#{queue_name}"

  sqs_client = Aws::SQS::Client.new(region: region)

  puts "Sending a message to the queue named '#{queue_name}'..."

  if message_sent?(sqs_client, queue_url, message_body)
    puts 'Message sent.'
  else
    puts 'Message not sent.'
  end
end

# Example usage:
run_me if $PROGRAM_NAME == __FILE__
```

- For API details, see SendMessage in *AWS SDK for Ruby API Reference*.

`SendMessageBatch`

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

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the AWS Code Examples Repository.

```
require 'aws-sdk-sqs'
require 'aws-sdk-sts'

#
# @param sqs_client [Aws::SQS::Client] An initialized Amazon SQS client.
# @param queue_url [String] The URL of the queue.
# @param entries [Hash] The contents of the messages to be sent,
```

```
#   in the correct format.
# @return [Boolean] true if the messages were sent; otherwise, false.
# @example
#   exit 1 unless messages_sent?(
#     Aws::SQS::Client.new(region: 'us-west-2'),
#     'https://sqs.us-west-2.amazonaws.com/111111111111/my-queue',
#     [
#       {
#         id: 'Message1',
#         message_body: 'This is the first message.'
#       },
#       {
#         id: 'Message2',
#         message_body: 'This is the second message.'
#       }
#     ]
#   )
def messages_sent?(sqs_client, queue_url, entries)
  sqs_client.send_message_batch(
    queue_url: queue_url,
    entries: entries
  )
  true
rescue StandardError => e
  puts "Error sending messages: #{e.message}"
  false
end

# Full example call:
# Replace us-west-2 with the AWS Region you're using for Amazon SQS.
def run_me
  region = 'us-west-2'
  queue_name = 'my-queue'
  entries = [
    {
      id: 'Message1',
      message_body: 'This is the first message.'
    },
    {
      id: 'Message2',
      message_body: 'This is the second message.'
    }
  ]
```

```
  sts_client = Aws::STS::Client.new(region: region)

  # For example:
  # 'https://sqs.us-west-2.amazonaws.com/111111111111/my-queue'
  queue_url = "https://sqs.#{region}.amazonaws.com/
#{sts_client.get_caller_identity.account}/#{queue_name}"

  sqs_client = Aws::SQS::Client.new(region: region)

  puts "Sending messages to the queue named '#{queue_name}'..."

  if messages_sent?(sqs_client, queue_url, entries)
    puts 'Messages sent.'
  else
    puts 'Messages not sent.'
  end
end
```

- For API details, see SendMessageBatch in *AWS SDK for Ruby API Reference*.

Serverless examples

Invoke a Lambda function from an Amazon SQS trigger

The following code example shows how to implement a Lambda function that receives an event triggered by receiving messages from an SQS queue. The function retrieves the messages from the event parameter and logs the content of each message.

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the Serverless examples repository.

Consuming an SQS event with Lambda using Ruby.

```
# Copyright Amazon.com, Inc. or its affiliates. All Rights Reserved.
```

```
# SPDX-License-Identifier: Apache-2.0
def lambda_handler(event:, context:)
  event['Records'].each do |message|
    process_message(message)
  end
  puts "done"
end

def process_message(message)
  begin
    puts "Processed message #{message['body']}"
    # TODO: Do interesting work based on the new message
  rescue StandardError => err
    puts "An error occurred"
    raise err
  end
end
```

Reporting batch item failures for Lambda functions with an Amazon SQS trigger

The following code example shows how to implement partial batch response for Lambda functions that receive events from an SQS queue. The function reports the batch item failures in the response, signaling to Lambda to retry those messages later.

SDK for Ruby

> **Note**
>
> There's more on GitHub. Find the complete example and learn how to set up and run in the Serverless examples repository.

Reporting SQS batch item failures with Lambda using Ruby.

```
# Copyright Amazon.com, Inc. or its affiliates. All Rights Reserved.
# SPDX-License-Identifier: Apache-2.0
require 'json'

def lambda_handler(event:, context:)
  if event
    batch_item_failures = []
```

```
    sqs_batch_response = {}

    event["Records"].each do |record|
      begin
        # process message
      rescue StandardError => e
        batch_item_failures << {"itemIdentifier" => record['messageId']}
      end
    end

    sqs_batch_response["batchItemFailures"] = batch_item_failures
    return sqs_batch_response
  end
end
```

AWS STS examples using SDK for Ruby

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

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

`AssumeRole`

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

SDK for Ruby

> **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 AWS Security Token Service (AWS STS) client with specified
credentials.
 # This is separated into a factory function so that it can be mocked for unit
testing.
 #
 # @param key_id [String] The ID of the access key used by the STS client.
 # @param key_secret [String] The secret part of the access key used by the STS
client.
 def create_sts_client(key_id, key_secret)
   Aws::STS::Client.new(access_key_id: key_id, secret_access_key: key_secret)
 end

 # Gets temporary credentials that can be used to assume a role.
 #
 # @param role_arn [String] The ARN of the role that is assumed when these
credentials
 #                          are used.
 # @param sts_client [AWS::STS::Client] An AWS STS client.
 # @return [Aws::AssumeRoleCredentials] The credentials that can be used to assume
the role.
 def assume_role(role_arn, sts_client)
   credentials = Aws::AssumeRoleCredentials.new(
     client: sts_client,
     role_arn: role_arn,
     role_session_name: 'create-use-assume-role-scenario'
   )
   @logger.info("Assumed role '#{role_arn}', got temporary credentials.")
   credentials
 end
```

- For API details, see AssumeRole in *AWS SDK for Ruby API Reference*.

Amazon Textract examples using SDK for Ruby

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

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 application to analyze customer feedback

The following code example shows how to create an application that analyzes customer comment cards, translates them from their original language, determines their sentiment, and generates an audio file from the translated text.

SDK for Ruby

This example application analyzes and stores customer feedback cards. Specifically, it fulfills the need of a fictitious hotel in New York City. The hotel receives feedback from guests in various languages in the form of physical comment cards. That feedback is uploaded into the app through a web client. After an image of a comment card is uploaded, the following steps occur:

- Text is extracted from the image using Amazon Textract.
- Amazon Comprehend determines the sentiment of the extracted text and its language.
- The extracted text is translated to English using Amazon Translate.
- Amazon Polly synthesizes an audio file from the extracted text.

The full app can be deployed with the AWS CDK. For source code and deployment instructions, see the project in GitHub.

Services used in this example

- Amazon Comprehend

- Lambda
- Amazon Polly
- Amazon Textract
- Amazon Translate

Amazon Translate examples using SDK for Ruby

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

Create an application to analyze customer feedback

The following code example shows how to create an application that analyzes customer comment cards, translates them from their original language, determines their sentiment, and generates an audio file from the translated text.

SDK for Ruby

This example application analyzes and stores customer feedback cards. Specifically, it fulfills the need of a fictitious hotel in New York City. The hotel receives feedback from guests in various languages in the form of physical comment cards. That feedback is uploaded into the app through a web client. After an image of a comment card is uploaded, the following steps occur:

- Text is extracted from the image using Amazon Textract.
- Amazon Comprehend determines the sentiment of the extracted text and its language.
- The extracted text is translated to English using Amazon Translate.

- Amazon Polly synthesizes an audio file from the extracted text.

The full app can be deployed with the AWS CDK. For source code and deployment instructions, see the project in GitHub.

Services used in this example

- Amazon Comprehend
- Lambda
- Amazon Polly
- Amazon Textract
- Amazon Translate

Migrating from AWS SDK for Ruby version 1 or 2 to AWS SDK for Ruby version 3

This topic includes details to help you migrate from version 1 or 2 of the AWS SDK for Ruby to version 3.

Side-by-side usage

It isn't necessary to replace the version 1 or 2 of the AWS SDK for Ruby with version 3. You can use them together in the same application. See this blog post for more information.

A quick example follows.

```
require 'aws-sdk-v1' # version 1
require 'aws-sdk'    # version 2
require 'aws-sdk-s3' # version 3

s3 = AWS::S3::Client.new # version 1
s3 = Aws::S3::Client.new # version 2 or 3
```

You don't need to rewrite existing working version 1 or 2 code to start using the version 3 SDK. A valid migration strategy is to only write new code against the version 3 SDK.

General differences

Version 3 differs from version 2 in one important way.

- Each service is available as a separate gem.

Version 2 differs from version 1 in several important ways.

- Different root namespace –`Aws` versus `AWS`. This enables side-by-side usage.
- `Aws.config`– Now a vanilla Ruby hash, instead of a method.
- Strict constructor options - When constructing a client or resource object in the version 1 SDK, unknown constructor options are ignored. In version 2, unknown constructor options trigger an `ArgumentError`. For example:

```
# version 1
AWS::S3::Client.new(http_reed_timeout: 10)
# oops, typo'd option is ignored

# version 2
Aws::S3::Client.new(http_reed_timeout: 10)
# => raises ArgumentError
```

Client differences

There are no differences between the client classes in version 2 and version 3.

Between version 1 and version 2, the client classes have the fewest external differences. Many service clients will have compatible interfaces after client construction. Some important differences:

- `Aws::S3::Client` - The version 1 Amazon S3 client class was hand-coded. Version 2 is generated from a service model. Method names and inputs are very different in version 2.
- `Aws::EC2::Client`- Version 2 uses plural names for output lists, version 1 uses the suffix `_set`. For example:

```
# version 1
resp = AWS::EC2::Client.new.describe_security_groups
resp.security_group_set
#=> [...]

# version 2
resp = Aws::EC2::Client.new.describe_security_groups
resp.security_groups
#=> [...]
```

- `Aws::SWF::Client`– Version 2 uses structured responses, where version 1 uses vanilla Ruby hashes.
- Service class renames – Version 2 uses a different name for multiple services:
  - `AWS::SimpleWorkflow` has become `Aws::SWF`
  - `AWS::ELB` has become `Aws::ElasticLoadBalancing`
  - `AWS::SimpleEmailService` has become `Aws::SES`

- Client configuration options – Some of the version 1 configuration options are renamed in version 2. Others are removed or replaced. Here are the primary changes:
  - `:use_ssl` has been removed. Version 2 uses SSL everywhere. To disable SSL you must configure an `:endpoint` that uses `http://`.
  - `:ssl_ca_file` is now `:ssl_ca_bundle`
  - `:ssl_ca_path` is now `:ssl_ca_directory`
  - Added `:ssl_ca_store`.
  - `:endpoint` must now be a fully qualified HTTP or HTTPS URI instead of a hostname.
  - Removed `:*_port` options for each service, now replaced by `:endpoint`.
  - `:user_agent_prefix` is now `:user_agent_suffix`

Resource differences

There are no differences between the resource interfaces in version 2 and version 3.

There are significant differences between the resource interfaces in version 1 and version 2. Version 1 was entirely hand-coded, where as version 2 resource interfaces are generated from a model. Version 2 resource interfaces are significantly more consistent. Some of the systemic differences include:

- Separate resource class – In version 2, the service name is a module, not a class. In this module, it is the resource interface:

```
# version 1
s3 = AWS::S3.new

# version 2
s3 = Aws::S3::Resource.new
```

- Referencing resources – The version 2 SDK separates collections and individual resource getters into two different methods:

```
# version 1
s3.buckets['bucket-name'].objects['key'].delete

# version 2
s3.bucket('bucket-name').object('key').delete
```

- Batch operations – In version 1, all batch operations were hand-coded utilities. In version 2, many batch operations are autogenerated batching operations over the API. **Version 2 batching interfaces are very different from version 1.**

Security for AWS SDK for Ruby

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.

Topics

- Data Protection in AWS SDK for Ruby
- Identity and Access Management for AWS SDK for Ruby
- Compliance Validation for AWS SDK for Ruby
- Resilience for AWS SDK for Ruby
- Infrastructure Security for AWS SDK for Ruby
- Enforcing a minimum TLS version in the AWS SDK for Ruby
- Amazon S3 Encryption Client Migration (V1 to V2)
- Amazon S3 Encryption Client Migration (V2 to V3)

Data Protection in AWS SDK for Ruby

The AWS shared responsibility model applies to data protection in . 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 Data Privacy FAQ. For information about data protection in Europe, see the General Data Protection Regulation (GDPR) Center.

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. For information about using CloudTrail trails to capture AWS activities, see Working with CloudTrail trails in the *AWS CloudTrail User Guide*.
- 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 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.

Identity and Access Management for AWS SDK for Ruby

AWS Identity and Access Management (IAM) is an Amazon Web Services (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 resources AWS services. IAM is an AWS service that you can use with no additional charge.

To use AWS SDK for Ruby to access AWS, you need an AWS account and AWS credentials. To increase the security of your AWS account, we recommend that you use an *IAM user* to provide access credentials instead of using your AWS account credentials.

For details about working with IAM, see IAM.

For an overview of IAM users and why they are important for the security of your account, see AWS Security Credentials in the Amazon Web Services General Reference.

AWS SDK for Ruby 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.

Compliance Validation for AWS SDK for Ruby

AWS SDK for Ruby 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.

The security and compliance of Amazon Web Services (AWS) services is assessed by third-party auditors as part of multiple AWS compliance programs. These include SOC, PCI, FedRAMP, HIPAA, and others. AWS provides a frequently updated list of AWS services in scope of specific compliance programs at AWS Services in Scope by Compliance Program.

Third-party audit reports are available for you to download using AWS Artifact. For more information, see Downloading Reports in AWS Artifact.

For more information about AWS compliance programs, see AWS Compliance Programs.

Your compliance responsibility when using AWS SDK for Ruby to access an AWS service is determined by the sensitivity of your data, your organization's compliance objectives, and applicable laws and regulations. If your use of an AWS service is subject to compliance with standards such as HIPAA, PCI, or FedRAMP, AWS provides resources to help:

- Security and Compliance Quick Start Guides– Deployment guides that discuss architectural considerations and provide steps for deploying security-focused and compliance-focused baseline environments on AWS.
- HIPAA Eligible Services Reference – Lists HIPAA eligible services. Not all AWS services are HIPAA eligible.
- AWS Compliance Resources– A collection of workbooks and guides that might apply to your industry and location.
- AWS Config– A service that assesses how well your resource configurations comply with internal practices, industry guidelines, and regulations.

- AWS Security Hub– A comprehensive view of your security state within AWS that helps you check your compliance with security industry standards and best practices.

Resilience for AWS SDK for Ruby

The Amazon Web Services (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 Availability 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.

AWS SDK for Ruby 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 AWS SDK for Ruby

AWS SDK for Ruby 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.

For information about AWS security processes, see the AWS: Overview of Security Processes whitepaper.

Enforcing a minimum TLS version in the AWS SDK for Ruby

Communication between the AWS SDK for Ruby and AWS is secured using Secure Sockets Layer (SSL) or Transport Layer Security (TLS). All versions of SSL, and versions of TLS earlier than 1.2, have vulnerabilities that can compromise the security of your communication with AWS. For this

reason, you should make sure that you're using the AWS SDK for Ruby with a version of Ruby that supports TLS version 1.2 or later.

Ruby uses the OpenSSL library to secure HTTP connections. Supported versions of Ruby (1.9.3 and later) installed through system package managers (`yum`, `apt`, and others), an official installer, or Ruby managers (rbenv, RVM, and others) typically incorporate OpenSSL 1.0.1 or later, which supports TLS 1.2.

When used with a supported version of Ruby with OpenSSL 1.0.1 or later, the AWS SDK for Ruby prefers TLS 1.2, and uses the latest version of SSL or TLS supported by both the client and server. This is always at least TLS 1.2 for AWS services. (The SDK uses the Ruby `Net::HTTP` class with `use_ssl=true`.)

Checking the OpenSSL version

To make sure your installation of Ruby is using OpenSSL 1.0.1 or later, enter the following command.

```
ruby -r openssl -e 'puts OpenSSL::OPENSSL_VERSION'
```

An alternative way to get the OpenSSL version is to query the `openssl` executable directly. First, locate the appropriate executable using the following command.

```
ruby -r rbconfig -e 'puts RbConfig::CONFIG["configure_args"]'
```

The output should have `--with-openssl-dir=/path/to/openssl` indicating the location of the OpenSSL installation. Make a note of this path. To check the version of OpenSSL, enter the following commands.

```
cd /path/to/openssl
bin/openssl version
```

This latter method might not work with all installations of Ruby.

Upgrading TLS support

If the version of OpenSSL used by your Ruby installation is earlier than 1.0.1, upgrade your Ruby or OpenSSL installation using your system package manager, Ruby installer, or Ruby manager, as described in Ruby's installation guide. If you're installing Ruby from source, install the latest

OpenSSL first, and then pass `--with-openssl-dir=/path/to/upgraded/openssl` when running `./configure`.

Amazon S3 Encryption Client Migration (V1 to V2)

> **Note**
>
> If you are using V2 of the S3 encryption client and want to migrate to V3, see Amazon S3 Encryption Client Migration (V2 to V3).

This topic shows how to migrate your applications from Version 1 (V1) of the Amazon Simple Storage Service (Amazon S3) encryption client to Version 2 (V2), and ensure application availability throughout the migration process.

Migration Overview

This migration happens in two phases:

1. **Update existing clients to read new formats.** First, deploy an updated version of the AWS SDK for Ruby to your application. This will allow existing V1 encryption clients to decrypt objects written by the new V2 clients. If your application uses multiple AWS SDKs, you must upgrade each SDK separately.

2. **Migrate encryption and decryption clients to V2.** Once all of your V1 encryption clients can read new formats, you can migrate your existing encryption and decryption clients to their respective V2 versions.

Update Existing Clients to Read New Formats

The V2 encryption client uses encryption algorithms that older versions of the client don't support. The first step in the migration is to update your V1 decryption clients to the latest SDK release. After completing this step, your application's V1 clients will be able to decrypt objects encrypted by V2 encryption clients. See details below for each major version of the AWS SDK for Ruby.

Update AWS SDK for Ruby Version 3

Version 3 is the latest version of the AWS SDK For Ruby. To complete this migration, you need to use version 1.76.0 or later of the `aws-sdk-s3` gem.

Installing from the Command Line

For projects that install the `aws-sdk-s3` gem, use the version option to verify that the minimum version of 1.76.0 is installed.

```
gem install aws-sdk-s3 -v '>= 1.76.0'
```

Using Gemfiles

For projects that use a Gemfile to manage dependencies, set the minimum version of the `aws-sdk-s3` gem to 1.76.0. For example:

```
gem 'aws-sdk-s3', '>= 1.76.0'
```

1. Modify your Gemfile.
2. Run `bundle update aws-sdk-s3`. To verify your version, run `bundle info aws-sdk-s3`.

Upgrade AWS SDK for Ruby Version 2

Version 2 of the AWS SDK for Ruby will enter maintenance mode on November 21st, 2021. To complete this migration, you need to use version 2.11.562 or later of the aws-sdk gem.

Installing from the Command Line

For projects that install the `aws-sdk` gem, from the command line, use the version option to verify that the minimum version of 2.11.562 is installed.

```
gem install aws-sdk -v '>= 2.11.562'
```

Using Gemfiles

For projects that use a Gemfile to manage dependencies, set the minimum version of the `aws-sdk` gem to 2.11.562. For example:

```
gem 'aws-sdk', '>= 2.11.562'
```

1. Modify your Gemfile. If you have a Gemfile.lock file, delete or update it.

2. Run `bundle update aws-sdk`. To verify your version, run `bundle info aws-sdk`.

Migrate Encryption and Decryption Clients to V2

After updating your clients to read the new encryption formats, you can update your applications to the V2 encryption and decryption clients. The following steps show you how to successfully migrate your code from V1 to V2.

Before updating your code to use the V2 encryption client, ensure that you have followed the preceding steps and are using the `aws-sdk-s3` gem version 2.11.562 or later.

> **Note**
>
> When decrypting with AES-GCM, read the entire object to the end before you start using the decrypted data. This is to verify that the object has not been modified since it was encrypted.

Configuring V2 Encryption Clients

The *EncryptionV2::Client* requires additional configuration. For detailed configuration information, see the EncryptionV2::Client documentation or the examples provided later in this topic.

1. **The key wrap method and content encryption algorithm must be specified on client construction.** When creating a new `EncryptionV2::Client`, you need to provide values for `key_wrap_schema` and `content_encryption_schema`.

`key_wrap_schema` - If you are using AWS KMS, this must be set to `:kms_context`. If you are using a symmetric (AES) key, it must be set to `:aes_gcm`. If you are using an asymmetric (RSA) key, it must be set to `:rsa_oaep_sha1`.

`content_encryption_schema` - This must be set to *:aes_gcm_no_padding*.

2. **security_profile must be specified on client construction.** When creating a new `EncryptionV2::Client`, you need to provide a value for `security_profile`. The *security_profile* parameter determines the support for reading objects written using the older V1 `Encryption::Client`. There are two values: *:v2* and *:v2_and_legacy*. To support migration, set the `security_profile` to *:v2_and_legacy*. Use *:v2* only for new application development.

3. **AWS KMS key ID is enforced by default.** In V1, `Encryption::Client`, the `kms_key_id` used to create the client was not provided to the AWS KMS `Decrypt call`. AWS KMS can get this information from metadata and add it to the symmetric ciphertext blob. In V2, E`ncryptionV2::Client`, the *kms_key_id* is passed to the AWS KMS Decrypt call, and the call fails if it does not match the key used to encrypt the object. If your code previously relied on not setting a specific `kms_key_id`, either set `kms_key_id: :kms_allow_decrypt_with_any_cmk` on client creation or set `kms_allow_decrypt_with_any_cmk: true` on `get_object` calls.

Example: Using a Symmetric (AES) Key

Pre-migration

```
client = Aws::S3::Encryption::Client.new(encryption_key: aes_key)
client.put_object(bucket: bucket, key: key, body: secret_data)
resp = client.get_object(bucket: bucket, key: key)
```

Post-migration

```
client = Aws::S3::EncryptionV2::Client.new(
  encryption_key: rsa_key,
  key_wrap_schema: :rsa_oaep_sha1, # the key_wrap_schema must be rsa_oaep_sha1 for
 asymmetric keys
  content_encryption_schema: :aes_gcm_no_padding,
  security_profile: :v2_and_legacy # to allow reading/decrypting objects encrypted by
 the V1 encryption client
 )
client.put_object(bucket: bucket, key: key, body: secret_data)  # No changes
resp = client.get_object(bucket: bucket, key: key) # No changes
```

Example: Using AWS KMS with kms_key_id

Pre-migration

```
client = Aws::S3::Encryption::Client.new(kms_key_id: kms_key_id)
client.put_object(bucket: bucket, key: key, body: secret_data)
resp = client.get_object(bucket: bucket, key: key)
```

Post-migration

```
client = Aws::S3::EncryptionV2::Client.new(
```

```
  kms_key_id: kms_key_id,
  key_wrap_schema: :kms_context, # the key_wrap_schema must be kms_context for KMS keys
  content_encryption_schema: :aes_gcm_no_padding,
  security_profile: :v2_and_legacy # to allow reading/decrypting objects encrypted by
 the V1 encryption client
)
client.put_object(bucket: bucket, key: key, body: secret_data)  # No changes
resp = client.get_object(bucket: bucket, key: key) # No change
```

Example: Using AWS KMS without kms_key_id

Pre-migration

```
client = Aws::S3::Encryption::Client.new(kms_key_id: kms_key_id)
client.put_object(bucket: bucket, key: key, body: secret_data)
resp = client.get_object(bucket: bucket, key: key)
```

Post-migration

```
client = Aws::S3::EncryptionV2::Client.new(
  kms_key_id: kms_key_id,
  key_wrap_schema: :kms_context, # the key_wrap_schema must be kms_context for KMS keys
  content_encryption_schema: :aes_gcm_no_padding,
  security_profile: :v2_and_legacy # to allow reading/decrypting objects encrypted by
 the V1 encryption client
)
client.put_object(bucket: bucket, key: key, body: secret_data)  # No changes
resp = client.get_object(bucket: bucket, key: key, kms_allow_decrypt_with_any_cmk:
 true) # To allow decrypting with any cmk
```

Post-Migration Alternative

If you only read and decrypt (never write and encrypt) objects using the S2 encryption client, use this code.

```
client = Aws::S3::EncryptionV2::Client.new(
  kms_key_id: :kms_allow_decrypt_with_any_cmk, # set kms_key_id to allow all get_object
 requests to use any cmk
  key_wrap_schema: :kms_context, # the key_wrap_schema must be kms_context for KMS keys
  content_encryption_schema: :aes_gcm_no_padding,
  security_profile: :v2_and_legacy # to allow reading/decrypting objects encrypted by
 the V1 encryption client
```

```
)
resp = client.get_object(bucket: bucket, key: key) # No change
```

Amazon S3 Encryption Client Migration (V2 to V3)

> **Note**
>
> If you are using V1 of the S3 encryption client, you must first migrate to V2 before migrating to V3. See Amazon S3 Encryption Client Migration (V1 to V2) for instructions on migrating from V1 to V2.

This topic shows how to migrate your applications from Version 2 (V2) of the Amazon Simple Storage Service (Amazon S3) encryption client to Version 3 (V3), and ensure application availability throughout the migration process. V3 introduces AES GCM with Key Commitment and Commitment Policies to enhance security and protect against data key tampering.

Migration Overview

Version 3 of the Amazon S3 encryption client introduces AES GCM with Key Commitment for enhanced security. This new encryption algorithm provides protection against data key tampering and ensures the integrity of encrypted data. The migration to V3 requires careful planning to maintain application availability and data accessibility throughout the process.

This migration happens in two phases:

1. **Update existing clients to read new formats.** First, deploy an updated version of the AWS SDK for Ruby to your application. This will allow existing V2 encryption clients to decrypt objects written by the new V3 clients. If your application uses multiple AWS SDKs, you must upgrade each SDK separately.

2. **Migrate encryption and decryption clients to V3.** Once all of your V2 encryption clients can read new formats, you can migrate your existing encryption and decryption clients to their respective V3 versions. This includes configuring Commitment Policies and updating your code to use the new client configuration options.

If you have not yet migrated from V1 to V2, you must complete that migration first. See Amazon S3 Encryption Client Migration (V1 to V2) for detailed instructions on migrating from V1 to V2.

Understanding V3 Features

Version 3 of the Amazon S3 encryption client introduces two key security features: Commitment Policies and AES GCM with Key Commitment. Understanding these features is essential for planning your migration strategy and ensuring the security of your encrypted data.

Commitment Policies

Commitment Policies control how the encryption client handles key commitment during encryption and decryption operations. Key commitment ensures that encrypted data can only be decrypted with the exact key that was used to encrypt it, protecting against certain types of cryptographic attacks.

The V3 encryption client supports three Commitment Policy options:

`FORBID_ENCRYPT_ALLOW_DECRYPT`

This policy encrypts objects without key commitment and allows decryption of both objects with and without key commitment.

- **Encryption behavior:** Objects are encrypted without key commitment, using the same algorithm suite as V2.
- **Decryption behavior:** Can decrypt objects encrypted with or without key commitment.
- **Security implications:** This policy does not enforce key commitment and may allow tampering. Objects encrypted with this policy do not benefit from the enhanced security protections of key commitment. Use this policy only during migration when you need to maintain compatibility with V2 encryption behavior.
- **Version compatibility:** Objects encrypted with this policy can be read by all V2 and V3 implementations of the S3 encryption client.

`REQUIRE_ENCRYPT_ALLOW_DECRYPT`

This policy encrypts objects with key commitment and allows decryption of both objects with and without key commitment.

- **Encryption behavior:** Objects are encrypted with key commitment using AES GCM with Key Commitment.
- **Decryption behavior:** Can decrypt objects encrypted with or without key commitment, providing backward compatibility.

- **Security implications:** New objects benefit from key commitment protection, while existing objects without key commitment can still be read. This provides a balance between security and backward compatibility during migration.
- **Version compatibility:** Objects encrypted with this policy can only be read by the V3 and the latest V2 implementations of the S3 encryption client.

`REQUIRE_ENCRYPT_REQUIRE_DECRYPT`

This policy encrypts objects with key commitment and only allows decryption of objects that were encrypted with key commitment.

- **Encryption behavior:** Objects are encrypted with key commitment using AES GCM with Key Commitment.
- **Decryption behavior:** Can only decrypt objects that were encrypted with key commitment. Attempts to decrypt objects without key commitment will fail.
- **Security implications:** This policy provides the highest level of security by enforcing key commitment for all operations. Use this policy only after all objects have been re-encrypted with key commitment and all clients have been upgraded to V3.
- **Version compatibility:** Objects encrypted with this policy can only be read by the V3 and the latest V2 implementations of the S3 encryption client. This policy also prevents reading objects encrypted by V2 or V1 clients.

> **Note**
>
> When planning your migration, start with `REQUIRE_ENCRYPT_ALLOW_DECRYPT` to maintain backward compatibility while gaining the security benefits of key commitment for new objects. Only move to `REQUIRE_ENCRYPT_REQUIRE_DECRYPT` after all objects have been re-encrypted and all clients have been upgraded to V3.

AES GCM with Key Commitment

AES GCM with Key Commitment (`ALG_AES_256_GCM_HKDF_SHA512_COMMIT_KEY`) is a new encryption algorithm introduced in V3 that provides enhanced security by protecting against data key tampering. Understanding how this algorithm works and when it applies is important for planning your migration.

How ALG_AES_256_GCM_HKDF_SHA512_COMMIT_KEY Differs from Previous Algorithms

Previous versions of the S3 encryption client used AES CBC or AES GCM without key commitment to encrypt the data key in Instruction Files. ALG_AES_256_GCM_HKDF_SHA512_COMMIT_KEY adds a cryptographic commitment to the encryption process, which binds the encrypted data to a specific key. This prevents an attacker from tampering with the encrypted data key in the Instruction File and causing the client to decrypt data with an incorrect key.

Without key commitment, it may be possible for an attacker to modify the encrypted data key in an Instruction File such that it decrypts to a different key, potentially allowing unauthorized access or data corruption. ALG_AES_256_GCM_HKDF_SHA512_COMMIT_KEY prevents this attack by ensuring that the encrypted data key can only decrypt to the original key that was used during encryption.

Version Compatibility

Objects encrypted with ALG_AES_256_GCM_HKDF_SHA512_COMMIT_KEY can only be decrypted by V3 implementations of the S3 encryption client and certain transition versions of V2 that include support for reading V3 formats. V2 clients without this transition support cannot decrypt Instruction Files encrypted with ALG_AES_256_GCM_HKDF_SHA512_COMMIT_KEY.

> **⚠ Warning**
>
> Before enabling encryption with ALG_AES_256_GCM_HKDF_SHA512_COMMIT_KEY (by using REQUIRE_ENCRYPT_ALLOW_DECRYPT or REQUIRE_ENCRYPT_REQUIRE_DECRYPT commitment policies), ensure that all clients that need to read your encrypted objects have been upgraded to V3 or a transition version that supports V3 formats. If any V2 clients without transition support attempt to read objects encrypted with ALG_AES_256_GCM_HKDF_SHA512_COMMIT_KEY, decryption will fail.

During migration, you can use the FORBID_ENCRYPT_ALLOW_DECRYPT commitment policy to continue encrypting without ALG_AES_256_GCM_HKDF_SHA512_COMMIT_KEY while still allowing your V3 clients to read objects encrypted with key commitment. This provides a safe migration path where you first upgrade all readers, then switch to encrypting with key commitment.

Update Existing Clients to Read New Formats

The V3 encryption client uses encryption algorithms and key commitment features that V2 clients don't support by default. The first step in the migration is to update your V2 decryption clients to a version of the AWS SDK for Ruby that can read V3 encrypted objects. After completing this step, your application's V2 clients will be able to decrypt objects encrypted by V3 encryption clients.

To read objects encrypted by V3 clients (those using `REQUIRE_ENCRYPT_ALLOW_DECRYPT` or `REQUIRE_ENCRYPT_REQUIRE_DECRYPT` commitment policies), you need to use version 1.93.0 or later of the `aws-sdk-s3` gem. This version includes support for decrypting objects encrypted with AES GCM with Key Commitment.

Installing from the Command Line

For projects that install the `aws-sdk-s3` gem from the command line, use the version option to verify that the minimum version of 1.208.0 is installed.

```
gem install aws-sdk-s3 -v '>= 1.208.0'
```

Using Gemfiles

For projects that use a Gemfile to manage dependencies, set the minimum version of the `aws-sdk-s3` gem to 1.208.0. For example:

```
gem 'aws-sdk-s3', '>= 1.208.0'
```

1. Modify your Gemfile to specify the minimum version.
2. Run `bundle update aws-sdk-s3` to update the gem.
3. To verify your version, run `bundle info aws-sdk-s3`.

> **Note**
>
> After updating to the latest version, your existing V2 encryption clients will be able to decrypt objects encrypted by V3 clients. However, they will continue to encrypt new objects using V2 algorithms until you migrate them to V3 as described in the next section.

Migrate Encryption and Decryption Clients to V3

After updating your clients to read the new encryption formats, you can update your applications to the V3 encryption and decryption clients. The following steps show you how to successfully migrate your code from V2 to V3.

Before updating your code to use the V3 encryption client, ensure that you have followed the preceding steps and are using the `aws-sdk-s3` gem version 1.93.0 or later.

> **Note**
>
> When decrypting with AES-GCM, read the entire object to the end before you start using the decrypted data. This is to verify that the object has not been modified since it was encrypted.

Configuring V3 Clients

The V3 encryption client introduces new configuration options that control key commitment behavior and backward compatibility. Understanding these options is essential for a successful migration.

commitment_policy

The `commitment_policy` parameter controls how the encryption client handles key commitment during encryption and decryption operations. This is the most important configuration option for V3 clients.

- `:require_encrypt_allow_decrypt` - Encrypts new objects with key commitment and allows decryption of objects with or without key commitment. This is the recommended setting for migration, as it provides enhanced security for new objects while maintaining backward compatibility with existing V2 objects.
- `:forbid_encrypt_allow_decrypt` - Encrypts new objects without key commitment (using V2 algorithms) and allows decryption of objects with or without key commitment. Use this setting only if you need to maintain V2 encryption behavior during migration, such as when some clients cannot yet read V3 encrypted objects.
- `:require_encrypt_require_decrypt` - Encrypts new objects with key commitment and only allows decryption of objects that were encrypted with key commitment. Use this setting

only after all objects have been re-encrypted with key commitment and all clients have been upgraded to V3.

security_profile

The `security_profile` parameter determines support for reading objects written by older encryption client versions. This parameter is essential for maintaining backward compatibility during migration.

- `:v3_and_legacy` - Allows the V3 client to decrypt objects encrypted by V1 and V2 encryption clients. Use this setting during migration to ensure your V3 clients can read all existing encrypted objects.
- `:v3` - Allows the V3 client to decrypt objects encrypted by V2 encryption clients only. Use this setting if you have already migrated all V1 objects to V2 format.
- If not specified, the client will only decrypt objects encrypted by V3 clients. Use this only for new application development where no legacy objects exist.

envelope_location

The `envelope_location` parameter determines where encryption metadata (including the encrypted data key) is stored. This parameter affects which objects are protected by AES GCM with Key Commitment.

- `:metadata` (Default) - Stores encryption metadata in the S3 object's metadata headers. This is the default behavior and is recommended for most use cases. When using metadata storage, AES GCM with Key Commitment does not apply.
- `:instruction_file` - Stores encryption metadata in a separate S3 object (Instruction File) with a configurable suffix. When using Instruction Files, AES GCM with Key Commitment protects the encrypted data key from tampering. Use this setting if you require the additional security provided by key commitment for the data key itself.

When using `:instruction_file`, you can optionally specify the `instruction_file_suffix` parameter to customize the suffix used for Instruction File objects. The default suffix is `.instruction`.

When to Use Each Configuration Option

During migration, follow this recommended configuration strategy:

1. **Initial Migration:** Set `commitment_policy: :require_encrypt_allow_decrypt` and `security_profile: :v3_and_legacy`. This allows your V3 clients to encrypt new objects with key commitment while still being able to decrypt all existing V1 and V2 objects.
2. **After All Clients Are Upgraded:** Continue using `commitment_policy: :require_encrypt_allow_decrypt` and `security_profile: :v3_and_legacy` until you have re-encrypted all objects that need key commitment protection.
3. **Full V3 Enforcement:** Only after all objects have been re-encrypted with key commitment and you no longer need to read V1/V2 objects, you can optionally switch to `commitment_policy: :require_encrypt_require_decrypt` and remove the `security_profile` parameter (or set it to `:v2` if V2 objects still exist).

For `envelope_location`, continue using your existing storage method (`:metadata` or `:instruction_file`) unless you have a specific reason to change it. If you are currently using metadata storage and want the additional security of AES GCM with Key Commitment for the data key, you can switch to `:instruction_file`, but note that this will require updating all clients that read these objects.

Migrate Encryption and Decryption clients to V3

After updating your clients to read the new encryption formats, you can update your applications to the V3 encryption and decryption clients. The following examples show you how to successfully migrate your code from V2 to V3.

Using V3 Encryption Clients

Pre-migration (V2)

```
require 'aws-sdk-s3'

# Create V2 encryption client with KMS
client = Aws::S3::EncryptionV2::Client.new(
  kms_key_id: kms_key_id,
  key_wrap_schema: :kms_context,
  content_encryption_schema: :aes_gcm_no_padding,
  security_profile: :v2_and_legacy,
  commitment_policy: :forbid_encrypt_allow_decrypt
```

```
)

# Encrypt and upload object
client.put_object(bucket: 'my-bucket', key: 'my-object', body: 'secret data')

# Download and decrypt object
resp = client.get_object(bucket: 'my-bucket', key: 'my-object')
decrypted_data = resp.body.read
```

During migration (V3 with backward compatibility)

```
require 'aws-sdk-s3'

# Create V3 encryption client with KMS
client = Aws::S3::EncryptionV3::Client.new(
  kms_key_id: kms_key_id,
  key_wrap_schema: :kms_context,
  content_encryption_schema: :aes_gcm_no_padding,
  security_profile: :v3_and_legacy,
  commitment_policy: :require_encrypt_allow_decrypt
)

# Encrypt and upload object
client.put_object(bucket: 'my-bucket', key: 'my-object', body: 'secret data')

# Download and decrypt object
resp = client.get_object(bucket: 'my-bucket', key: 'my-object')
decrypted_data = resp.body.read
```

Post-migration (V3)

```
require 'aws-sdk-s3'

# Create V3 encryption client with KMS
client = Aws::S3::EncryptionV3::Client.new(
  kms_key_id: kms_key_id,
  key_wrap_schema: :kms_context,
  content_encryption_schema: :aes_gcm_no_padding,
  security_profile: :v3,
  # Use the commitment policy (REQUIRE_ENCRYPT_REQUIRE_DECRYPT)
  # This encrypts with key commitment and does not decrypt V2 objects
  commitment_policy: :require_encrypt_require_decrypt
)
```

```
# Encrypt and upload object
client.put_object(bucket: 'my-bucket', key: 'my-object', body: 'secret data')

# Download and decrypt object
resp = client.get_object(bucket: 'my-bucket', key: 'my-object')
decrypted_data = resp.body.read
```

The key difference in V3 is the addition of the `commitment_policy` parameter. Setting it to `:require_encrypt_require_decrypt` ensures that new objects are encrypted with key commitment and that the client is only decrypting object encrypted with key commitment, providing enhanced security against data key tampering.

The `put_object` call itself remains unchanged. All the security enhancements are configured at the client level.

Additional Examples

This section provides additional examples for specific migration scenarios and configuration options that may be useful during your V2 to V3 migration.

Instruction File vs Metadata Storage

The S3 encryption client can store encryption metadata (including the encrypted data key) in two different locations: in the S3 object's metadata headers or in a separate Instruction File. The choice of storage method affects which objects benefit from AES GCM with Key Commitment protection.

Metadata Storage (Default)

By default, the encryption client stores encryption metadata in the S3 object's metadata headers. This is the recommended approach for most use cases because it keeps the encryption metadata with the object and doesn't require managing separate Instruction File objects.

```
require 'aws-sdk-s3'

# Create V3 encryption client with metadata storage (default)
client = Aws::S3::EncryptionV3::Client.new(
  kms_key_id: kms_key_id,
  key_wrap_schema: :kms_context,
  content_encryption_schema: :aes_gcm_no_padding,
  security_profile: :v3_and_legacy,
```

```
  commitment_policy: :require_encrypt_allow_decrypt,
  envelope_location: :metadata # Explicitly set to metadata (this is the default)
)

# Encrypt and upload object
# Encryption metadata is stored in the object's metadata headers
client.put_object(bucket: 'my-bucket', key: 'my-object',body: 'secret data')
```

When using metadata storage, AES GCM with Key Commitment does not apply to the encrypted data key. However, the content encryption still benefits from key commitment when using `commitment_policy: :require_encrypt_allow_decrypt` or `:require_encrypt_require_decrypt`.

Instruction File Storage

Alternatively, you can configure the encryption client to store encryption metadata in a separate S3 object called an Instruction File. When using Instruction Files with V3, the encrypted data key is protected by AES GCM with Key Commitment, providing additional security against data key tampering.

```
require 'aws-sdk-s3'

# Create V3 encryption client with instruction file storage
client = Aws::S3::EncryptionV3::Client.new(
  kms_key_id: kms_key_id,
  key_wrap_schema: :kms_context,
  content_encryption_schema: :aes_gcm_no_padding,
  security_profile: :v3_and_legacy,
  commitment_policy: :require_encrypt_allow_decrypt,
  envelope_location: :instruction_file, # Store metadata in separate instruction file
  instruction_file_suffix: '.instruction' # Optional: customize the suffix (default is
 '.instruction')
)

# Encrypt and upload object
# Encryption metadata is stored in a separate object: 'my-object.instruction'
client.put_object(bucket: 'my-bucket', key: 'my-object', body: 'secret data')

# When retrieving the object, the client automatically reads the instruction file
resp = client.get_object(bucket: 'my-bucket', key: 'my-object')
decrypted_data = resp.body.read
```

When using `envelope_location: :instruction_file`, the encryption client creates two S3 objects:

1. The encrypted data object (e.g., `my-object`)
2. The Instruction File containing encryption metadata (e.g., `my-object.instruction`)

The `instruction_file_suffix` parameter allows you to customize the suffix used for Instruction Files. The default value is `.instruction`.

When to Use Each Storage Method

- **Use Metadata Storage** for most scenarios. It simplifies object management since encryption metadata travels with the object.
- **Use Instruction File Storage** when object metadata size is a concern or when you need to separate encryption metadata from the encrypted object. Note that using Instruction Files requires managing two S3 objects (the encrypted object and its instruction file) instead of one.

> **Warning**
>
> If you change from metadata storage to instruction file storage (or vice versa), existing objects encrypted with the old storage method will not be readable by clients configured with the new storage method. Plan your storage method carefully and maintain consistency across your application.

Document History

The following table describes important changes in this guide. For notification about updates to this documentation, you can subscribe to an RSS feed.

Change	Description	Date
Content reorganization	Updating the table of contents and content organization to better align with other AWS SDKs.	March 29, 2025
Observability	Added information regarding Ruby Observability.	January 24, 2025
General updates	Updated minimum required Ruby version to v2.5. Updated resource links.	November 13, 2024
Table of contents and guided examples	Removed guided examples to defer to the more comprehen sive Code Examples Repositor y.	July 10, 2024
Table of contents	Updated table of contents to make code examples more accessible.	June 1, 2023
IAM best practices updates	Updated guide to align with the IAM best practices . For more information, see Security best practices in IAM. Updates to Getting started.	May 8, 2023
General updates	Updating welcome page for relevant external resources . Also updated minimum required Ruby version for	August 8, 2022

	v2.3. Updated AWS Key Management Service sections to reflect terminology updates. Updated usage information on REPL utility for clarity.	
Correcting broken links	Fixed broken examples links. Removed redundant Tips and Tricks page; redirecti ng to Amazon EC2 example content. Included lists of the code examples that are available on GitHub in the Code Examples repository.	August 3, 2022
SDK Metrics	Removed information about enabling SDK Metrics for Enterprise Support, which has been deprecated.	January 28, 2022