aws

User Guide

AWS Secrets Manager

AWS Secrets Manager: User Guide

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What is AWS Secrets Manager?

AWS Secrets Manager helps you manage, retrieve, and rotate database credentials, application credentials, OAuth tokens, API keys, and other secrets throughout their lifecycles. Many AWS services store and use secrets in Secrets Manager.

Secrets Manager helps you improve your security posture, because you no longer need hard-coded credentials in application source code. Storing the credentials in Secrets Manager helps avoid possible compromise by anyone who can inspect your application or the components. You replace hard-coded credentials with a runtime call to the Secrets Manager service to retrieve credentials dynamically when you need them.

With Secrets Manager, you can configure an automatic rotation schedule for your secrets. This enables you to replace long-term secrets with short-term ones, significantly reducing the risk of compromise. Since the credentials are no longer stored with the application, rotating credentials no longer requires updating your applications and deploying changes to application clients.

For other types of secrets you might have in your organization:

- AWS credentials – We recommend AWS Identity and Access Management.
- Encryption keys – We recommend AWS Key Management Service.
- SSH keys – We recommend Amazon EC2 Instance Connect.
- Private keys and certificates – We recommend AWS Certificate Manager.

Get started with Secrets Manager

If you are new to Secrets Manager, start with *Concepts* or one of the following tutorials:

- the section called “Replace hardcoded secrets ”
- the section called “Replace hardcoded DB credentials ”
- the section called “Alternating users rotation”
- the section called “Single user rotation”

Other tasks you can do with secrets:

- Create and manage secrets

- Control access to your secrets
- Retrieve secrets
- Rotate secrets
- Monitor secrets
- Audit secrets for compliance
- Create secrets in AWS CloudFormation

Compliance with standards

AWS Secrets Manager has undergone auditing for the multiple standards and can be part of your solution when you need to obtain compliance certification. For more information, see *Compliance validation*.

Pricing

When you use Secrets Manager, you pay only for what you use, with no minimum or setup fees. There is no charge for secrets that are marked for deletion. For the current complete pricing list, see AWS Secrets Manager Pricing.

You can use the AWS managed key `aws/secretsmanager` that Secrets Manager creates to encrypt your secrets for free. If you create your own KMS keys to encrypt your secrets, AWS charges you at the current AWS KMS rate. For more information, see AWS Key Management Service Pricing.

When you turn on automatic rotation (except managed rotation), Secrets Manager uses an AWS Lambda function to rotate the secret, and you are charged for the rotation function at the current Lambda rate. For more information, see AWS Lambda Pricing.

If you enable AWS CloudTrail on your account, you can obtain logs of the API calls that Secrets Manager sends out. Secrets Manager logs all events as management events. AWS CloudTrail stores the first copy of all management events for free. However, you can incur charges for Amazon S3 for log storage and for Amazon SNS if you enable notification. Also, if you set up additional trails, the additional copies of management events can incur costs. For more information, see AWS CloudTrail pricing.

AWS services that use AWS Secrets Manager secrets

- **AWS App Runner** – See Referencing environment variables and Managing environment variables in the *AWS App Runner Developer Guide*.
- **AWS App2Container** – See Manage secrets for AWS App2Container in the *AWS App2Container Use Guide*.
- **AWS AppConfig** – See Creating a freeform configuration profile in the *AWS AppConfig User Guide*.
- **Amazon AppFlow** – See *Secrets managed by other services*.
- **AWS AppSync** – See Tutorial: Aurora Serverless in the *AWS AppSync Developer Guide* .
- **Amazon Athena** – See Using Amazon Athena Federated Query in the *Amazon Athena User Guide*.
- **Amazon Aurora** – See See *Secrets managed by other services*.
- **AWS CodeBuild** – See Private registry with AWS Secrets Manager sample for CodeBuild in the *AWS CodeBuild User Guide*.
- **AWS DataSync** – See *Secrets managed by other services*.
- **Amazon DataZone** – See Create a data source for an Amazon Redshift database using a new AWS Glue connection in the *Amazon DataZone User Guide*.
- **AWS Direct Connect** – See *Secrets managed by other services*.
- **AWS Directory Service** – See Seamlessly join a Linux EC2 instance to your AWS Managed Microsoft AD directory, Seamlessly join a Linux EC2 instance to your AD Connector directory, and Seamlessly join a Linux EC2 instance to your Simple AD directory in the *AWS Direct Connect User Guide*.
- **Amazon DocumentDB (with MongoDB compatibility)** – See the section called “Create a database secret” and Managing Amazon DocumentDB Users in the *Amazon DocumentDB Developer Guide*.
- **AWS Elastic Beanstalk** – See Docker configuration in the *AWS Elastic Beanstalk Developer Guide*.
- **Amazon Elastic Container Registry** – See Creating a pull through cache rule in the *Amazon ECR User Guide*.
- **Amazon Elastic Container Service** – See Tutorial: Specifying sensitive data using Secrets Manager secrets, Retrieve secrets programmatically through your application, Retrieve secrets through environment variables, Retrieve secrets for logging configuration, Tutorial: Using FSx for Windows File Server file systems with Amazon ECS, FSx for Windows File Server volumes, and Private registry authentication for tasks in the *Amazon Elastic Container Service Developer Guide*.

- **Amazon Elastic Container Service Service Connect** – See *Secrets managed by other services*.
- **Amazon ElastiCache** – See Automatically rotating passwords for users in the *Amazon ElastiCache User Guide*.
- **AWS Elemental Live** – See How delivery from AWS Elemental Live to MediaConnect works at runtime in the *Elemental Live User Guide*.
- **AWS Elemental MediaConnect** – See Static key encryption in AWS Elemental MediaConnect in the *AWS Elemental MediaConnect User Guide*.
- **AWS Elemental MediaConvert** – See Using Kantar for audio watermarking in AWS Elemental MediaConvert outputs in the *AWS Elemental MediaConvert User Guide*.
- **AWS Elemental MediaLive** – See Setting up MediaLive as a trusted entity in the *MediaLive User Guide*.
- **AWS Elemental MediaPackage** – See Secrets Manager access for CDN authorization in the *AWS Elemental MediaPackage User Guide*.
- **AWS Elemental MediaTailor** – See Configuring AWS Secrets Manager access token authentication in the *AWS Elemental MediaTailor User Guide*.
- **Amazon EMR running on Amazon EC2** – See Store sensitive configuration data in Secrets Manager and Add a Git-based Repository to Amazon EMR in the *Amazon EMR Management Guide*.
- **EMR Serverless** – See Secrets Manager for data protection with EMR Serverless in the *Amazon EMR Serverless User Guide*.
- **Amazon EventBridge** – See *Secrets managed by other services*.
- **Amazon FSx** – See File shares and Migrating file share configurations to Amazon FSx in the *Amazon FSx for Windows File Server User Guide*.
- **AWS Glue DataBrew** – See *Secrets managed by other services*.
- **AWS Glue Studio** – See Tutorial: Using the AWS Glue Connector for Elasticsearch in the *AWS Glue Developer Guide*.
- **AWS IoT SiteWise** – See Configuring data source authentication in the *AWS IoT SiteWise User Guide*.
- **Amazon Kendra** – See Using a database data source in the *Amazon Kendra User Guide*.
- **Amazon Kinesis Video Streams** – See Deploy the Amazon Kinesis Video Streams Edge Agent to AWS IoT Greengrass in the *Amazon Kinesis Video Streams Developer Guide*.
- **AWS Launch Wizard** – See Set up for AWS Launch Wizard for Active Directory in the *AWS Launch Wizard User Guide*.

- **Amazon Lookout for Metrics** – See Using Amazon RDS with Lookout for Metrics and Using Amazon Redshift with Lookout for Metrics in the *Amazon Lookout for Metrics Developer Guide*.
- **Amazon Managed Grafana** – See Configuring Amazon Redshift in the *Amazon Managed Grafana User Guide*.
- **AWS Managed Services** – See AWS Secrets Manager (AMS self-service provisioning) in the *AMS Advanced User Guide*.
- **Amazon Managed Streaming for Apache Kafka** – See Username and password authentication with AWS Secrets Manager in the *Amazon Managed Streaming for Apache Kafka Developer Guide*.
- **Amazon Managed Workflows for Apache Airflow** – See Configuring an Apache Airflow connection using a Secrets Manager secret and Using a secret key in AWS Secrets Manager for an Apache Airflow variable in the *Amazon Managed Workflows for Apache Airflow User Guide*.
- **AWS Marketplace** – See *Secrets managed by other services*.
- **AWS Migration Hub** – See Migrate SAP NetWeaver applications to AWS and Rehost applications on Amazon EC2 in the *AWS Migration Hub Orchestrator User Guide*.
- **AWS OpsWorks for Chef Automate** – See *Secrets managed by other services*.
- **AWS Panorama** – See Managing camera streams in AWS Panorama in the *AWS Panorama Developer Guide*.
- **AWS ParallelCluster** – See Integrating Active Directory in the *AWS ParallelCluster User Guide*.
- **Amazon Q** – See Concepts - Authentication in the *Amazon Q Developer Guide*.
- **Amazon QuickSight** – See Using AWS Secrets Manager secrets in place of database credentials in Amazon QuickSight in the *Amazon QuickSight User Guide*.
- **Amazon RDS** – See *Secrets managed by other services*.
- **Amazon Redshift** – See *Secrets managed by other services*, the section called "Create a database secret", Storing database credentials in AWS Secrets Manager, Using the Amazon Redshift Data API, and Querying a database using the query editor in the *Amazon Redshift Management Guide*.
- **Amazon Redshift query editor v2** – See *Secrets managed by other services*.
- **Amazon SageMaker** – See Associate Git Repositories with Amazon SageMaker Notebook Instances, Import data from Databricks (JDBC), and Import data from Snowflake in the *Amazon SageMaker Developer Guide*.
- **AWS Schema Conversion Tool** – See Using AWS Secrets Manager in the AWS SCT user interface in the *AWS Schema Conversion Tool User Guide*.
- **AWS Toolkit for JetBrains** – See Accessing Amazon Redshift clusters in the *AWS Toolkit for JetBrains User Guide*.

- **AWS Transfer Family** – See Basic authentication for AS2 connectors, Working with custom identity providers, and Generate and manage PGP keys in the *AWS Transfer Family User Guide*.
- **AWS Wickr** – See Start the data retention bot in the *AWS Wickr Administration Guide*.

Access AWS Secrets Manager

You can work with Secrets Manager in any of the following ways:

- Secrets Manager console
- Command line tools
- AWS SDKs
- HTTPS Query API
- AWS Secrets Manager endpoints

Secrets Manager console

You can manage your secrets using the browser-based Secrets Manager console and perform almost any task related to your secrets by using the console.

Command line tools

The AWS command line tools allows you to issue commands at your system command line to perform Secrets Manager and other AWS tasks. This can be faster and more convenient than using the console. The command line tools can be useful if you want to build scripts to perform AWS tasks.

When you enter commands in a command shell, there is a risk of the command history being accessed or utilities having access to your command parameters. See the section called “Mitigate the risks of using the AWS CLI to store your AWS Secrets Manager secrets”.

The command line tools automatically use the default endpoint for the service in an AWS Region. You can specify a different endpoint for your API requests. See the section called “Secrets Manager endpoints”.

AWS provides two sets of command line tools:

- AWS Command Line Interface (AWS CLI)
- AWS Tools for Windows PowerShell

AWS SDKs

The AWS SDKs consist of libraries and sample code for various programming languages and platforms. The SDKs include tasks such as cryptographically signing requests, managing errors, and retrying requests automatically. To download and install any of the SDKs, see Tools for Amazon Web Services.

The AWS SDKs automatically use the default endpoint for the service in an AWS Region. You can specify a different endpoint for your API requests. See the section called "Secrets Manager endpoints".

For SDK documentation, see:

- C++
- Go
- Java
- JavaScript
- Kotlin
- .NET
- PHP
- Python (Boto3)
- Ruby
- Rust
- SAP ABAP
- Swift

HTTPS Query API

The HTTPS Query API gives you programmatic access to Secrets Manager and AWS. The HTTPS Query API allows you to issue HTTPS requests directly to the service.

Although you can make direct calls to the Secrets Manager HTTPS Query API, we recommend that you use one of the SDKs instead. The SDK performs many useful tasks you otherwise must perform manually. For example, the SDKs automatically sign your requests and convert responses into a structure syntactically appropriate to your language.

To make HTTPS calls to Secrets Manager, you connect to ???.

AWS Secrets Manager endpoints

To connect programmatically to Secrets Manager, you use an *endpoint*, the URL of the entry point for the service. Secrets Manager endpoints are dual-stack endpoints, which means they support both IPv4 and IPv6.

Secrets Manager offers endpoints that support Federal Information Processing Standard (FIPS) 140-2 in some Regions.

Secrets Manager supports TLS 1.2 and 1.3. Secrets Manager supports PQTLS in all regions except China Regions.

> **Note**
>
> The Python AWS SDK and the AWS CLI attempt to call IPv6 and then IPv4 in sequence, so if you don't have IPv6 enabled, it can take some time before the call times out and retries with IPv4. To work around this issue, you can disable IPv6 completely or migrate to IPv6.

The following are the service endpoints for Secrets Manager. Note that the naming differs from the typical dual-stack naming convention.

Region Name	Region	Endpoint	Protocol
US East (Ohio)	us-east-2	secretsmanager.us-east-2.amazonaws.com secretsmanager-fips.us-east-2.amazonaws.com	HTTPS HTTPS
US East (N. Virginia)	us-east-1	secretsmanager.us-east-1.amazonaws.com secretsmanager-fips.us-east-1.amazonaws.com	HTTPS HTTPS
US West (N.	us-west-1	secretsmanager.us-west-1.amazonaws.com	HTTPS HTTPS

Region Name	Region	Endpoint	Protocol
California)		secretsmanager-fips.us-west-1.amazonaws.com	
US West (Oregon)	us-west-2	secretsmanager.us-west-2.amazonaws.com secretsmanager-fips.us-west-2.amazonaws.com	HTTPS HTTPS
Africa (Cape Town)	af-south-1	secretsmanager.af-south-1.amazonaws.com	HTTPS
Asia Pacific (Hong Kong)	ap-east-1	secretsmanager.ap-east-1.amazonaws.com	HTTPS
Asia Pacific (Hyderabad)	ap-south-2	secretsmanager.ap-south-2.amazonaws.com	HTTPS
Asia Pacific (Jakarta)	ap-southeast-3	secretsmanager.ap-southeast-3.amazonaws.com	HTTPS
Asia Pacific (Melbourne)	ap-southeast-4	secretsmanager.ap-southeast-4.amazonaws.com	HTTPS
Asia Pacific (Mumbai)	ap-south-1	secretsmanager.ap-south-1.amazonaws.com	HTTPS

Region Name	Region	Endpoint	Protocol
Asia Pacific (Osaka)	ap-northeast-3	secretsmanager.ap-northeast-3.amazonaws.com	HTTPS
Asia Pacific (Seoul)	ap-northeast-2	secretsmanager.ap-northeast-2.amazonaws.com	HTTPS
Asia Pacific (Singapore)	ap-southeast-1	secretsmanager.ap-southeast-1.amazonaws.com	HTTPS
Asia Pacific (Sydney)	ap-southeast-2	secretsmanager.ap-southeast-2.amazonaws.com	HTTPS
Asia Pacific (Tokyo)	ap-northeast-1	secretsmanager.ap-northeast-1.amazonaws.com	HTTPS
Canada (Central)	ca-central-1	secretsmanager.ca-central-1.amazonaws.com secretsmanager-fips.ca-central-1.amazonaws.com	HTTPS HTTPS
Canada West (Calgary)	ca-west-1	secretsmanager.ca-west-1.amazonaws.com secretsmanager-fips.ca-west-1.amazonaws.com	HTTPS HTTPS
Europe (Frankfurt)	eu-central-1	secretsmanager.eu-central-1.amazonaws.com	HTTPS

Region Name	Region	Endpoint	Protocol
Europe (Ireland)	eu-west-1	secretsmanager.eu-west-1.amazonaws.com	HTTPS
Europe (London)	eu-west-2	secretsmanager.eu-west-2.amazonaws.com	HTTPS
Europe (Milan)	eu-south-1	secretsmanager.eu-south-1.amazonaws.com	HTTPS
Europe (Paris)	eu-west-3	secretsmanager.eu-west-3.amazonaws.com	HTTPS
Europe (Spain)	eu-south-2	secretsmanager.eu-south-2.amazonaws.com	HTTPS
Europe (Stockholm)	eu-north-1	secretsmanager.eu-north-1.amazonaws.com	HTTPS
Europe (Zurich)	eu-central-2	secretsmanager.eu-central-2.amazonaws.com	HTTPS
Israel (Tel Aviv)	il-central-1	secretsmanager.il-central-1.amazonaws.com	HTTPS
Middle East (Bahrain)	me-south-1	secretsmanager.me-south-1.amazonaws.com	HTTPS
Middle East (UAE)	me-central-1	secretsmanager.me-central-1.amazonaws.com	HTTPS

Region Name	Region	Endpoint	Protocol
South America (São Paulo)	sa-east-1	secretsmanager.sa-east-1.amazonaws.com	HTTPS
AWS GovCloud (US-East)	us-gov-east-1	secretsmanager.us-gov-east-1.amazonaws.com secretsmanager-fips.us-gov-east-1.amazonaws.com	HTTPS HTTPS
AWS GovCloud (US-West)	us-gov-west-1	secretsmanager.us-gov-west-1.amazonaws.com secretsmanager-fips.us-gov-west-1.amazonaws.com	HTTPS HTTPS

AWS Secrets Manager concepts

The following concepts are important for understanding how Secrets Manager works.

- Secret
- Version
- Rotation
- Rotation strategy

Secret

In Secrets Manager, a *secret* consists of secret information, the *secret value*, plus metadata about the secret. A secret value can be a string or binary. To store multiple string values in one secret, we recommend that you use a JSON text string with key/value pairs, for example:

```
{
  "host"       : "ProdServer-01.databases.example.com",
  "port"       : "8888",
  "username"   : "administrator",
  "password"   : "EXAMPLE-PASSWORD",
  "dbname"     : "MyDatabase",
  "engine"     : "mysql"
}
```

A secret's metadata includes:

- An Amazon Resource Name (ARN) with the following format:

  ```
  arn:aws:secretsmanager:<Region>:<AccountId>:secret:SecretName-6RandomCharacters
  ```

  Secrets Manager includes six random characters at the end of the secret name to help ensure that the secret ARN is unique. If the original secret is deleted, and then a new secret is created with the same name, the two secrets have different ARNs because of these characters. Users with access to the old secret don't automatically get access to the new secret because the ARNs are different.

- The name of the secret, a description, a resource policy, and tags.

- The ARN for an *encryption key*, an AWS KMS key that Secrets Manager uses to encrypt and decrypt the secret value. Secrets Manager stores secret text in an encrypted form and encrypts the secret in transit. See the section called "Secret encryption and decryption".
- Information about how to rotate the secret, if you set up rotation. See the section called "Rotation".

Secrets Manager uses IAM permission policies to make sure that only authorized users can access or modify a secret. See Authentication and access control for AWS Secrets Manager.

A secret has *versions* which hold copies of the encrypted secret value. When you change the secret value, or the secret is rotated, Secrets Manager creates a new version. See the section called "Version".

You can use a secret across multiple AWS Regions by *replicating* it. When you replicate a secret, you create a copy of the original or *primary secret* called a *replica secret*. The replica secret remains linked to the primary secret. See the section called "Replicate a secret to other Regions".

See *Create and manage secrets*.

Version

A secret has *versions* which hold copies of the encrypted secret value. When you change the secret value, or the secret is rotated, Secrets Manager creates a new version.

Secrets Manager doesn't store a linear history of secrets with versions. Instead, it keeps track of three specific versions by labelling them:

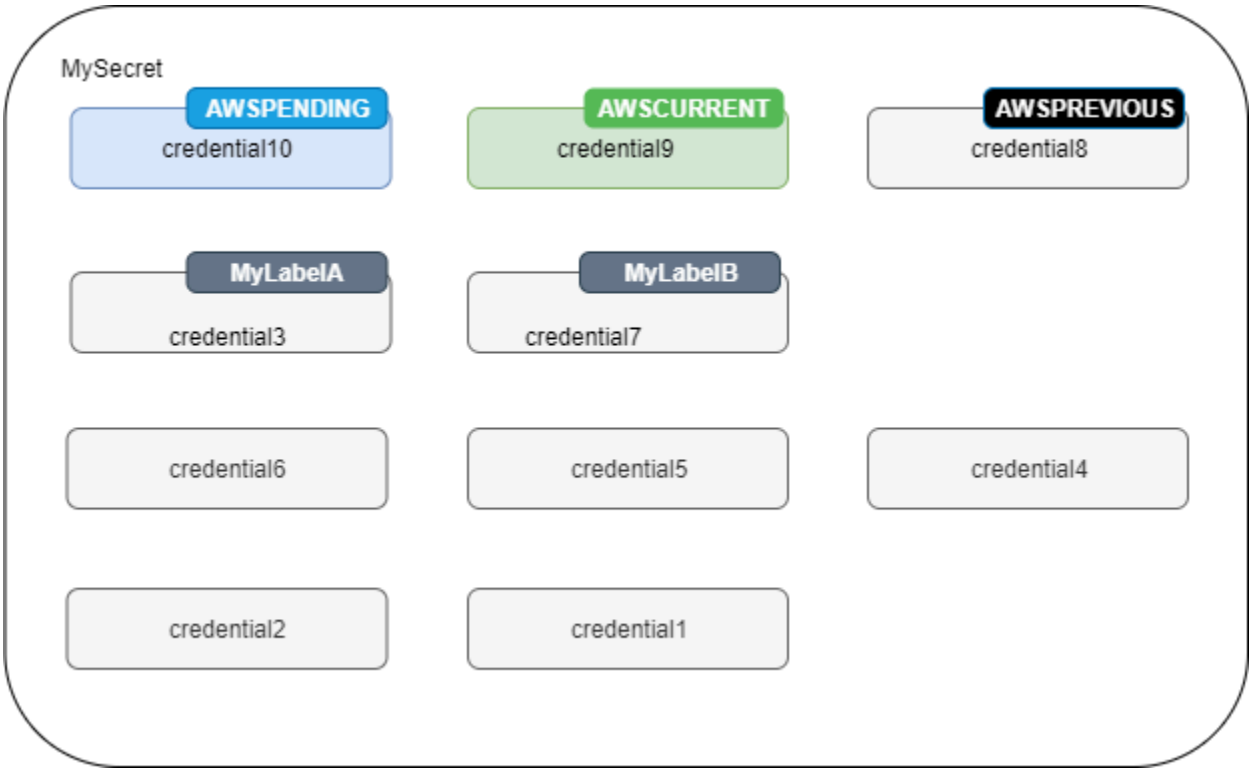
- The current version - `AWSCURRENT`
- The previous version - `AWSPREVIOUS`
- The pending version (during rotation) - `AWSPENDING`

A secret always has a version labeled `AWSCURRENT`, and Secrets Manager returns that version by default when you retrieve the secret value.

You can also label versions with your own labels by calling `update-secret-version-stage` in the AWS CLI. You can attach up to 20 labels to versions in a secret. Two versions of a secret can't have the same staging label. Versions can have multiple labels.

Secrets Manager never removes labeled versions, but unlabeled versions are considered deprecated. Secrets Manager removes deprecated versions when there are more than 100. Secrets Manager doesn't remove versions created less than 24 hours ago.

The following figure shows a secret that has AWS labeled versions and customer labeled versions. The versions without labels are considered deprecated and will be removed by Secrets Manager at some point in the future.



Rotation

Rotation is the process of periodically updating a secret to make it more difficult for an attacker to access the credentials. In Secrets Manager, you can set up automatic rotation for your secrets. When Secrets Manager rotates a secret, it updates the credentials in both the secret and the database or service. See *Rotate secrets*.

> **Tip**
>
> For some Secrets managed by other services, you use *managed rotation*. To use Managed rotation, you first create the secret through the managing service.

Rotation strategy

Secrets Manager offers two rotation strategies:

- Rotation strategy: single user
- Rotation strategy: alternating users

Rotation strategy: single user

This strategy updates credentials for one user in one secret. For Amazon RDS Db2 instances, because users can't change their own passwords, you must provide admin credentials in a separate secret. **This is the simplest rotation strategy, and it is appropriate for most use cases.** In particular, we recommend you use this strategy for credentials for one-time (ad hoc) or interactive users.

When the secret rotates, open database connections are not dropped. While rotation is happening, there is a short period of time between when the password in the database changes and when the secret is updated. During this time, there is a low risk of the database denying calls that use the rotated credentials. You can mitigate this risk with an appropriate retry strategy. After rotation, new connections use the new credentials.

Rotation strategy: alternating users

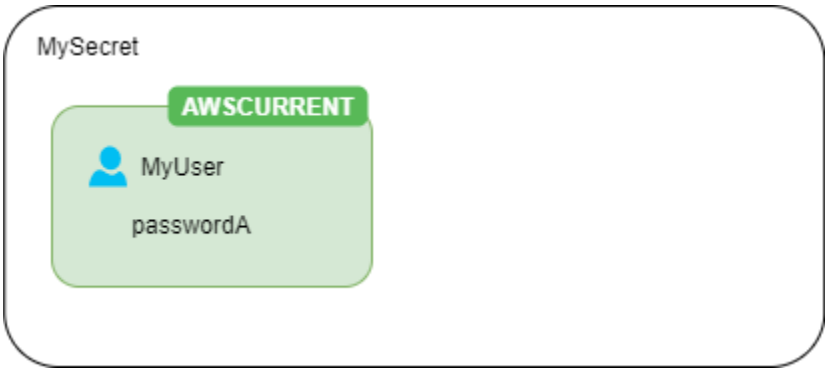
This strategy updates credentials for two users in one secret. You create the first user, and during the first rotation, the rotation function clones it to create the second user. Every time the secret rotates, the rotation function alternates which user's password it updates. Because most users don't have permission to clone themselves, you must provide the credentials for a `superuser` in another secret. We recommend using the single-user rotation strategy when cloned users in your database don't have the same permissions as the original user, and for credentials for one-time (ad hoc) or interactive users.

This strategy is appropriate for databases with permission models where one role owns the database tables and a second role has permission to access the database tables. It is also appropriate for applications that require high availability. If an application retrieves the secret during rotation, the application still gets a valid set of credentials. After rotation, both `user` and `user_clone` credentials are valid. There is even less chance of applications getting a deny during this type of rotation than single user rotation. If the database is hosted on a server farm where the

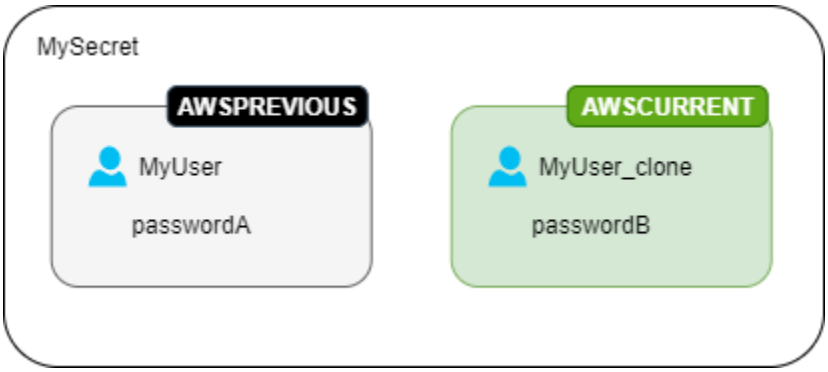
password change takes time to propagate to all servers, there is a risk of the database denying calls that use the new credentials. You can mitigate this risk with an appropriate retry strategy.

Secrets Manager creates the cloned user with the same permissions as the original user. If you change the original user's permissions after the clone is created, you must also change the cloned user's permissions.

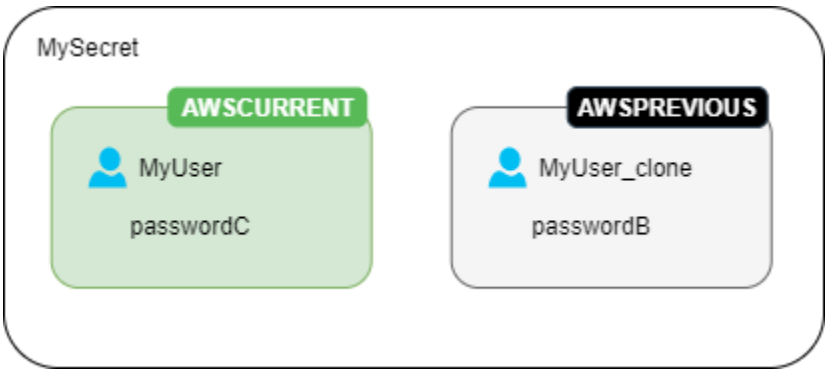
For example, if you create a secret with a database user's credentials, the secret contains one version with those credentials.



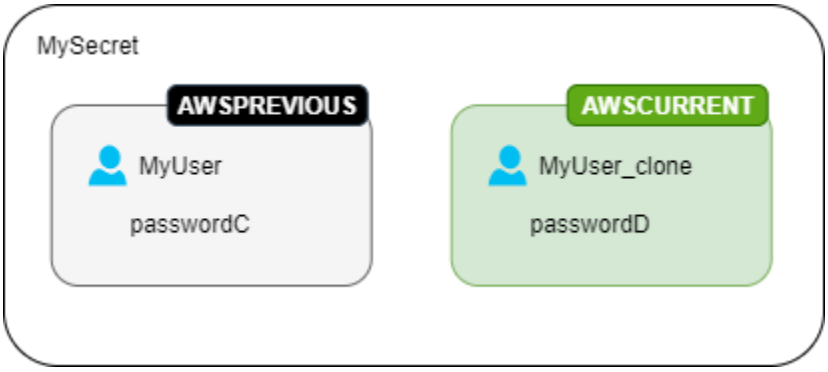
First rotation - The rotation function creates a clone of your user with a generated password, and those credentials become the current secret version.



Second rotation - The rotation function updates the password for the original user.



Third rotation - The rotation function updates the password for the cloned user.



AWS Secrets Manager tutorials

Topics

Find unprotected secrets in your code with Amazon CodeGuru Reviewer

Amazon CodeGuru Reviewer is a service that uses program analysis and machine learning to detect potential defects that are difficult for developers to find and offers suggestions for improving your Java and Python code. CodeGuru Reviewer integrates with Secrets Manager to find unprotected secrets in your code. For the types of secrets it can find, see Types of secrets detected by CodeGuru Reviewer in the *Amazon CodeGuru Reviewer User Guide*.

Once you've found hardcoded secrets, take action to replace them:

- the section called “Replace hardcoded DB credentials ”
- the section called “Replace hardcoded secrets ”

Move hardcoded secrets to AWS Secrets Manager

If you have plaintext secrets in your code, we recommend that you rotate them and store them in Secrets Manager. Moving the secret to Secrets Manager solves the problem of the secret being visible to anyone who sees the code, because going forward, your code retrieves the secret directly from Secrets Manager. Rotating the secret revokes the current hardcoded secret so that it is no longer valid.

For database credential secrets, see Move hardcoded database credentials to AWS Secrets Manager.

Before you begin, you need to determine who needs access to the secret. We recommend using two IAM roles to manage permission to your secret:

- A role that manages the secrets in your organization. For more information, see the section called “Secrets Manager administrator permissions”. You'll create and rotate the secret using this role.
- A role that can use the secret at runtime, for example in this tutorial you use *RoleToRetrieveSecretAtRuntime*. Your code assumes this role to retrieve the secret. In this tutorial, you grant the role only the permission to retrieve one secret value, and you grant permission by using the secret's resource policy. For other alternatives, see the section called “Next steps”.

Steps:

Step 1: Create the secret

The first step is to copy the existing hardcoded secret into Secrets Manager. If the secret is related to an AWS resource, store it in the same Region as the resource. Otherwise, store it in the Region that has lowest latency for your use case.

To create a secret (console)

1. Open the Secrets Manager console at https://console.aws.amazon.com/secretsmanager/.
2. Choose **Store a new secret**.
3. On the **Choose secret type** page, do the following:
    a. For **Secret type**, choose **Other type of secret**.
    b. Enter your secret as **Key/value pairs** or in **Plaintext**. Some examples:

API key key/value pairs:

ClientID : *my_client_id*

ClientSecret : *wJalrXUtnFEMI/K7MDENG/bPxRfiCYEXAMPLEKEY*

Credentials key/value pairs:

Username : *saanvis*

Password : *EXAMPLE-PASSWORD*

OAuth token plaintext:

AKIAI44QH8DHBEXAMPLE

Digital certificate plaintext:

```
-----BEGIN CERTIFICATE-----
EXAMPLE
-----END CERTIFICATE-----
```

Private key plaintext:

```
----BEGIN PRIVATE KEY ---
EXAMPLE
---- END PRIVATE KEY ----
```

c. For **Encryption key**, choose **aws/secretsmanager** to use the AWS managed key for Secrets Manager. There is no cost for using this key. You can also use your own customer managed key, for example to access the secret from another AWS account. For information about the costs of using a customer managed key, see Pricing.

d. Choose **Next**.

4. On the **Choose secret type** page, do the following:

a. Enter a descriptive **Secret name** and **Description**.

b. In **Resource permissions**, choose **Edit permissions**. Paste the following policy, which allows *RoleToRetrieveSecretAtRuntime* to retrieve the secret, and then choose **Save**.

```
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Effect": "Allow",
      "Principal": {
        "AWS": "arn:aws:iam::AccountId:role/RoleToRetrieveSecretAtRuntime"
      },
      "Action": "secretsmanager:GetSecretValue",
      "Resource": "*"
    }
  ]
}
```

c. At the bottom of the page, choose **Next**.

5. On the **Configure rotation** page, keep rotation off. Choose **Next**.
6. On the **Review** page, review your secret details, and then choose **Store**.

Step 2: Update your code

Your code must assume the IAM role *RoleToRetrieveSecretAtRuntime* to be able to retrieve the secret. For more information, see Switching to an IAM role (AWS API).

Next, you update your code to retrieve the secret from Secrets Manager using the sample code provided by Secrets Manager.

To find the sample code

1. Open the Secrets Manager console at https://console.aws.amazon.com/secretsmanager/.
2. On the **Secrets** page, choose your secret.
3. Scroll down to **Sample code**. Choose your programming language, and then copy the code snippet.

In your application, remove the hardcoded secret and paste the code snippet. Depending on your code language, you might need to add a call to the function or method in the snippet.

Test that your application works as expected with the secret in place of the hardcoded secret.

Step 3: Update the secret

The last step is to revoke and update the hardcoded secret. Refer to the source of the secret to find instructions to revoke and update the secret. For example, you might need to deactivate the current secret and generate a new secret.

To update the secret with the new value

1. Open the Secrets Manager console at https://console.aws.amazon.com/secretsmanager/.
2. Choose **Secrets**, and then choose the secret.
3. On the **Secret details** page, scroll down and choose **Retrieve secret value**, and then choose **Edit**.
4. Update the secret and then choose **Save**.

Next, test that your application works as expected with the new secret.

Next steps

After you remove a hardcoded secret from your code, some ideas to consider next:

- To find hardcoded secrets in your Java and Python applications, we recommend Amazon CodeGuru Reviewer.
- You can improve performance and reduce costs by caching secrets. For more information, see *Retrieve secrets*.
- For secrets that you access from multiple Regions, consider replicating your secret to improve latency. For more information, see the section called “Replicate a secret to other Regions”.
- In this tutorial, you granted *RoleToRetrieveSecretAtRuntime* only the permission to retrieve the secret value. To grant the role more permissions, for example to get metadata about the secret or to view a list of secrets, see the section called “Permissions policy examples”.
- In this tutorial, you granted permission to *RoleToRetrieveSecretAtRuntime* by using the secret's resource policy. For other ways to grant permission, see the section called “Attach a permissions policy to an identity”.

Move hardcoded database credentials to AWS Secrets Manager

If you have plaintext database credentials in your code, we recommend that you move the credentials to Secrets Manager and then rotate them immediately. Moving the credentials to Secrets Manager solves the problem of the credentials being visible to anyone who sees the code, because going forward, your code retrieves the credentials directly from Secrets Manager. Rotating the secret updates the password and then revokes the current hardcoded password so that it is no longer valid.

For Amazon RDS, Amazon Redshift, and Amazon DocumentDB databases, use the steps in this page to move hardcoded credentials to Secrets Manager. For other types of credentials and other secrets, see the section called “Replace hardcoded secrets ”.

Before you begin, you need to determine who needs access to the secret. We recommend using two IAM roles to manage permission to your secret:

- A role that manages the secrets in your organization. For more information, see the section called “Secrets Manager administrator permissions”. You'll create and rotate the secret using this role.
- A role that can use the credentials at runtime, *RoleToRetrieveSecretAtRuntime* in this tutorial. Your code assumes this role to retrieve the secret.

Steps:

Step 1: Create the secret

The first step is to copy the existing hardcoded credentials into a secret in Secrets Manager. For the lowest latency, store the secret in the same Region as the database.

To create a secret

1. Open the Secrets Manager console at https://console.aws.amazon.com/secretsmanager/.

2. Choose **Store a new secret**.
3. On the **Choose secret type** page, do the following:
   a. For **Secret type**, choose the type of database credentials to store:
      - **Amazon RDS database**
      - **Amazon DocumentDB database**
      - **Amazon Redshift cluster**.
      - For other types of secrets, see Replace hardcoded secrets .
   b. For **Credentials**, enter the existing hardcoded credentials for the database.
   c. For **Encryption key**, choose **aws/secretsmanager** to use the AWS managed key for Secrets Manager. There is no cost for using this key. You can also use your own customer managed key, for example to access the secret from another AWS account. For information about the costs of using a customer managed key, see Pricing.
   d. For **Database**, choose your database.
   e. Choose **Next**.
4. On the **Configure secret** page, do the following:
   a. Enter a descriptive **Secret name** and **Description**.
   b. In **Resource permissions**, choose **Edit permissions**. Paste the following policy, which allows *RoleToRetrieveSecretAtRuntime* to retrieve the secret, and then choose **Save**.

```
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Effect": "Allow",
      "Principal": {
        "AWS": "arn:aws:iam::AccountId:role/RoleToRetrieveSecretAtRuntime"
      },
      "Action": "secretsmanager:GetSecretValue",
      "Resource": "*"
    }
  ]
}
```

   c. At the bottom of the page, choose **Next**.
5. On the **Configure rotation** page, keep rotation off for now. You'll turn it on later. Choose **Next**.

6. On the **Review** page, review your secret details, and then choose **Store**.

Step 2: Update your code

Your code must assume the IAM role *RoleToRetrieveSecretAtRuntime* to be able to retrieve the secret. For more information, see Switching to an IAM role (AWS API).

Next, you update your code to retrieve the secret from Secrets Manager using the sample code provided by Secrets Manager.

To find the sample code

1. Open the Secrets Manager console at https://console.aws.amazon.com/secretsmanager/.
2. On the **Secrets** page, choose your secret.
3. Scroll down to **Sample code**. Choose your language, and then copy the code snippet.

In your application, remove the hardcoded credentials and paste the code snippet. Depending on your code language, you might need to add a call to the function or method in the snippet.

Test that your application works as expected with the secret in place of the hardcoded credentials.

Step 3: Rotate the secret

The last step is to revoke the hardcoded credentials by rotating the secret. *Rotation* is the process of periodically updating a secret. When you rotate a secret, you update the credentials in both the secret and the database. Secrets Manager can automatically rotate a secret for you on a schedule you set.

Part of setting up rotation is ensuring that the Lambda rotation function can access both Secrets Manager and your database. When you turn on automatic rotation, Secrets Manager creates the Lambda rotation function in the same VPC as your database so that it has network access to the database. The Lambda rotation function must also be able to make calls to Secrets Manager to update the secret. We recommend that you create a Secrets Manager endpoint in the VPC so that calls from Lambda to Secrets Manager don't leave AWS infrastructure. For instructions, see *VPC endpoint*.

To turn on rotation

1. Open the Secrets Manager console at https://console.aws.amazon.com/secretsmanager/.

2. On the **Secrets** page, choose your secret.
3. On the **Secret details** page, in the **Rotation configuration** section, choose **Edit rotation**.
4. In the **Edit rotation configuration** dialog box, do the following:

    a. Turn on **Automatic rotation**.

    b. Under **Rotation schedule**, enter your schedule in UTC time zone.

    c. Choose **Rotate immediately when the secret is stored** to rotate your secret when you save your changes.

    d. Under **Rotation function**, choose **Create a new Lambda function** and enter a name for your new function. Secrets Manager adds "SecretsManager" to the beginning of your function name.

    e. For **Rotation strategy**, choose **Single user**.

    f. Choose **Save**.

To check that the secret rotated

1. Open the Secrets Manager console at https://console.aws.amazon.com/secretsmanager/.
2. Choose **Secrets**, and then choose the secret.
3. On the **Secret details** page, scroll down and choose **Retrieve secret value**.

    If the secret value changed, then rotation succeeded. If the secret value didn't change, you need to Troubleshoot rotation by looking at the CloudWatch Logs for the rotation function.

Test that your application works as expected with the rotated secret.

Next steps

After you remove a hardcoded secret from your code, some ideas to consider next:

- You can improve performance and reduce costs by caching secrets. For more information, see *Retrieve secrets*.
- You can choose a different rotation schedule. For more information, see the section called "Schedule expressions".
- To find hardcoded secrets in your Java and Python applications, we recommend Amazon CodeGuru Reviewer.

Set up alternating users rotation for AWS Secrets Manager

In this tutorial, you learn how to set up alternating users rotation for a secret that contains database credentials. *Alternating users rotation* is a rotation strategy where Secrets Manager clones the user and then alternates which user's credentials are updated. This strategy is a good choice if you need high availability for your secret, because one of the alternating users has current credentials to the database while the other one is being updated. For more information, see the section called “Alternating users”.

To set up alternating users rotation, you need two secrets:

- One secret with the credentials that you want to rotate.
- A second secret that has admin credentials.

  This user has permissions to clone the first user and change the first users's password. In this tutorial, you have Amazon RDS create this secret for an admin user. Amazon RDS also manages the admin password rotation. For more information, see the section called “Managed rotation”.

The first part of this tutorial is setting up a realistic environment. To show you how rotation works, this tutorial uses an example Amazon RDS MySQL database. For security, the database is in a VPC that restricts inbound internet access. To connect to the database from your local computer through the internet, you use a *bastion host*, a server in the VPC that can connect to the database, but that also allows SSH connections from the internet. The bastion host in this tutorial is an Amazon EC2 instance, and the security groups for the instance prevent other types of connections.

After you finish the tutorial, we recommend that you clean up the resources from the tutorial. Don't use them in a production setting.

Secrets Manager rotation uses an AWS Lambda function to update the secret and the database. For information about the costs of using a Lambda function, see Pricing.

Tutorial:

Permissions

For the tutorial prerequisites, you need administrative permissions to your AWS account. In a production setting, it is a best practice to use different roles for each of the steps. For example, a role with database admin permissions would create the Amazon RDS database, and a role with network admin permissions would set up the VPC and security groups. For the tutorial steps, we recommend you continue using the same identity.

For information about how to set up permissions in a production environment, see *Authentication and access control*.

Prerequisites

For this tutorial, you need the following:

- Prereq A: Amazon VPC
- Prereq B: Amazon EC2 instance
- Prereq C: Amazon RDS database and a Secrets Manager secret for the admin credentials
- Prereq D: Allow your local computer to connect to the EC2 instance

Prereq A: Amazon VPC

In this step, you create a VPC that you can launch an Amazon RDS database and an Amazon EC2 instance into. In a later step, you'll use your computer to connect through the internet to the bastion and then to the database, so you need to allow traffic out of the VPC. To do this, Amazon VPC attaches an internet gateway to the VPC and adds a route in the route table so that traffic destined for outside the VPC is sent to the internet gateway.

Within the VPC, you create a Secrets Manager endpoint and an Amazon RDS endpoint. When you set up automatic rotation in a later step, Secrets Manager creates a Lambda rotation function within the VPC so that it can access the database. The Lambda rotation function also calls Secrets Manager to update the secret, and it calls Amazon RDS to get the database connection information. By creating endpoints within the VPC, you ensure that calls from the Lambda function to Secrets Manager and Amazon RDS don't leave AWS infrastructure. Instead, they are routed to the endpoints within the VPC.

To create a VPC

1. Open the Amazon VPC console at https://console.aws.amazon.com/vpc/.
2. Choose **Create VPC**.
3. On the **Create VPC** page, choose **VPC and more**.
4. Under **Name tag auto-generation**, under **Auto-generate**, enter **`SecretsManagerTutorial`**.
5. For **DNS options**, choose both **`Enable DNS hostnames`** and **`Enable DNS resolution`**.
6. Choose **Create VPC**.

To create a Secrets Manager endpoint within the VPC

1. In the Amazon VPC console, under **Endpoints**, choose **Create Endpoint**.
2. Under **Endpoint settings**, for **Name**, enter **`SecretsManagerTutorialEndpoint`**.
3. Under **Services**, enter **`secretsmanager`** to filter the list, and then select the Secrets Manager endpoint in your AWS Region. For example, in the US East (N. Virginia), choose `com.amazonaws.us-east-1.secretsmanager`.
4. For **VPC**, choose **`vpc**** (SecretsManagerTutorial)`**.
5. For **Subnets**, select all **Availability Zones**, and then for each one, choose a **Subnet ID** to include.
6. For **IP address type**, choose **`IPv4`**.
7. For **Security groups**, choose the default security group.
8. For **Policy**, choose **`Full access`**.
9. Choose **Create endpoint**.

To create an Amazon RDS endpoint within the VPC

1. In the Amazon VPC console, under **Endpoints**, choose **Create Endpoint**.
2. Under **Endpoint settings**, for **Name**, enter **`RDSTutorialEndpoint`**.
3. Under **Services**, enter **`rds`** to filter the list, and then select the Amazon RDS endpoint in your AWS Region. For example, in the US East (N. Virginia), choose `com.amazonaws.us-east-1.rds`.
4. For **VPC**, choose **`vpc**** (SecretsManagerTutorial)`**.

5. For **Subnets**, select all **Availability Zones**, and then for each one, choose a **Subnet ID** to include.
6. For **IP address type**, choose **`IPv4`**.
7. For **Security groups**, choose the default security group.
8. For **Policy**, choose **`Full access`**.
9. Choose **Create endpoint**.

Prereq B: Amazon EC2 instance

The Amazon RDS database you create in a later step will be in the VPC, so to access it, you need a bastion host. The bastion host is also in the VPC, but in a later step, you configure a security group to allow your local computer to connect to the bastion host with SSH.

To create an EC2 instance for a bastion host

1. Open the Amazon EC2 console at https://console.aws.amazon.com/ec2/.
2. Choose **Instances** and then choose **Launch Instances**.
3. Under **Name and tags**, for **Name**, enter **`SecretsManagerTutorialInstance`**.
4. Under **Application and OS Images**, keep the default **`Amazon Linux 2 AMI (HMV) Kernel 5.10`**.
5. Under **Instance type**, keep the default **`t2.micro`**.
6. Under **Key pair**, choose **Create key pair**.

   In the **Create key pair** dialog box, for **Key pair name**, enter **`SecretsManagerTutorialKeyPair`**, and then choose **Create key pair**.

   The key pair is automatically downloaded.
7. Under **Network settings**, choose **Edit**, and then do the following:
   a. For **VPC**, choose **`vpc-**** SecretsManagerTutorial`**.
   b. For **Auto-assign Public IP**, choose **`Enable`**.
   c. For **Firewall**, choose **Select existing security group**.
   d. For **Common security groups**, choose **`default`**.
8. Choose **Launch instance**.

Prereq C: Amazon RDS database and a Secrets Manager secret for the admin credentials

In this step, you create an Amazon RDS MySQL database and configure it so that Amazon RDS creates a secret to contain the admin credentials. Then Amazon RDS automatically manages rotation of the admin secret for you. For more information, see Managed rotation.

As part of creating your database, you specify the bastion host you created in the previous step. Then Amazon RDS sets up security groups so that the database and the instance can access each other. You add a rule to the security group attached to the instance to allow your local computer to connect to it as well.

To create an Amazon RDS database with an Secrets Manager secret that contains the admin credentials

1. In the Amazon RDS console, choose **Create database**.
2. In the **Engine options** section, for **Engine type**, choose **`MySQL`**.
3. In the **Templates** section, choose **`Free tier`**.
4. In the **Settings** section, do the following:
   a. For **DB instance identifier**, enter **`SecretsManagerTutorial`**.
   b. Under **Credential settings**, select **Manage master credentials in AWS Secrets Manager**.
5. In the **Connectivity** section, for **Computer resource**, choose **Connect to an EC2 computer resource**, and then for **EC2 Instance**, choose **`SecretsManagerTutorialInstance`**.
6. Choose **Create database**.

Prereq D: Allow your local computer to connect to the EC2 instance

In this step, you configure the EC2 instance you created in Prereq B to allow your local computer to connect to it. To do this, you edit the security group that Amazon RDS added in Prereq C to include a rule that allows your computer's IP address to connect with SSH. The rule allows your local computer (identified by your current IP address) to connect to the bastion host by using SSH over the internet.

To allow your local computer to connect to the EC2 instance

1. Open the Amazon EC2 console at https://console.aws.amazon.com/ec2/.

2. On the EC2 instance **SecretsManagerTutorialInstance**, on the **Security** tab, under **Security groups**, choose **`sg-*** (ec2-rds-X)`**.
3. Under **Input rules**, choose **Edit inbound rules**.
4. Choose **Add rule**, and then for the rule, do the following:

    a. For **Type**, choose **SSH**.

    b. For **Source type**, choose **`My IP`**.

Step 1: Create an Amazon RDS database user

First, you need a user whose credentials will be stored in the secret. To create the user, log into the Amazon RDS database with admin credentials. For simplicity, in the tutorial, you create a user with full permission to a database. In a production setting, this is not typical, and we recommend that you follow the principle of least privilege.

To connect to the database, you use a MySQL client tool. In this tutorial, you use MySQL Workbench, a GUI-based application. To install MySQL Workbench, see Download MySQL Workbench.

To connect to the database, create a connection configuration in MySQL Workbench. For the configuration, you need some information from both Amazon EC2 and Amazon RDS.

To create a database connection in MySQL Workbench

1. In MySQL Workbench, next to **MySQL Connections**, choose the (+) button.
2. In the **Setup New Connection** dialog box, do the following:

    a. For **Connection Name**, enter **`SecretsManagerTutorial`**.

    b. For **Connection Method**, choose **`Standard TCP/IP over SSH`**.

    c. On the **Parameters** tab, do the following:

        i. For **SSH Hostname**, enter the public IP address of the Amazon EC2 instance.

        You can find the IP address on the Amazon EC2 console by choosing the instance **SecretsManagerTutorialInstance**. Copy the IP address under **Public IPv4 DNS**.

        ii. For **SSH Username**, enter **`ec2-user`**.

        iii. For **SSH Keyfile**, choose the key pair file **SecretsManagerTutorialKeyPair.pem** you downloaded in the previous prerequisite.

iv. For **MySQL Hostname**, enter the Amazon RDS endpoint address.

You can find the endpoint address on the Amazon RDS console by choosing the database instance **secretsmanagertutorialdb**. Copy the address under **Endpoint**.

v. For **Username**, enter **`admin`**.

d. Choose **OK**.

To retrieve the admin password

1. In the Amazon RDS console, navigate to your database.
2. On the **Configuration** tab, under **Master Credentials ARN**, choose **Manage in Secrets Manager**.

   The Secrets Manager console opens.
3. In the secret details page, choose **Retrieve secret value**.
4. The password appears in the **Secret value** section.

To create a database user

1. In MySQL Workbench, choose the connection **SecretsManagerTutorial**.
2. Enter the admin password you retrieved from the secret.
3. In MySQL Workbench, in the **Query** window, enter the following commands (including a strong password) and then choose **Execute**.

```
CREATE DATABASE myDB;
CREATE USER 'appuser'@'%' IDENTIFIED BY 'EXAMPLE-PASSWORD';
GRANT ALL PRIVILEGES ON myDB . * TO 'appuser'@'%';
```

   In the **Output** window, you see the commands are successful.

Step 2: Create a secret for the user credentials

Next, you create a secret to store the credentials of the user you just created. This is the secret you'll be rotating. You turn on automatic rotation, and to indicate the alternating users strategy, you choose a separate superuser secret that has permission to change the first user's password.

1. Open the Secrets Manager console at https://console.aws.amazon.com/secretsmanager/.
2. Choose **Store a new secret**.
3. On the **Choose secret type** page, do the following:
   a. For **Secret type**, choose **Credentials for Amazon RDS database**.
   b. For **Credentials**, enter the username **`appuser`** and the password you entered for the database user you created using MySQL Workbench.
   c. For **Database**, choose **secretsmanagertutorialdb**.
   d. Choose **Next**.
4. On the **Configure secret** page, for **Secret name**, enter **`SecretsManagerTutorialAppuser`** and then choose **Next**.
5. On the **Configure rotation** page, do the following:
   a. Turn on **Automatic rotation**.
   b. For **Rotation schedule**, set a schedule of **Days**: **2** Days with **Duration**: **2h**. Keep **Rotate immediately** selected.
   c. For **Rotation function**, choose **Create a rotation function**, and then for the function name, enter **`tutorial-alternating-users-rotation`**.
   d. For **Rotation strategy**, choose **Alternating users**, and then under **Admin credential secret**, choose the secret named **rds!cluster...** which has a **Description** that includes the name of the database you created in this tutorial **`secretsmanagertutorial`**, for example `Secret associated with primary RDS DB instance: arn:aws:rds:`*`Region`*`:`*`AccountId`*`:db:secretsmanagertutorial`.
   e. Choose **Next**.
6. On the **Review** page, choose **Store**.

   Secrets Manager returns to the the secret details page. At the top of the page, you can see the rotation configuration status. Secrets Manager uses CloudFormation to create resources such as the Lambda rotation function and an execution role that runs the Lambda function. When CloudFormation finishes, the banner changes to **Secret scheduled for rotation**. The first rotation is complete.

Step 3: Test the rotated secret

Now that the secret is rotated, you can check that the secret contains valid new credentials. The password in the secret has changed from the original credentials.

To retrieve the new password from the secret

1. Open the Secrets Manager console at https://console.aws.amazon.com/secretsmanager/.
2. Choose **Secrets**, and then choose the secret **`SecretsManagerTutorialAppuser`**.
3. On the **Secret details** page, scroll down and choose **Retrieve secret value**.
4. In the **Key/value** table, copy the **Secret value** for **`password`**.

To test the credentials

1. In MySQL Workbench, right-click the connection **SecretsManagerTutorial** and then choose **Edit Connection**.
2. In the **Manage Server Connections** dialog box, for **Username**, enter **`appuser`**, and then choose **Close**.
3. Back in MySQL Workbench, choose the connection **SecretsManagerTutorial**.
4. In the **Open SSH Connection** dialog box, for **Password**, paste the password you retrieved from the secret, and then choose **OK**.

   If the credentials are valid, then MySQL Workbench opens to the design page for the database.

This shows that the secret rotation is successful. The credentials in the secret have been updated and it is a valid password to connect to the database.

Step 4: Clean up resources

If you want to try another rotation strategy, *single user rotation*, skip cleaning up resources and go to the section called “Single user rotation”.

Otherwise, to avoid potential charges, and to remove the EC2 instance that has access to the internet, delete the following resources you created in this tutorial and its prerequisites:

- Amazon RDS database instance. For instructions, see Deleting a DB instance in the *Amazon RDS User Guide*.

- Amazon EC2 instance. For instructions, see Terminate an instance in the *Amazon EC2 User Guide for Linux Instances*.
- Secrets Manager secret `SecretsManagerTutorialAppuser`. For instructions, see the section called "Delete a secret".
- Secrets Manager endpoint. For instructions, see Delete a VPC endpoint in the *AWS PrivateLink Guide*.
- VPC endpoint. For instructions, see Delete your VPC in the *AWS PrivateLink Guide*.

Next steps

- Learn how to retrieve secrets in your applications.
- Learn about other rotation schedules.

Set up single user rotation for AWS Secrets Manager

In this tutorial, you learn how to set up single user rotation for a secret that contains database credentials. *Single user rotation* is a rotation strategy where Secrets Manager updates a user's credentials in both the secret and the database. For more information, see the section called "Single user".

After you finish the tutorial, we recommend that you clean up the resources from the tutorial. Don't use them in a production setting.

Secrets Manager rotation uses an AWS Lambda function to update the secret and the database. For information about the costs of using a Lambda function, see Pricing.

Contents

Permissions

For the tutorial prerequisites, you need administrative permissions to your AWS account. In a production setting, it is a best practice to use different roles for each of the steps. For example, a role with database admin permissions would create the Amazon RDS database, and a role with network admin permissions would set up the VPC and security groups. For the tutorial steps, we recommend you continue using the same identity.

For information about how to set up permissions in a production environment, see *Authentication and access control*.

Prerequisites

The prerequisite for this tutorial is the section called "Alternating users rotation". Don't clean up the resources at the end of the first tutorial. After that tutorial, you have a realistic environment with an Amazon RDS database and a Secrets Manager secret that contains admin credentials for the database. You also have a second secret that contains credentials for a database user, but you don't use that secret in this tutorial.

You also have a connection configured in MySQL Workbench to connect to the database with the admin credentials.

Step 1: Create an Amazon RDS database user

First, you need a user whose credentials will be stored in the secret. To create the user, log into the Amazon RDS database with admin credentials that are stored in a secret. For simplicity, in the tutorial, you create a user with full permission to a database. In a production setting, this is not typical, and we recommend that you follow the principle of least privilege.

To retrieve the admin password

1. In the Amazon RDS console, navigate to your database.
2. On the **Configuration** tab, under **Master Credentials ARN**, choose **Manage in Secrets Manager**.

   The Secrets Manager console opens.
3. In the secret details page, choose **Retrieve secret value**.
4. The password appears in the **Secret value** section.

To create a database user

1. In MySQL Workbench, right-click the connection **SecretsManagerTutorial** and then choose **Edit Connection**.
2. In the **Manage Server Connections** dialog box, for **Username**, enter **`admin`**, and then choose **Close**.
3. Back in MySQL Workbench, choose the connection **SecretsManagerTutorial**.
4. Enter the admin password you retrieved from the secret.
5. In MySQL Workbench, in the **Query** window, enter the following commands (including a strong password) and then choose **Execute**.

   ```
   CREATE USER 'dbuser'@'%' IDENTIFIED BY 'EXAMPLE-PASSWORD';
   GRANT ALL PRIVILEGES ON myDB . * TO 'dbuser'@'%';
   ```

   In the **Output** window, you see the commands are successful.

Step 2: Create a secret for the database user credentials

Next, you create a secret to store the credentials of the user you just created, and you turn on automatic rotation, including an immediate rotation. Secrets Manager rotates the secret, which means the password is programmatically generated - no human has seen this new password. Having the rotation begin immediately can also help you determine if rotation is set up correctly.

1. Open the Secrets Manager console at https://console.aws.amazon.com/secretsmanager/.
2. Choose **Store a new secret**.
3. On the **Choose secret type** page, do the following:

   a. For **Secret type**, choose **Credentials for Amazon RDS database**.

   b. For **Credentials**, enter the username **`dbuser`** and the password you entered for the database user you created using MySQL Workbench.

   c. For **Database**, choose **secretsmanagertutorialdb**.

   d. Choose **Next**.
4. On the **Configure secret** page, for **Secret name**, enter **`SecretsManagerTutorialDbuser`** and then choose **Next**.
5. On the **Configure rotation** page, do the following:

a. Turn on **Automatic rotation**.

b. For **Rotation schedule**, set a schedule of **Days**: **2** Days with **Duration**: **2h**. Keep **Rotate immediately** selected.

c. For **Rotation function**, choose **Create a rotation function**, and then for the function name, enter **`tutorial-single-user-rotation`**.

d. For **Rotation strategy**, choose **Single user**.

e. Choose **Next**.

6. On the **Review** page, choose **Store**.

   Secrets Manager returns to the the secret details page. At the top of the page, you can see the rotation configuration status. Secrets Manager uses CloudFormation to create resources such as the Lambda rotation function and an execution role that runs the Lambda function. When CloudFormation finishes, the banner changes to **Secret scheduled for rotation**. The first rotation is complete.

Step 3: Test the rotated password

After the first secret rotation, which might take a few seconds, you can check that the secret still contains valid credentials. The password in the secret has changed from the original credentials.

To retrieve the new password from the secret

1. Open the Secrets Manager console at https://console.aws.amazon.com/secretsmanager/.
2. Choose **Secrets**, and then choose the secret **`SecretsManagerTutorialDbuser`**.
3. On the **Secret details** page, scroll down and choose **Retrieve secret value**.
4. In the **Key/value** table, copy the **Secret value** for **`password`**.

To test the credentials

1. In MySQL Workbench, right-click the connection **SecretsManagerTutorial** and then choose **Edit Connection**.
2. In the **Manage Server Connections** dialog box, for **Username**, enter **`dbuser`**, and then choose **Close**.
3. Back in MySQL Workbench, choose the connection **SecretsManagerTutorial**.

4. In the **Open SSH Connection** dialog box, for **Password**, paste the password you retrieved from the secret, and then choose **OK**.

   If the credentials are valid, then MySQL Workbench opens to the design page for the database.

Step 4: Clean up resources

To avoid potential charges, delete the secret you created in this tutorial. For instructions, see the section called "Delete a secret".

To clean up resources created in the previous tutorial, see the section called "Step 4: Clean up resources".

Next steps

- Learn how to retrieve secrets in your applications. See *Retrieve secrets*.
- Learn about other rotation schedules. See the section called "Schedule expressions".

Authentication and access control for AWS Secrets Manager

Secrets Manager uses AWS Identity and Access Management (IAM) to secure access to secrets. IAM provides authentication and access control. *Authentication* verifies the identity of individuals' requests. Secrets Manager uses a sign-in process with passwords, access keys, and multi-factor authentication (MFA) tokens to verify the identity of the users. See Signing in to AWS. *Access control* ensures that only approved individuals can perform operations on AWS resources such as secrets. Secrets Manager uses policies to define who has access to which resources, and which actions the identity can take on those resources. See Policies and permissions in IAM.

You can use AWS Identity and Access Management Roles Anywhere to obtain temporary security credentials in IAM for workloads such as servers, containers, and applications that run outside of AWS. Your workloads can use the same IAM policies and IAM roles that you use with AWS applications to access AWS resources. With IAM Roles Anywhere, you can use Secrets Manager to store and manage credentials that can be accessed by resources in AWS as well as on-premises devices such as application servers. For more information, see the IAM Roles Anywhere User Guide.

Secrets Manager administrator permissions

To grant Secrets Manager administrator permissions, follow the instructions at Adding and removing IAM identity permissions, and attach the following policies:

- SecretsManagerReadWrite
- IAMFullAccess

We recommend you do not grant administrator permissions to end users. While this allows your users to create and manage their secrets, the permission required to enable rotation (IAMFullAccess) grants significant permissions that are not appropriate for end users.

Permissions to access secrets

By using IAM permission policies, you control which users or services have access to your secrets. A *permissions policy* describes who can perform which actions on which resources. You can:

- the section called “Attach a permissions policy to an identity”

- the section called “Attach a permissions policy to a secret”

Permissions for Lambda rotation functions

Secrets Manager uses AWS Lambda functions to rotate secrets. The Lambda function must have access to the secret as well as the database or service that the secret contains credentials for. See Permissions for rotation.

Permissions for encryption keys

Secrets Manager uses AWS Key Management Service (AWS KMS) keys to encrypt secrets. The AWS managed key `aws/secretsmanager` automatically has the correct permissions. If you use a different KMS key, Secrets Manager needs permissions to that key. See the section called “Permissions for the KMS key”.

Attach a permissions policy to an identity

You can attach permissions policies to IAM identities: users, user groups, and roles. In an identity-based policy, you specify which secrets the identity can access and the actions the identity can perform on the secrets. For more information, see Adding and removing IAM identity permissions.

You can grant permissions to a role that represents an application or user in another service. For example, an application running on an Amazon EC2 instance might need access to a database. You can create an IAM role attached to the EC2 instance profile and then use a permissions policy to grant the role access to the secret that contains credentials for the database. For more information, see Using an IAM role to grant permissions to applications running on Amazon EC2 instances. Other services that you can attach roles to include Amazon Redshift, AWS Lambda, and Amazon ECS.

You can also grant permissions to users authenticated by an identity system other than IAM. For example, you can associate IAM roles to mobile app users who sign in with Amazon Cognito. The role grants the app temporary credentials with the permissions in the role permission policy. Then you can use a permissions policy to grant the role access to the secret. For more information, see Identity providers and federation.

You can use identity-based policies to:

- Grant an identity access to multiple secrets.

- Control who can create new secrets, and who can access secrets that haven't been created yet.
- Grant an IAM group access to secrets.

For more information, see the section called “Permissions policy examples”.

Attach a permissions policy to an AWS Secrets Manager secret

In a resource-based policy, you specify who can access the secret and the actions they can perform on the secret. You can use resource-based policies to:

- Grant access to a single secret to multiple users and roles.
- Grant access to users or roles in other AWS accounts.

See the section called “Permissions policy examples”.

When you attach a resource-based policy to a secret in the console, Secrets Manager uses the automated reasoning engine Zelkova and the API `ValidateResourcePolicy` to prevent you from granting a wide range of IAM principals access to your secrets. Alternatively, you can call the `PutResourcePolicy` API with the `BlockPublicPolicy` parameter from the CLI or SDK.

To view, change, or delete the resource policy for a secret (console)

1. Open the Secrets Manager console at https://console.aws.amazon.com/secretsmanager/.
2. From the list of secrets, choose your secret.
3. On the secret details page, on the **Overview** tab, in the **Resource permissions** section, choose **Edit permissions**.
4. In the code field, do one of the following, and then choose **Save**:
   - To attach or modify a resource policy, enter the policy.
   - To delete the policy, clear the code field.

AWS CLI

Example Retrieve a resource policy

The following `get-resource-policy` example retrieves the resource-based policy attached to a secret.

```
aws secretsmanager get-resource-policy \
    --secret-id MyTestSecret
```

Example Delete a resource policy

The following `delete-resource-policy` example deletes the resource-based policy attached to a secret.

```
aws secretsmanager delete-resource-policy \
    --secret-id MyTestSecret
```

Example Add a resource policy

The following `put-resource-policy` example adds a permissions policy to a secret, checking first that the policy does not provide broad access to the secret. The policy is read from a file. For more information, see Loading AWS CLI parameters from a file in the AWS CLI User Guide.

```
aws secretsmanager put-resource-policy \
    --secret-id MyTestSecret \
    --resource-policy file://mypolicy.json \
    --block-public-policy
```

Contents of `mypolicy.json`:

```
{
    "Version": "2012-10-17",
    "Statement": [
        {
            "Effect": "Allow",
            "Principal": {
                "AWS": "arn:aws:iam::123456789012:role/MyRole"
            },
            "Action": "secretsmanager:GetSecretValue",
            "Resource": "*"
        }
    ]
}
```

AWS SDK

To retrieve the policy attached to a secret, use `GetResourcePolicy` .

To delete a policy attached to a secret, use `DeleteResourcePolicy`.

To attach a policy to a secret, use `PutResourcePolicy`. If there is already a policy attached, the command replaces it with the new policy. The policy must be formatted as JSON structured text. See JSON policy document structure. Use the the section called "Permissions policy examples" to get started writing your policy.

For more information, see the section called "AWS SDKs".

AWS managed policy for AWS Secrets Manager

An AWS managed policy is a standalone policy that is created and administered by AWS. AWS managed policies are designed to provide permissions for many common use cases so that you can start assigning permissions to users, groups, and roles.

Keep in mind that AWS managed policies might not grant least-privilege permissions for your specific use cases because they're available for all AWS customers to use. We recommend that you reduce permissions further by defining customer managed policies that are specific to your use cases.

You cannot change the permissions defined in AWS managed policies. If AWS updates the permissions defined in an AWS managed policy, the update affects all principal identities (users, groups, and roles) that the policy is attached to. AWS is most likely to update an AWS managed policy when a new AWS service is launched or new API operations become available for existing services.

For more information, see AWS managed policies in the *IAM User Guide*.

AWS managed policy: SecretsManagerReadWrite

This policy provides read/write access to AWS Secrets Manager, including permission to describe Amazon RDS, Amazon Redshift, and Amazon DocumentDB resources, and permission to use AWS KMS to encrypt and decrypt secrets. This policy also provides permission to create AWS CloudFormation change sets, get rotation templates from an Amazon S3 bucket that is managed by AWS, list AWS Lambda functions, and describe Amazon EC2 VPCs. These permissions are required by the console to set up rotation with existing rotation functions.

To create new rotation functions, you must also have permission to create AWS CloudFormation stacks and AWS Lambda execution roles. You can assign the IAMFullAccess managed policy. See Permissions for rotation.

Permissions details

This policy includes the following permissions.

- `secretsmanager` – Allows principals to perform all Secrets Manager actions.
- `cloudformation` – Allows principals to create AWS CloudFormation stacks. This is required so that principals using the console to turn on rotation can create Lambda rotation functions through AWS CloudFormation stacks. For more information, see the section called "How Secrets Manager uses AWS CloudFormation".
- `ec2` – Allows principals to describe Amazon EC2 VPCs. This is required so that principals using the console can create rotation functions in the same VPC as the database of the credentials they are storing in a secret.
- `kms` – Allows principals to use AWS KMS keys for cryptographic operations. This is required so that Secrets Manager can encrypt and decrypt secrets. For more information, see the section called "Secret encryption and decryption".
- `lambda` – Allows principals to list Lambda rotation functions. This is required so that principals using the console can choose existing rotation functions.
- `rds` – Allows principals to describe clusters and instances in Amazon RDS. This is required so that principals using the console can choose Amazon RDS clusters or instances.
- `redshift` – Allows principals to describe clusters in Amazon Redshift. This is required so that principals using the console can choose Amazon Redshift clusters.
- `docdb-elastic` – Allows principals to describe elastic clusters in Amazon DocumentDB. This is required so that principals using the console can choose Amazon DocumentDB elastic clusters.
- `tag` – Allows principals to get all resources in the account that are tagged.
- `serverlessrepo` – Allows principals to create AWS CloudFormation change sets. This is required so that principals using the console can create Lambda rotation functions. For more information, see the section called "How Secrets Manager uses AWS CloudFormation".
- `s3` – Allows principals to get objects from an Amazon S3 bucket that is managed by AWS. This bucket contains Lambda Rotation function templates. This permission is required so that principals using the console can create Lambda rotation functions based on the templates in the bucket. For more information, see the section called "How Secrets Manager uses AWS CloudFormation".

To view the policy, see SecretsManagerReadWrite JSON policy document.

Secrets Manager updates to AWS managed policies

View details about updates to AWS managed policies for Secrets Manager.

Change	Description	Date
SecretsManagerReadWrite – Update to an existing policy	This policy was updated to allow describe access to Amazon DocumentDB elastic clusters so that console users can choose an elastic cluster when they create an Amazon DocumentDB secret.	September 12, 2023
SecretsManagerReadWrite – Update to an existing policy	This policy was updated to allow describe access to Amazon Redshift so that console users can choose a Amazon Redshift cluster when they create an Amazon Redshift secret. The update also added new permissio ns to allow read access to an Amazon S3 bucket managed by AWS that stores the Lambda rotation function templates.	June 24, 2020
SecretsManagerReadWrite – Update to an existing policy	This policy was updated to allow describe access to Amazon RDS clusters so that console users can choose a cluster when they create an Amazon RDS secret.	May 3, 2018
SecretsManagerReadWrite – New policy	Secrets Manager created a policy to grant permissions that are needed for using the	April 04, 2018

Change	Description	Date
	console with all read/write access to Secrets Manager.	
Secrets Manager started tracking changes	Secrets Manager started tracking changes for its AWS managed policies.	April 04, 2018

Determine who has permissions to your AWS Secrets Manager secrets

By default, IAM identities don't have permission to access secrets. When authorizing access to a secret, Secrets Manager evaluates the resource-based policy attached to the secret and all identity-based policies attached to the IAM user or role sending the request. To do this, Secrets Manager uses a process similar to the one described in Determining whether a request is allowed or denied in the *IAM User Guide*.

When multiple policies apply to a request, Secrets Manager uses a hierarchy to control permissions:

1. If a statement in any policy with an explicit `deny` matches the request action and resource:

   The explicit `deny` overrides everything else and blocks the action.
2. If there is no explicit `deny`, but a statement with an explicit `allow` matches the request action and resource:

   The explicit `allow` grants the action in the request access to the resources in the statement.

   If the identity and the secret are in two different accounts, there must be an `allow` in both the resource policy for the secret and the policy attached to the identity, otherwise AWS denies the request. For more information, see Cross-account access.
3. If there is no statement with an explicit `allow` that matches the request action and resource:

   AWS denies the request by default, which is called an *implicit* deny.

To view the resource-based policy for a secret

- Do one of the following:

- Open the Secrets Manager console at https://console.aws.amazon.com/secretsmanager/. In the secret details page for your secret, in the **Resource permissions** section, choose **Edit permissions**.
- Use the AWS CLI to call `get-resource-policy` or AWS SDK to call `GetResourcePolicy`.

To determine who has access through identity-based policies

- Use the IAM policy simulator. See Testing IAM policies with the IAM policy simulator

Permissions to AWS Secrets Manager secrets for users in a different account

To allow users in one account to access secrets in another account (*cross-account access*), you must allow access both in a resource policy and in an identity policy. This is different than granting access to identities in the same account as the secret.

You must also allow the identity to use the KMS key that the secret is encrypted with. This is because you can't use the AWS managed key (`aws/secretsmanager`) for cross-account access. Instead, you must encrypt your secret with a KMS key that you create, and then attach a key policy to it. There is a charge for creating KMS keys. To change the encryption key for a secret, see the section called “Modify a secret”.

The following example policies assume you have a secret and encryption key in *Account1*, and an identity in *Account2* that you want to allow to access the secret value.

Step 1: Attach a resource policy to the secret in *Account1*

- The following policy allows *`ApplicationRole`* in *`Account2`* to access the secret in *`Account1`*. To use this policy, see the section called “Attach a permissions policy to a secret”.

```
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Effect": "Allow",
      "Principal": {
        "AWS": "arn:aws:iam::Account2:role/ApplicationRole"
```

```
      },
      "Action": "secretsmanager:GetSecretValue",
      "Resource": "*"
    }
  ]
}
```

Step 2: Add a statement to the key policy for the KMS key in *Account1*

- The following key policy statement allows *ApplicationRole* in *Account2* to use the KMS key in *Account1* to decrypt the secret in *Account1*. To use this statement, add it to the key policy for your KMS key. For more information, see Changing a key policy.

```
{
  "Effect": "Allow",
  "Principal": {
    "AWS": "arn:aws:iam::Account2:role/ApplicationRole"
  },
  "Action": [
    "kms:Decrypt",
    "kms:DescribeKey"
  ],
  "Resource": "*"
}
```

Step 3: Attach an identity policy to the identity in *Account2*

- The following policy allows *ApplicationRole* in *Account2* to access the secret in *Account1* and decrypt the secret value by using the encryption key which is also in *Account1*. To use this policy, see the section called "Attach a permissions policy to an identity". You can find the ARN for your secret in the Secrets Manager console on the secret details page under **Secret ARN**. Alternatively, you can call `describe-secret`.

```
{
  "Version" : "2012-10-17",
  "Statement" : [
    {
      "Effect": "Allow",
      "Action": "secretsmanager:GetSecretValue",
```

```
      "Resource": "SecretARN"
    },
    {
      "Effect": "Allow",
      "Action": "kms:Decrypt",
      "Resource": "arn:aws:kms:Region:Account1:key/EncryptionKey"
    }
  ]
}
```

Lambda rotation function execution role permissions for AWS Secrets Manager

Secrets Manager uses a Lambda function to rotate a secret. For the Lambda function to run, Lambda assumes an IAM execution role and provides those credentials to the Lambda function code. For instructions on how to set up automatic rotation, see:

- Automatic rotation for database secrets (console)
- Automatic rotation (console)
- Automatic rotation (AWS CLI)

The following examples show inline policies for Lambda rotation function execution roles. To create an execution role and attach a permissions policy, see AWS Lambda execution role.

Examples:

- Policy for a Lambda rotation function execution role
- Policy statement for customer managed key
- Policy statement for alternating users strategy

Policy for a Lambda rotation function execution role

The following example policy allows the rotation function to:

- Run Secrets Manager operations for *SecretARN*.
- Create a new password.

- Set up the required configuration if your database or service runs in a VPC. See Configuring a Lambda function to access resources in a VPC.

```
{
    "Version": "2012-10-17",
    "Statement": [
        {
            "Effect": "Allow",
            "Action": [
                "secretsmanager:DescribeSecret",
                "secretsmanager:GetSecretValue",
                "secretsmanager:PutSecretValue",
                "secretsmanager:UpdateSecretVersionStage"
            ],
            "Resource": "SecretARN"
        },
        {
            "Effect": "Allow",
            "Action": [
                "secretsmanager:GetRandomPassword"
            ],
            "Resource": "*"
        },
        {
            "Action": [
                "ec2:CreateNetworkInterface",
                "ec2:DeleteNetworkInterface",
                "ec2:DescribeNetworkInterfaces",
                "ec2:DetachNetworkInterface"
            ],
            "Resource": "*",
            "Effect": "Allow"
        }
    ]
}
```

Policy statement for customer managed key

If the secret is encrypted with a KMS key other than the AWS managed key `aws/secretsmanager`, then you need to grant the Lambda execution role permission to use the key. You can use the SecretARN encryption context to limit the use of the decrypt function, so

the rotation function role only has access to decrypt the secret it is responsible for rotating. The following example shows a statement to add to the execution role policy to decrypt the secret using the KMS key.

```
        {
            "Effect": "Allow",
            "Action": [
                "kms:Decrypt",
                "kms:DescribeKey",
                "kms:GenerateDataKey"
            ],
            "Resource": "KMSKeyARN"
            "Condition": {
                "StringEquals": {
                    "kms:EncryptionContext:SecretARN": "SecretARN"
                }
            }
        }
```

To use the rotation function for multiple secrets that are encrypted with a customer managed key, add a statement like the following example to allow the execution role to decrypt the secret.

```
        {
            "Effect": "Allow",
            "Action": [
                "kms:Decrypt",
                "kms:DescribeKey",
                "kms:GenerateDataKey"
            ],
            "Resource": "KMSKeyARN"
            "Condition": {
                "StringEquals": {
                    "kms:EncryptionContext:SecretARN": [
                        "arn1",
                        "arn2"
                    ]
                }
            }
        }
```

Policy statement for alternating users strategy

For information about the *alternating users rotation strategy*, see the section called “Rotation strategy”.

For a secret that contains Amazon RDS credentials, if you are using the alternating users strategy and the superuser secret is managed by Amazon RDS, then you must also allow the rotation function to call read-only APIs on Amazon RDS so that it can get the connection information for the database. We recommend you attach the AWS managed policy AmazonRDSReadOnlyAccess.

The following example policy allows the function to:

- Run Secrets Manager operations for *SecretARN*.
- Retrieve the credentials in the superuser secret. Secrets Manager uses the credentials in the superuser secret to update the credentials in the rotated secret.
- Create a new password.
- Set up the required configuration if your database or service runs in a VPC. For more information, see Configuring a Lambda function to access resources in a VPC.

```
{
    "Version": "2012-10-17",
    "Statement": [
        {
            "Effect": "Allow",
            "Action": [
                "secretsmanager:DescribeSecret",
                "secretsmanager:GetSecretValue",
                "secretsmanager:PutSecretValue",
                "secretsmanager:UpdateSecretVersionStage"
            ],
            "Resource": "SecretARN"
        },
        {
            "Effect": "Allow",
            "Action": [
                "secretsmanager:GetSecretValue"
            ],
            "Resource": "SuperuserSecretARN"
        },
        {
```

```
            "Effect": "Allow",
            "Action": [
                "secretsmanager:GetRandomPassword"
            ],
            "Resource": "*"
        },
        {
            "Action": [
                "ec2:CreateNetworkInterface",
                "ec2:DeleteNetworkInterface",
                "ec2:DescribeNetworkInterfaces",
                "ec2:DetachNetworkInterface"
            ],
            "Resource": "*",
            "Effect": "Allow"
        }
    ]
}
```

Permissions policy examples for AWS Secrets Manager

A permissions policy is JSON structured text. See JSON policy document structure.

Permissions policies that you attach to resources and identities are very similar. Some elements you include in a policy for access to secrets include:

- `Principal`: who to grant access to. See Specifying a principal in the *IAM User Guide*. When you attach a policy to an identity, you don't include a `Principal` element in the policy.
- `Action`: what they can do. See the section called “Secrets Manager actions”.
- `Resource`: which secrets they can access. See the section called “Secrets Manager resources”.

  The wildcard character (*) has different meaning depending on what you attach the policy to:

  - In a policy attached to a secret, * means the policy applies to this secret.
  - In a policy attached to an identity, * means the policy applies to all resources, including secrets, in the account.

To attach a policy to a secret, see the section called “Attach a permissions policy to a secret”.

To attach a policy to an identity, see the section called “Attach a permissions policy to an identity”.

Topics

Example: Permission to retrieve individual secret values

To grant permission to retrieve secret values, you can attach policies to secrets or identities. For help determining which type of policy to use, see Identity-based policies and resource-based policies. For information about how to attach a policy, see the section called “Attach a permissions policy to a secret” and the section called “Attach a permissions policy to an identity”.

The following examples show two different ways to grant access to a secret. The first example is a resource-based policy that you can attach to a secret. This example is useful when you want to grant access to a single secret to multiple users or roles. The second example is an identity-based policy that you can attach to a user or role in IAM. This example is useful when you want to grant access to an IAM group. To grant permission to retrieve a group of secrets in a batch API call, see the section called “Permission to retrieve a group of secret values in a batch”.

Example Read one secret (attach to a secret)

You can grant access to a secret by attaching the following policy to the secret. To use this policy, see the section called “Attach a permissions policy to a secret”.

```
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Effect": "Allow",
      "Principal": {
        "AWS": "arn:aws:iam::AccountId:role/EC2RoleToAccessSecrets"
      },
      "Action": "secretsmanager:GetSecretValue",
```

```
      "Resource": "*"
    }
  ]
}
```

Example Read one secret (attach to an identity)

You can grant access to a secret by attaching the following policy to an identity. To use this policy, see the section called "Attach a permissions policy to an identity". If you attach this policy to the role *EC2RoleToAccessSecrets*, it grants the same permissions as the previous policy.

```
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Effect": "Allow",
      "Action": "secretsmanager:GetSecretValue",
      "Resource": "SecretARN"
    }
  ]
}
```

Example Read a secret that is encrypted using a customer managed key (attach to identity)

If a secret is encrypted using a customer managed key, you can grant access to read the secret by attaching the following policy to an identity. To use this policy, see the section called "Attach a permissions policy to an identity".

```
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Effect": "Allow",
      "Action": "secretsmanager:GetSecretValue",
      "Resource": "SecretARN"
    },
    {
      "Effect": "Allow",
      "Action": "kms:Decrypt",
      "Resource": "KMSKeyARN"
    }
  ]
```

```
}
```

Permission to retrieve a group of secret values in a batch

Example Read a group of secrets in a batch (attach to identity)

You can grant access to retrieve a group of secrets in a batch API call by attaching the following policy to an identity. The policy restricts the caller so that they can only retrieve the secrets specified by *SecretARN1*, *SecretARN2*, and *SecretARN3*, even if the batch call includes other secrets. If the caller also requests other secrets in the batch API call, Secrets Manager won't return them. For more information, see the section called “Retrieve secrets in a batch”. To use this policy, see the section called “Attach a permissions policy to an identity”.

```
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Effect": "Allow",
      "Action": [
        "secretsmanager:BatchGetSecretValue",
        "secretsmanager:ListSecrets"
      ],
      "Resource": "*"
    },
    {
      "Effect": "Allow",
      "Action": [
        "secretsmanager:GetSecretValue"
      ],
      "Resource": [
        "SecretARN1",
        "SecretARN2",
        "SecretARN3"
        ]
    }
  ]
}
```

Example: Wildcards

You can use wildcards to include a set of values in a policy element.

Example Access all secrets in a path (attach to identity)

The following policy grants access to retrieve all secrets with a name beginning with "*TestEnv/*". To use this policy, see the section called “Attach a permissions policy to an identity”.

```
{
  "Version": "2012-10-17",
  "Statement": {
    "Effect": "Allow",
    "Action": "secretsmanager:GetSecretValue",
    "Resource": "arn:aws:secretsmanager:Region:AccountId:secret:TestEnv/*"
  }
}
```

Example Access metadata on all secrets (attach to identity)

The following policy grants `DescribeSecret` and permissions beginning with `List`: `ListSecrets` and `ListSecretVersionIds`. To use this policy, see the section called “Attach a permissions policy to an identity”.

```
{
  "Version": "2012-10-17",
  "Statement": {
    "Effect": "Allow",
    "Action": [
      "secretsmanager:DescribeSecret",
      "secretsmanager:List*"
    ],
    "Resource": "*"
  }
}
```

Example Match secret name (attach to identity)

The following policy grants all Secrets Manager permissions for a secret by name. To use this policy, see the section called “Attach a permissions policy to an identity”.

To match a secret name, you create the ARN for the secret by putting together the Region, Account ID, secret name, and the wildcard (?) to match individual random characters. Secrets Manager appends six random characters to secret names as part of their ARN, so you can use this wildcard to match those characters. If you use the syntax `"another_secret_name-*"`, Secrets

Manager matches not only the intended secret with the 6 random characters, but also matches "another_secret_name-<anything-here>a1b2c3".

Because you can predict all of the parts of the ARN of a secret except the 6 random characters, using the wildcard character '??????' syntax enables you to securely grant permissions to a secret that doesn't yet exist. Be aware, however, if you delete the secret and recreate it with the same name, the user automatically receives permission to the new secret, even though the 6 characters changed.

```
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Effect": "Allow",
      "Action": "secretsmanager:*",
      "Resource": [
        "arn:aws:secretsmanager:Region:AccountId:secret:a_specific_secret_name-a1b2c3",
        "arn:aws:secretsmanager:Region:AccountId:secret:another_secret_name-??????"
      ]
    }
  ]
}
```

Example: Permission to create secrets

To grant a user permissions to create a secret, we recommend you attach a permissions policy to an IAM group the user belongs to. See IAM user groups.

Example Create secrets (attach to identity)

The following policy grants permission to create secrets and view a list of secrets. To use this policy, see the section called “Attach a permissions policy to an identity”.

```
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Effect": "Allow",
      "Action": [
        "secretsmanager:CreateSecret",
        "secretsmanager:ListSecrets"
```

```
      ],
      "Resource": "*"
    }
  ]
}
```

Example: Permissions and VPCs

If you need to access Secrets Manager from within a VPC, you can make sure that requests to Secrets Manager come from the VPC by including a condition in your permissions policies. For more information, see VPC endpoint conditions and *VPC endpoint*.

Make sure that requests to access the secret from other AWS services also come from the VPC, otherwise this policy will deny them access.

Example Require requests to come through a VPC endpoint (attach to secret)

The following policy allows a user to perform Secrets Manager operations only when the request comes through the VPC endpoint *vpce-1234a5678b9012c*. To use this policy, see the section called "Attach a permissions policy to a secret".

```
{
  "Id": "example-policy-1",
  "Version": "2012-10-17",
  "Statement": [
    {
      "Sid": "RestrictGetSecretValueoperation",
      "Effect": "Deny",
      "Principal": "*",
      "Action": "secretsmanager:GetSecretValue",
      "Resource": "*",
      "Condition": {
        "StringNotEquals": {
          "aws:sourceVpce": "vpce-1234a5678b9012c"
        }
      }
    }
  ]
}
```

Example Require requests to come from a VPC (attach to secret)

The following policy allows commands to create and manage secrets only when they come from *vpc-12345678*. In addition, the policy allows operations that use access the secret encrypted value only when the requests come from vpc-2b2b2b2b. You might use a policy like this one if you run an application in one VPC, but you use a second, isolated VPC for management functions. To use this policy, see the section called “Attach a permissions policy to a secret”.

```
{
  "Id": "example-policy-2",
  "Version": "2012-10-17",
  "Statement": [
    {
      "Sid": "AllowAdministrativeActionsfromONLYvpc-12345678",
      "Effect": "Deny",
      "Principal": "*",
      "Action": [
        "secretsmanager:Create*",
        "secretsmanager:Put*",
        "secretsmanager:Update*",
        "secretsmanager:Delete*",
        "secretsmanager:Restore*",
        "secretsmanager:RotateSecret",
        "secretsmanager:CancelRotate*",
        "secretsmanager:TagResource",
        "secretsmanager:UntagResource"
      ],
      "Resource": "*",
      "Condition": {
        "StringNotEquals": {
          "aws:sourceVpc": "vpc-12345678"
        }
      }
    },
    {
      "Sid": "AllowSecretValueAccessfromONLYvpc-2b2b2b2b",
      "Effect": "Deny",
      "Principal": "*",
      "Action": [
        "secretsmanager:GetSecretValue"
      ],
      "Resource": "*",
      "Condition": {
```

```
        "StringNotEquals": {
          "aws:sourceVpc": "vpc-2b2b2b2b"
        }
      }
    }
  ]
}
```

Example: Control access to secrets using tags

You can use tags to control access to your secrets. Using tags to control permissions is helpful in environments that are growing rapidly and helps with situations where policy management becomes cumbersome. One strategy is to attach tags to secrets and then grant permissions to an identity when a secret has a specific tag.

Example Allow access to secrets with a specific tag (attach to an identity)

The following policy allows `DescribeSecret` on secrets with a tag with the key "*ServerName*" and the value "*ServerABC*". To use this policy, see the section called “Attach a permissions policy to an identity”.

```
{
  "Version": "2012-10-17",
  "Statement": {
    "Effect": "Allow",
    "Action": "secretsmanager:DescribeSecret",
    "Resource": "*",
    "Condition": {
      "StringEquals": {
        "secretsmanager:ResourceTag/ServerName": "ServerABC"
      }
    }
  }
}
```

Example: Limit access to identities with tags that match secrets' tags

One strategy is to attach tags to both secrets and IAM identities. Then you create permissions policies to allow operations when the identity's tag matches the secret's tag. For a complete tutorial, see Define permissions to access secrets based on tags.

Using tags to control permissions is helpful in environments that are growing rapidly and helps with situations where policy management becomes cumbersome. For more information, see What is ABAC for AWS?

Example Allow access to roles that have the same tags as secrets (attach to a secret)

The following policy grants `GetSecretValue` to account *123456789012* only if the tag *AccessProject* has the same value for the secret and the role. To use this policy, see the section called "Attach a permissions policy to a secret".

```
{
  "Version": "2012-10-17",
  "Statement": {
    "Effect": "Allow",
    "Principal": {
      "AWS": "123456789012"
    },
    "Condition": {
      "StringEquals": {
        "aws:ResourceTag/AccessProject": "${ aws:PrincipalTag/AccessProject }"
      }
    },
    "Action": "secretsmanager:GetSecretValue",
    "Resource": "*"
  }
}
```

Example: Service principal

If the resource policy attached to your secret includes an AWS service principal, we recommend that you use the aws:SourceArn and aws:SourceAccount global condition keys. The ARN and account values are included in the authorization context only when a request comes to Secrets Manager from another AWS service. This combination of conditions avoids a potential confused deputy scenario.

If a resource ARN includes characters that are not permitted in a resource policy, you cannot use that resource ARN in the value of the `aws:SourceArn` condition key. Instead, use the `aws:SourceAccount` condition key. For more information, see IAM requirements.

Service principals are not typically used as principals in a policy attached to a secret, but some AWS services require it. For information about resource policies that a service requires you to attach to a secret, see the service's documentation.

Example Allow a service to access a secret using a service principal (attach to a secret)

```
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Effect": "Allow",
      "Principal": {
        "Service": [
          "service-name.amazonaws.com"
        ]
      },
      "Action": "secretsmanager:GetSecretValue",
      "Resource": "*",
      "Condition": {
        "ArnLike": {
          "aws:sourceArn": "arn:aws:service-name::123456789012:*"
        },
        "StringEquals": {
          "aws:sourceAccount": "123456789012"
        }
      }

    }
  ]
}
```

Permissions reference for AWS Secrets Manager

To see the elements that make up a permissions policy, see JSON policy document structure and IAM JSON policy elements reference.

To get started writing your own permissions policy, see the section called “Permissions policy examples”.

Secrets Manager actions

Actions	Description	Access level	Resource types (*required)	Condition keys	Dependent actions
CancelRotateSecret	Grants permission to cancel an in-progress secret rotation	Write	Secret*		
				secretsmanager:SecretId secretsmanager:resource/AllowRotationLambdaArn secretsmanager:ResourceTag/tag-key aws:ResourceTag/${TagKey} secretsmanager:SecretPrimaryRegion	
CreateSecret	Grants permission to create a secret that stores encrypted	Write	Secret*		

Actions	Description	Access level	Resource types (*required)	Condition keys	Dependent actions
	data that can be queried and rotated				

Actions	Description	Access level	Resource types (*required)	Condition keys	Dependent actions
				secretsmanager:Name secretsmanager:Description secretsmanager:KmsKeyId aws:RequestTag/${TagKey} aws:ResourceTag/${TagKey} aws:TagKeys secretsmanager:ResourceTag/tag-key secretsmanager:AddReplicaRegions	

Actions	Description	Access level	Resource types (*required)	Condition keys	Dependent actions
				secretsmanager:ForceOverwriteReplicaSecret	
DeleteResourcePolicy	Grants permission to delete the resource policy attached to a secret	Permissions management	Secret*		
				secretsmanager:SecretId secretsmanager:resource/AllowRotationLambdaArn secretsmanager:ResourceTag/tag-key aws:ResourceTag/${TagKey} secretsmanager:SecretPrimaryRegion	

Actions	Description	Access level	Resource types (*required)	Condition keys	Dependent actions
DeleteSecret	Grants permission to delete a secret	Write	Secret*		

Actions	Description	Access level	Resource types (*required)	Condition keys	Dependent actions
				secretsmanager:SecretId secretsmanager:resource/AllowRotationLambdaArn secretsmanager:RecoveryWindowInDays secretsmanager:ForceDeleteWithoutRecovery secretsmanager:ResourceTag/tag-key aws:ResourceTag/${TagKey}	

Actions	Description	Access level	Resource types (*required)	Condition keys	Dependent actions
				secretsmanager:SecretPrimaryRegion	
DescribeSecret	Grants permission to retrieve the metadata about a secret, but not the encrypted data	Read	Secret*		
				secretsmanager:SecretId secretsmanager:resource/AllowRotationLambdaArn secretsmanager:ResourceTag/tag-key aws:ResourceTag/${TagKey} secretsmanager:SecretPrimaryRegion	

Actions	Description	Access level	Resource types (*required)	Condition keys	Dependent actions
GetRandomPassword	Grants permission to generate a random string for use in password creation	Read			
GetResourcePolicy	Grants permission to get the resource policy attached to a secret	Read	Secret*		
				secretsmanager:SecretId secretsmanager:resource/AllowRotationLambdaArn secretsmanager:ResourceTag/tag-key aws:ResourceTag/${TagKey} secretsmanager:SecretPrimaryRegion	
GetSecretValue		Read	Secret*		

Actions	Description	Access level	Resource types (*required)	Condition keys	Dependent actions
	Grants permission to retrieve and decrypt the encrypted data			secretsmanager:SecretId secretsmanager:VersionId secretsmanager:VersionStage secretsmanager:resource/AllowRotationLambdaArn secretsmanager:ResourceTag/tag-key aws:ResourceTag/${TagKey} secretsmanager:SecretPrimaryRegion	

Actions	Description	Access level	Resource types (*required)	Condition keys	Dependent actions
ListSecretVersionIds	Grants permission to list the available versions of a secret	Read	Secret*		
				secretsmanager:SecretId secretsmanager:resource/AllowRotationLambdaArn secretsmanager:ResourceTag/tag-key aws:ResourceTag/${TagKey} secretsmanager:SecretPrimaryRegion	
ListSecrets	Grants permission to list the available secrets	List			

Actions	Description	Access level	Resource types (*required)	Condition keys	Dependent actions
PutResourcePolicy	Grants permission to attach a resource policy to a secret	Permissions management	Secret*	secretsmanager:SecretId secretsmanager:resource/AllowRotationLambdaArn secretsmanager:ResourceTag/tag-key aws:ResourceTag/${TagKey} secretsmanager:BlockPublicPolicy secretsmanager:SecretPrimaryRegion	

Actions	Description	Access level	Resource types (*required)	Condition keys	Dependent actions
PutSecretValue	Grants permission to create a new version of the secret with new encrypted data	Write	Secret*		
				secretsmanager:SecretId secretsmanager:resource/AllowRotationLambdaArn secretsmanager:ResourceTag/tag-key aws:ResourceTag/${TagKey} secretsmanager:SecretPrimaryRegion	
RemoveRegionsFromReplication	Grants permission to remove regions from replication	Write	Secret*		

Actions	Description	Access level	Resource types (*required)	Condition keys	Dependent actions
				secretsmanager:SecretId secretsmanager:resource/AllowRotationLambdaArn secretsmanager:ResourceTag/tag-key aws:ResourceTag/${TagKey} secretsmanager:SecretPrimaryRegion	

Actions	Description	Access level	Resource types (*required)	Condition keys	Dependent actions
Replicate SecretToRegions	Grants permission to convert an existing secret to a multi-Region secret and begin replicating the secret to a list of new regions	Write	Secret*	secretsmanager:SecretId secretsmanager:resource/AllowRotationLambdaArn secretsmanager:ResourceTag/tag-key aws:ResourceTag/${TagKey} secretsmanager:SecretPrimaryRegion secretsmanager:AddReplicaRegions	

Actions	Description	Access level	Resource types (*required)	Condition keys	Dependent actions
				secretsmanager:ForceOverwriteReplicaSecret	
RestoreSecret	Grants permission to cancel deletion of a secret	Write	Secret*		
				secretsmanager:SecretId secretsmanager:resource/AllowRotationLambdaArn secretsmanager:ResourceTag/tag-key aws:ResourceTag/${TagKey} secretsmanager:SecretPrimaryRegion	

Actions	Description	Access level	Resource types (*required)	Condition keys	Dependent actions
RotateSecret	Grants permission to start rotation of a secret	Write	Secret*		

Actions	Description	Access level	Resource types (*required)	Condition keys	Dependent actions
				secretsmanager:SecretId secretsmanager:RotationLambdaARN secretsmanager:resource/AllowRotationLambdaArn secretsmanager:ResourceTag/tag-key aws:ResourceTag/${TagKey} secretsmanager:SecretPrimaryRegion secretsmanager:Mod	

Actions	Description	Access level	Resource types (*required)	Condition keys	Dependent actions
				ifyRotationRules secretsmanager:RotateImmediately	

Actions	Description	Access level	Resource types (*required)	Condition keys	Dependent actions
StopReplicationToReplica	Grants permission to remove the secret from replication and promote the secret to a regional secret in the replica Region	Write	Secret*	secretsmanager:SecretId secretsmanager:resource/AllowRotationLambdaArn secretsmanager:ResourceTag/tag-key aws:ResourceTag/${TagKey} secretsmanager:SecretPrimaryRegion	
TagResource	Grants permission to add tags to a secret	Tagging	Secret*		

Actions	Description	Access level	Resource types (*required)	Condition keys	Dependent actions
				secretsmanager:SecretId aws:RequestTag/${TagKey} aws:TagKeys secretsmanager:resource/AllowRotationLambdaArn secretsmanager:ResourceTag/tag-key aws:ResourceTag/${TagKey} secretsmanager:SecretPrimaryRegion	

Actions	Description	Access level	Resource types (*required)	Condition keys	Dependent actions
UntagResource	Grants permission to remove tags from a secret	Tagging	Secret*		
				secretsmanager:SecretId aws:TagKeys secretsmanager:resource/AllowRotationLambdaArn secretsmanager:ResourceTag/tag-key aws:ResourceTag/${TagKey} secretsmanager:SecretPrimaryRegion	

Actions	Description	Access level	Resource types (*required)	Condition keys	Dependent actions
UpdateSecret	Grants permission to update a secret with new metadata or with a new version of the encrypted data	Write	Secret*		

Actions	Description	Access level	Resource types (*required)	Condition keys	Dependent actions
				secretsmanager:SecretId secretsmanager:Description secretsmanager:KmsKeyId secretsmanager:resource/AllowRotationLambdaArn secretsmanager:ResourceTag/tag-key aws:ResourceTag/${TagKey} secretsmanager:SecretPrimaryRegion	

Actions	Description	Access level	Resource types (*required)	Condition keys	Dependent actions
UpdateSecretVersionStage	Grants permission to move a stage from one secret to another	Write	Secret*		
				secretsmanager:SecretId secretsmanager:VersionStage secretsmanager:resource/AllowRotationLambdaArn secretsmanager:ResourceTag/tag-key aws:ResourceTag/${TagKey} secretsmanager:SecretPrimaryRegion	

Actions	Description	Access level	Resource types (*required)	Condition keys	Dependent actions
ValidateResourcePolicy	Grants permission to validate a resource policy before attaching policy	Permissions management	Secret*	secretsmanager:SecretId secretsmanager:resource/AllowRotationLambdaArn secretsmanager:ResourceTag/tag-key aws:ResourceTag/${TagKey} secretsmanager:SecretPrimaryRegion	

Secrets Manager resources

Resource types	ARN	Condition keys
Secret	`arn:${Partition}:secretsmanager:${Region}:${Account}:secret:${SecretId}`	aws:RequestTag/${TagKey} aws:ResourceTag/${TagKey} aws:TagKeys secretsmanager:ResourceTag/tag-key secretsmanager:resource/AllowRotationLambdaArn

Secrets Manager constructs the last part of the secret ARN by appending a dash and six random alphanumeric characters at the end of the secret name. If you delete a secret and then recreate another with the same name, this formatting helps ensure that individuals with permissions to the original secret don't automatically get access to the new secret because Secrets Manager generates six new random characters.

You can find the ARN for a secret in the Secrets Manager console on the secret details page or by calling `DescribeSecret`.

Condition keys

If you include string conditions from the following table in your permissions policy, callers to Secrets Manager must pass the matching parameter or they are denied access. To avoid denying callers for a missing parameter, add `IfExists` to the end of the condition operator name, for example `StringLikeIfExists`. For more information, see IAM JSON policy elements: Condition operators.

Condition keys	Description	Type
aws:RequestTag/${TagKey}	Filters access by a key that is present in the request the user makes to the Secrets Manager service	String
aws:ResourceTag/${TagKey}	Filters access by the tags associated with the resource	String
aws:TagKeys	Filters access by the list of all the tag key names present in the request the user makes to the Secrets Manager service	ArrayOfString
secretsmanager:AddReplicaRegions	Filters access by the list of Regions in which to replicate the secret	ArrayOfString
secretsmanager:BlockPublicPolicy	Filters access by whether the resource policy blocks broad AWS account access	Bool
secretsmanager:Description	Filters access by the description text in the request	String
secretsmanager:ForceDeleteWithoutRecovery	Filters access by whether the secret is to be deleted immediately without any recovery window	Bool
secretsmanager:ForceOverwriteReplicaSecret	Filters access by whether to overwrite a secret with the same name in the destination Region	Bool
secretsmanager:KmsKeyId	Filters access by the ARN of the KMS key in the request	String

Condition keys	Description	Type
secretsmanager:ModifyRotationRules	Filters access by whether the rotation rules of the secret are to be modified	Bool
secretsmanager:Name	Filters access by the friendly name of the secret in the request	String
secretsmanager:RecoveryWindowInDays	Filters access by the number of days that Secrets Manager waits before it can delete the secret	Numeric
secretsmanager:ResourceTag/tag-key	Filters access by a tag key and value pair	String
secretsmanager:RotateImmediately	Filters access by whether the secret is to be rotated immediately	Bool
secretsmanager:RotationLambdaARN	Filters access by the ARN of the rotation Lambda function in the request	ARN
secretsmanager:SecretId	Filters access by the SecretID value in the request	ARN
secretsmanager:SecretPrimaryRegion	Filters access by primary region in which the secret is created	String
secretsmanager:VersionId	Filters access by the unique identifier of the version of the secret in the request	String

Condition keys	Description	Type
secretsmanager:VersionStage	Filters access by the list of version stages in the request	String
secretsmanager:resource/AllowRotationLambdaArn	Filters access by the ARN of the rotation Lambda function associated with the secret	ARN

Block broad access to secrets with `BlockPublicPolicy` condition

In identity policies that allow the action `PutResourcePolicy`, we recommend you use `BlockPublicPolicy: true`. This condition means that users can only attach a resource policy to a secret if the policy doesn't allow broad access.

Secrets Manager uses Zelkova automated reasoning to analyze resource policies for broad access. For more information about Zelkova, see How AWS uses automated reasoning to help you achieve security at scale on the AWS Security Blog.

The following example shows how to use `BlockPublicPolicy`.

```
{
    "Version": "2012-10-17",
    "Statement": {
        "Effect": "Allow",
        "Action": "secretsmanager:PutResourcePolicy",
        "Resource": "SecretId",
        "Condition": {
            "Bool": {
                "secretsmanager:BlockPublicPolicy": "true"
            }
        }
    }
}
```

IP address conditions

Use caution when you specify the IP address condition operators or the `aws:SourceIp` condition key in a policy statement that allows or denies access to Secrets Manager. For example, if you attach a policy that restricts AWS actions to requests from your corporate network IP address range to a secret, then your requests as an IAM user invoking the request from the corporate network work as expected. However, if you enable other services to access the secret on your behalf, such as when you enable rotation with a Lambda function, that function calls the Secrets Manager operations from an AWS-internal address space. Requests impacted by the policy with the IP address filter fail.

Also, the `aws:sourceIP` condition key is less effective when the request comes from an Amazon VPC endpoint. To restrict requests to a specific VPC endpoint, use the section called "VPC endpoint conditions".

VPC endpoint conditions

To allow or deny access to requests from a particular VPC or VPC endpoint, use `aws:SourceVpc` to limit access to requests from the specified VPC or `aws:SourceVpce` to limit access to requests from the specified VPC endpoint. See the section called "Example: Permissions and VPCs".

- `aws:SourceVpc` limits access to requests from the specified VPC.
- `aws:SourceVpce` limits access to requests from the specified VPC endpoint.

If you use these condition keys in a resource policy statement that allows or denies access to Secrets Manager secrets, you can inadvertently deny access to services that use Secrets Manager to access secrets on your behalf. Only some AWS services can run with an endpoint within your VPC. If you restrict requests for a secret to a VPC or VPC endpoint, then calls to Secrets Manager from a service not configured for the service can fail.

See *VPC endpoint*.

Create and manage secrets with AWS Secrets Manager

A *secret* can be a password, a set of credentials such as a user name and password, an OAuth token, or other secret information that you store in an encrypted form in Secrets Manager.

Topics

Create an AWS Secrets Manager database secret

After you create a user in Amazon RDS, Amazon Aurora, Amazon Redshift, or Amazon DocumentDB, you can store their credentials in Secrets Manager by following these steps. When you use the AWS CLI or one of the SDKs to store the secret, you must provide the secret in the correct JSON structure. When you use the console to store a database secret, Secrets Manager automatically creates it in the correct JSON structure.

> **Tip**
>
> For Amazon RDS and Amazon Redshift admin user credentials, we recommend you use managed secrets. You create the managed secret through the managing servce, and then you can use managed rotation.

When you store database credentials for a source database that is replicated to other Regions, the secret contains connection information for the source database. If you then replicate the secret, the replicas are copies of the source secret and contain the same connection information. You can add additional key/value pairs to the secret for regional connection information.

To create a secret, you need the permissions granted by the **SecretsManagerReadWrite** AWS managed policies.

Secrets Manager generates a CloudTrail log entry when you create a secret. For more information, see the section called "Log with AWS CloudTrail ".

To create a secret (console)

1. Open the Secrets Manager console at https://console.aws.amazon.com/secretsmanager/.
2. Choose **Store a new secret**.
3. On the **Choose secret type** page, do the following:
   a. For **Secret type**, choose the type of database credentials to store:
      - **Amazon RDS database** (includes Aurora)
      - **Amazon DocumentDB database**
      - **Amazon Redshift cluster**
   b. For **Credentials**, enter the credentials for the database.
   c. For **Encryption key**, choose the AWS KMS key that Secrets Manager uses to encrypt the secret value. For more information, see Secret encryption and decryption.
      - For most cases, choose **aws/secretsmanager** to use the AWS managed key for Secrets Manager. There is no cost for using this key.
      - If you need to access the secret from another AWS account, or if you want to use your own KMS key so that you can rotate it or apply a key policy to it, choose a customer managed key from the list or choose **Add new key** to create one. For information about the costs of using a customer managed key, see Pricing.

        You must have the section called "Permissions for the KMS key". For information about cross-account access, see the section called "Cross-account access".
   d. For **Database**, choose your database.
   e. Choose **Next**.
4. On the **Configure secret** page, do the following:

a. Enter a descriptive **Secret name** and **Description**. Secret names must contain 1-512 Unicode characters.

b. (Optional) In the **Tags** section, add tags to your secret. For tagging strategies, see the section called "Tag secrets". Don't store sensitive information in tags because they aren't encrypted.

c. (Optional) In **Resource permissions**, to add a resource policy to your secret, choose **Edit permissions**. For more information, see the section called "Attach a permissions policy to a secret".

d. (Optional) In **Replicate secret**, to replicate your secret to another AWS Region, choose **Replicate secret**. You can replicate your secret now or come back and replicate it later. For more information, see Replicate a secret to other Regions.

e. Choose **Next**.

5. (Optional) On the **Configure rotation** page, you can turn on automatic rotation. You can also keep rotation off for now and then turn it on later. For more information, see Rotate secrets. Choose **Next**.

6. On the **Review** page, review your secret details, and then choose **Store**.

   Secrets Manager returns to the list of secrets. If your new secret doesn't appear, choose the refresh button.

AWS CLI

When you enter commands in a command shell, there is a risk of the command history being accessed or utilities having access to your command parameters. See the section called "Mitigate the risks of using the AWS CLI to store your AWS Secrets Manager secrets".

Example Create a secret from credentials in a JSON file

The following `create-secret` example creates a secret from credentials in a file. For more information, see Loading AWS CLI parameters from a file in the AWS CLI User Guide.

For Secrets Manager to be able to rotate the secret, you must make sure the JSON matches the JSON structure of a secret.

```
aws secretsmanager create-secret \
    --name MyTestSecret \
```

```
    --secret-string file://mycreds.json
```

Contents of mycreds.json:

```
{
    "engine": "mysql",
    "username": "saanvis",
    "password": "EXAMPLE-PASSWORD",
    "host": "my-database-endpoint.us-west-2.rds.amazonaws.com",
    "dbname": "myDatabase",
    "port": "3306"
}
```

AWS SDK

To create a secret by using one of the AWS SDKs, use the `CreateSecret` action. For more information, see the section called “AWS SDKs”.

JSON structure of AWS Secrets Manager secrets

You can store any text or binary in Secrets Manager secrets. If you want to turn on automatic rotation for a Secrets Manager secret, it must be in the correct JSON structure. During rotation, Secrets Manager uses the information in the secret to connect to the credential source and update the credentials there. The JSON key names are case-sensitive.

Note that when you use the console to store a database secret, Secrets Manager automatically creates it in the correct JSON structure.

You can add more key/value pairs to a secret, for example in a database secret, to contain connection information for replica databases in other Regions.

Topics

- Amazon DocumentDB secret structure
- Amazon Redshift secret structure
- Amazon ElastiCache secret structure

Amazon RDS Db2 secret structure

For Amazon RDS Db2 instances, because users can't change their own passwords, you must provide admin credentials in a separate secret.

```
{
  "engine": "db2",
  "host": "<instance host name/resolvable DNS name>",
  "username": "<username>",
  "password": "<password>",
  "dbname": "<database name. If not specified, defaults to None>",
  "port": "<TCP port number. If not specified, defaults to 3306>",
  "masterarn": "<the ARN of the elevated secret>"
}
```

Amazon RDS MariaDB secret structure

```
{
  "engine": "mariadb",
  "host": "<instance host name/resolvable DNS name>",
  "username": "<username>",
  "password": "<password>",
  "dbname": "<database name. If not specified, defaults to None>",
  "port": "<TCP port number. If not specified, defaults to 3306>"
}
```

To use the the section called “Alternating users”, you include the `masterarn` for the secret that contains admin or superuser credentials.

```
{
  "engine": "mariadb",
  "host": "<instance host name/resolvable DNS name>",
  "username": "<username>",
  "password": "<password>",
  "dbname": "<database name. If not specified, defaults to None>",
  "port": "<TCP port number. If not specified, defaults to 3306>",
```

```
  "masterarn": "<the ARN of the elevated secret>"
}
```

Amazon RDS and Amazon Aurora MySQL secret structure

```
{
  "engine": "mysql",
  "host": "<instance host name/resolvable DNS name>",
  "username": "<username>",
  "password": "<password>",
  "dbname": "<database name. If not specified, defaults to None>",
  "port": "<TCP port number. If not specified, defaults to 3306>"
}
```

To use the the section called “Alternating users”, you include the `masterarn` for the secret that contains admin or superuser credentials.

```
{
  "engine": "mysql",
  "host": "<instance host name/resolvable DNS name>",
  "username": "<username>",
  "password": "<password>",
  "dbname": "<database name. If not specified, defaults to None>",
  "port": "<TCP port number. If not specified, defaults to 3306>",
  "masterarn": "<the ARN of the elevated secret>"
}
```

Amazon RDS Oracle secret structure

```
{
  "engine": "oracle",
  "host": "<required: instance host name/resolvable DNS name>",
  "username": "<required: username>",
  "password": "<required: password>",
  "dbname": "<required: database name>",
  "port": "<optional: TCP port number. If not specified, defaults to 1521>"
}
```

To use the the section called “Alternating users”, you include the `masterarn` for the secret that contains admin or superuser credentials.

```
{
  "engine": "oracle",
  "host": "<required: instance host name/resolvable DNS name>",
  "username": "<required: username>",
  "password": "<required: password>",
  "dbname": "<required: database name>",
  "port": "<optional: TCP port number. If not specified, defaults to 1521>",
  "masterarn": "<the ARN of the elevated secret>"
}
```

Amazon RDS and Amazon Aurora PostgreSQL secret structure

```
{
  "engine": "postgres",
  "host": "<instance host name/resolvable DNS name>",
  "username": "<username>",
  "password": "<password>",
  "dbname": "<database name. If not specified, defaults to 'postgres'>",
  "port": "<TCP port number. If not specified, defaults to 5432>"
}
```

To use the the section called “Alternating users”, you include the `masterarn` for the secret that contains admin or superuser credentials.

```
{
  "engine": "postgres",
  "host": "<instance host name/resolvable DNS name>",
  "username": "<username>",
  "password": "<password>",
  "dbname": "<database name. If not specified, defaults to 'postgres'>",
  "port": "<TCP port number. If not specified, defaults to 5432>",
  "masterarn": "<the ARN of the elevated secret>"
}
```

Amazon RDS Microsoft SQLServer secret structure

```
{
  "engine": "sqlserver",
  "host": "<instance host name/resolvable DNS name>",
  "username": "<username>",
```

```
  "password": "<password>",
  "dbname": "<database name. If not specified, defaults to 'master'>",
  "port": "<TCP port number. If not specified, defaults to 1433>"
}
```

To use the the section called “Alternating users”, you include the `masterarn` for the secret that contains admin or superuser credentials.

```
{
  "engine": "sqlserver",
  "host": "<instance host name/resolvable DNS name>",
  "username": "<username>",
  "password": "<password>",
  "dbname": "<database name. If not specified, defaults to 'master'>",
  "port": "<TCP port number. If not specified, defaults to 1433>",
  "masterarn": "<the ARN of the elevated secret>"
}
```

Amazon DocumentDB secret structure

```
{
  "engine": "mongo",
  "host": "<instance host name/resolvable DNS name>",
  "username": "<username>",
  "password": "<password>",
  "dbname": "<database name. If not specified, defaults to None>",
  "port": "<TCP port number. If not specified, defaults to 27017>"
}
```

To use the the section called “Alternating users”, you include the `masterarn` for the secret that contains admin or superuser credentials.

```
{
  "engine": "mongo",
  "host": "<instance host name/resolvable DNS name>",
  "username": "<username>",
  "password": "<password>",
  "dbname": "<database name. If not specified, defaults to None>",
  "port": "<TCP port number. If not specified, defaults to 27017>",
  "masterarn": "<the ARN of the elevated secret>"
}
```

Amazon Redshift secret structure

```
{
  "engine": "redshift",
  "host": "<instance host name/resolvable DNS name>",
  "username": "<username>",
  "password": "<password>",
  "dbname": "<database name. If not specified, defaults to None>",
  "port": "<TCP port number. If not specified, defaults to 5439>"
}
```

To use the the section called “Alternating users”, you include the `masterarn` for the secret that contains admin or superuser credentials.

```
{
  "engine": "redshift",
  "host": "<instance host name/resolvable DNS name>",
  "username": "<username>",
  "password": "<password>",
  "dbname": "<database name. If not specified, defaults to None>",
  "port": "<TCP port number. If not specified, defaults to 5439>",
  "masterarn": "<the ARN of the elevated secret>"
}
```

Amazon ElastiCache secret structure

```
{
  "password": "<password>",
  "username": "<username>"
  "user_arn": "ARN of the Amazon EC2 user"
}
```

For more information, see Automatically rotating passwords for users in the *Amazon ElastiCache User Guide*.

Create an AWS Secrets Manager secret

To store API keys, access tokens, credentials that aren't for databases, and other secrets in Secrets Manager, follow these steps. For an Amazon ElastiCache secret, if you want to turn on rotation, you must store the secret in the expected JSON structure.

To create a secret, you need the permissions granted by the **SecretsManagerReadWrite** AWS managed policies.

Secrets Manager generates a CloudTrail log entry when you create a secret. For more information, see the section called "Log with AWS CloudTrail ".

To create a secret (console)

1. Open the Secrets Manager console at https://console.aws.amazon.com/secretsmanager/.
2. Choose **Store a new secret**.
3. On the **Choose secret type** page, do the following:
   a. For **Secret type**, choose **Other type of secret**.
   b. In **Key/value pairs**, either enter your secret in JSON **Key/value** pairs, or choose the **Plaintext** tab and enter the secret in any format. You can store up to 65536 bytes in the secret.
   c. For **Encryption key**, choose the AWS KMS key that Secrets Manager uses to encrypt the secret value. For more information, see Secret encryption and decryption.
      - For most cases, choose **aws/secretsmanager** to use the AWS managed key for Secrets Manager. There is no cost for using this key.
      - If you need to access the secret from another AWS account, or if you want to use your own KMS key so that you can rotate it or apply a key policy to it, choose a customer managed key from the list or choose **Add new key** to create one. For information about the costs of using a customer managed key, see Pricing.

        You must have the section called "Permissions for the KMS key". For information about cross-account access, see the section called "Cross-account access".
   d. Choose **Next**.
4. On the **Configure secret** page, do the following:
   a. Enter a descriptive **Secret name** and **Description**. Secret names must contain 1-512 Unicode characters.
   b. (Optional) In the **Tags** section, add tags to your secret. For tagging strategies, see the section called "Tag secrets". Don't store sensitive information in tags because they aren't encrypted.

c. (Optional) In **Resource permissions**, to add a resource policy to your secret, choose **Edit permissions**. For more information, see the section called "Attach a permissions policy to a secret".

d. (Optional) In **Replicate secret**, to replicate your secret to another AWS Region, choose **Replicate secret**. You can replicate your secret now or come back and replicate it later. For more information, see Replicate a secret to other Regions.

e. Choose **Next**.

5. (Optional) On the **Configure rotation** page, you can turn on automatic rotation. You can also keep rotation off for now and then turn it on later. For more information, see Rotate secrets. Choose **Next**.

6. On the **Review** page, review your secret details, and then choose **Store**.

   Secrets Manager returns to the list of secrets. If your new secret doesn't appear, choose the refresh button.

AWS CLI

When you enter commands in a command shell, there is a risk of the command history being accessed or utilities having access to your command parameters. See the section called "Mitigate the risks of using the AWS CLI to store your AWS Secrets Manager secrets".

Example Create a secret

The following `create-secret` example creates a secret with two key-value pairs.

```
aws secretsmanager create-secret \
    --name MyTestSecret \
    --description "My test secret created with the CLI." \
    --secret-string "{\"user\":\"diegor\",\"password\":\"EXAMPLE-PASSWORD\"}"
```

Example Create a secret from credentials in a JSON file

The following `create-secret` example creates a secret from credentials in a file. For more information, see Loading AWS CLI parameters from a file in the AWS CLI User Guide.

```
aws secretsmanager create-secret \
    --name MyTestSecret \
```

```
    --secret-string file://mycreds.json
```

Contents of mycreds.json:

```
{
    "username": "diegor",
    "password": "EXAMPLE-PASSWORD"
}
```

AWS SDK

To create a secret by using one of the AWS SDKs, use the `CreateSecret` action. For more information, see the section called "AWS SDKs".

Update the value for an AWS Secrets Manager secret

To update the value of your secret, you can use the console, the CLI, or an SDK. When you update the secret value, Secrets Manager creates a new version of the secret with the staging label `AWSCURRENT`. You can still access the old version, which has the label `AWSPREVIOUS`. You can also add your own labels. For more information, see Secrets Manager versioning.

To update the secret value (console)

1. Open the Secrets Manager console at https://console.aws.amazon.com/secretsmanager/.
2. From the list of secrets, choose your secret.
3. On the secret details page, on the **Overview** tab, in the **Secret value** section, choose **Retrieve secret value** and then choose **Edit**.

AWS CLI

To update the secret value (AWS CLI)

- When you enter commands in a command shell, there is a risk of the command history being accessed or utilities having access to your command parameters. See the section called "Mitigate the risks of using the AWS CLI to store your AWS Secrets Manager secrets".

  The following `put-secret-value` creates a new version of a secret with two key-value pairs.

```
aws secretsmanager put-secret-value \
      --secret-id MyTestSecret \
      --secret-string "{\"user\":\"diegor\",\"password\":\"EXAMPLE-PASSWORD\"}"
```

The following `put-secret-value` creates a new version with a custom staging label. The new version will have the labels `MyLabel` and `AWSCURRENT`.

```
aws secretsmanager put-secret-value \
      --secret-id MyTestSecret \
      --secret-string "{\"user\":\"diegor\",\"password\":\"EXAMPLE-PASSWORD\"}"
      --version-stages "MyLabel"
```

AWS SDK

We recommend you avoid calling `PutSecretValue` or `UpdateSecret` at a sustained rate of more than once every 10 minutes. When you call `PutSecretValue` or `UpdateSecret` to update the secret value, Secrets Manager creates a new version of the secret. Secrets Manager removes unlabeled versions when there are more than 100, but it does not remove versions created less than 24 hours ago. If you update the secret value more than once every 10 minutes, you create more versions than Secrets Manager removes, and you will reach the quota for secret versions.

To update a secret value, use the following actions: `UpdateSecret` or `PutSecretValue`. For more information, see the section called "AWS SDKs".

Change the encryption key for an AWS Secrets Manager secret

Secrets Manager uses envelope encryption with AWS KMS keys and data keys to protect each secret value. For each secret, you can choose which KMS key to use. You can use the AWS managed key **aws/secretsmanager**, or you can use a customer managed key. For most cases, we recommend using **aws/secretsmanager**, and there is no cost for using it. If you need to access the secret from another AWS account, or if you want to use your own KMS key so that you can rotate it or apply a key policy to it, use a customer managed key. You must have the section called "Permissions for the KMS key". For information about the costs of using a customer managed key, see Pricing.

You can change the encryption key for your secret. For example, if you want to access the secret from another account, and the secret is currently encrypted using the AWS managed key `aws/secretsmanager`, you can switch to a customer managed key.

> **Tip**
>
> If you want to rotate your customer managed key, we recommend using AWS KMS automatic key rotation. For more information, see Rotating AWS KMS keys.

When you change the encryption key for a secret, it does not affect existing versions of the secret. Only the new versions you create after the key change are encrypted under the new encryption key. (The only exceptions are the `AWSCURRENT`, `AWSPENDING`, and `AWSPREVIOUS` versions, which Secrets Manager re-encrypts to help ensure you are't locked out of the secret.)

If you deactivate the previous encryption key, you will not be able to decrypt any secret versions except `AWSCURRENT`, `AWSPENDING`, and `AWSPREVIOUS`. If you have other labelled secret versions that you want to retain access to, you need to recreate those versions with the new encryption key using the the section called “AWS CLI”.

To change the encryption key for a secret (console)

1. Open the Secrets Manager console at https://console.aws.amazon.com/secretsmanager/.
2. From the list of secrets, choose your secret.
3. On the secret details page, in the **Secrets details** section, choose **Actions**, and then choose **Edit encryption key**.

AWS CLI

If you change the encryption key for a secret and then deactivate the previous encryption key, you will not be able to decrypt any secret versions except `AWSCURRENT`, `AWSPENDING`, and `AWSPREVIOUS`. If you have other labelled secret versions that you want to retain access to, you need to recreate those versions with the new encryption key using the the section called “AWS CLI”.

To change the encryption key for a secret (AWS CLI)

1. The following `update-secret` example updates the KMS key used to encrypt the secret value. The KMS key must be in the same region as the secret.

```
aws secretsmanager update-secret \
      --secret-id MyTestSecret \
```

```
      --kms-key-id arn:aws:kms:us-west-2:123456789012:key/EXAMPLE1-90ab-cdef-fedc-
ba987EXAMPLE
```

2. (Optional) If you have secret versions that have custom labels, to re-encrypt them using the new key, you must recreate those versions.

   When you enter commands in a command shell, there is a risk of the command history being accessed or utilities having access to your command parameters. See the section called "Mitigate the risks of using the AWS CLI to store your AWS Secrets Manager secrets".

   a. Get the value of the secret version.

   ```
   aws secretsmanager get-secret-value \
         --secret-id MyTestSecret \
         --version-stage MyCustomLabel
   ```

   Make a note of the secret value.

   b. Create a new version with that value.

   ```
   aws secretsmanager put-secret-value \
       --secret-id testDescriptionUpdate \
       --secret-string "SecretValue" \
       --version-stages "MyCustomLabel"
   ```

Modify an AWS Secrets Manager secret

You can modify the metadata of a secret after it is created, depending on who created the secret. For secrets created by other services, you might need to use the other service to update or rotate it.

To determine who manages a secret, you can review the secret name. Secrets managed by other services are prefixed with the ID of that service. Or, in the AWS CLI, call describe-secret, and then review the field `OwningService`. For more information, see *Secrets managed by other services*.

For secrets you manage, you can modify the description, resource-based policy, the encryption key, and tags. You can also change the encrypted secret value; however, we recommend you use rotation to update secret values that contain credentials. Rotation updates both the secret in Secrets Manager and the credentials on the database or service. This keeps the secret automatically synchronized so when clients request a secret value, they always get a working set of credentials. For more information, see *Rotate secrets*.

Secrets Manager generates a CloudTrail log entry when you modify a secret. For more information, see the section called “Log with AWS CloudTrail ”.

To update a secret you manage (console)

1. Open the Secrets Manager console at https://console.aws.amazon.com/secretsmanager/.
2. From the list of secrets, choose your secret.
3. On the secret details page, do any of the following:

   Note that you can't change the name or ARN of a secret.

   - To update the description, in the **Secrets details** section, choose **Actions**, and then choose **Edit description**.
   - To update the encryption key, see the section called “Change the encryption key for a secret”.
   - To update tags, on the **Tags** tab, choose **Edit tags**. See the section called “Tag secrets”.
   - To update the secret value, see the section called “Update a secret value”.
   - To update permissions for your secret, on the **Overview** tab, choose **Edit permissions**. See the section called “Attach a permissions policy to a secret”.
   - To update rotation for your secret, on the **Rotation** tab, choose **Edit rotation**. See *Rotate secrets*.
   - To replicate your secret to other Regions, see Replicate a secret to other Regions.
   - If your secret has replicas, you can change the encryption key for a replica. On the **Replication** tab, select the radio button for the replica, and then on the **Actions** menu, choose **Edit encryption key**. See the section called “Secret encryption and decryption”.
   - To change a secret so that it is managed by another service, you need to recreate the secret in that service. See Secrets managed by other services.

AWS CLI

Example Update secret description

The following `update-secret` example updates the description of a secret.

```
aws secretsmanager update-secret \
    --secret-id MyTestSecret \
```

```
    --description "This is a new description for the secret."
```

AWS SDK

We recommend you avoid calling `PutSecretValue` or `UpdateSecret` at a sustained rate of more than once every 10 minutes. When you call `PutSecretValue` or `UpdateSecret` to update the secret value, Secrets Manager creates a new version of the secret. Secrets Manager removes unlabeled versions when there are more than 100, but it does not remove versions created less than 24 hours ago. If you update the secret value more than once every 10 minutes, you create more versions than Secrets Manager removes, and you will reach the quota for secret versions.

To update a secret, use the following actions: `UpdateSecret` or `ReplicateSecretToRegions`. For more information, see the section called "AWS SDKs".

Find secrets in AWS Secrets Manager

When you search for secrets without a filter, Secrets Manager matches keywords in the secret name, description, tag key, and tag value. Searching without filters is not case-sensitive and ignores special characters, such as space, /, _, =, #, and only uses numbers and letters. When you search without a filter, Secrets Manager analyzes the search string to convert it to separate words. The words are separated by any change from uppercase to lowercase, from letter to number, or from number/letter to punctuation. For example, entering the search term `credsDatabase#892` searches for `creds`, `Database`, and 892 in name, description, and tag key and value.

Secrets Manager generates a CloudTrail log entry when you list secrets. For more information, see the section called "Log with AWS CloudTrail ".

You can apply the following filters to your search:

Name

Matches the beginning of secret names; case-sensitive. For example, **Name: `Data`** returns a secret named `DatabaseSecret`, but not `databaseSecret` or `MyData`.

Description

Matches the words in secret descriptions, not case-sensitive. For example, **Description**: **`My Description`** matches secrets with the following descriptions:

- `My Description`

- `my description`
- `My basic description`
- `Description of my secret`

Owning service

Matches the beginning of the managing service ID prefix, not case-sensitive. For example, **`my-ser`** matches secrets managed by services with the prefix `my-serv` and `my-service`. For more information, see Secrets managed by other services.

Replicated secrets

You can filter for primary secrets, replica secrets, or secrets that aren't replicated.

Tag keys

Matches the beginning of tag keys; case-sensitive. For example, **Tag key: `Prod`** returns secrets with the tag `Production` and `Prod1`, but not secrets with the tag `prod` or `1 Prod`.

Tag values

Matches the beginning of tag values; case-sensitive. For example, **Tag value: `Prod`** returns secrets with the tag `Production` and `Prod1`, but not secrets with the tag value `prod` or `1 Prod`.

Secrets Manager is a regional service and only secrets within the selected region are returned.

AWS CLI

Example List the secrets in your account

The following `list-secrets` example gets a list of the secrets in your account.

```
aws secretsmanager list-secrets
```

Example Filter the list of secrets in your account

The following `list-secrets` example gets a list of the secrets in your account that have **Test** in the name. Filtering by name is case sensitive.

```
aws secretsmanager list-secrets \
    --filter Key="name",Values="Test"
```

Example Find secrets that are managed by other AWS services

The following `list-secrets` example gets a list of secrets managed by a service. You specify the service by ID. For more information, see Secrets managed by other services.

```
aws secretsmanager list-secrets --filter Key="owning-service",Values="<service ID
 prefix>"
```

AWS SDK

To find secrets by using one of the AWS SDKs, use `ListSecrets`. For more information, see the section called “AWS SDKs”.

Delete an AWS Secrets Manager secret

Because of the critical nature of secrets, AWS Secrets Manager intentionally makes deleting a secret difficult. Secrets Manager does not immediately delete secrets. Instead, Secrets Manager immediately makes the secrets inaccessible and scheduled for deletion after a recovery window of a minimum of seven days. Until the recovery window ends, you can recover a secret you previously deleted. There is no charge for secrets that you have marked for deletion.

You can't delete a primary secret if it is replicated to other Regions. First delete the replicas, then delete the primary secret. When you delete a replica, it is deleted immediately.

You can't directly delete a version of a secret. Instead, you remove all staging labels from the version using the AWS CLI or AWS SDK. This marks the version as deprecated, and then Secrets Manager can automatically delete the version in the background.

If you don't know whether an application still uses a secret, you can create an Amazon CloudWatch alarm to alert you to any attempts to access a secret during the recovery window. For more information, see Monitor AWS Secrets Manager secrets scheduled for deletion by using Amazon CloudWatch.

To delete a secret, you must have `secretsmanager:ListSecrets` and `secretsmanager:DeleteSecret` permissions.

Secrets Manager generates a CloudTrail log entry when you delete a secret. For more information, see the section called “Log with AWS CloudTrail ”.

To delete a secret (console)

1. Open the Secrets Manager console at https://console.aws.amazon.com/secretsmanager/.
2. In the list of secrets, choose the secret you want to delete.
3. In the **Secret details** section, choose **Actions**, and then choose **Delete secret**.
4. In the **Disable secret and schedule deletion** dialog box, in **Waiting period**, enter the number of days to wait before the deletion becomes permanent. Secrets Manager attaches a field called `DeletionDate` and sets the field to the current date and time, plus the number of days specified for the recovery window.
5. Choose **Schedule deletion**.

To view deleted secrets

1. Open the Secrets Manager console at https://console.aws.amazon.com/secretsmanager/.
2. On the **Secrets** page, choose **Preferences** ( ).
3. In the Preferences dialog box, select **Show secrets scheduled for deletion**, and then choose **Save**.

To delete a replica secret

1. Open the Secrets Manager console at https://console.aws.amazon.com/secretsmanager/.
2. Choose the primary secret.
3. In the **Replicate Secret** section, choose the replica secret.
4. From the **Actions** menu, choose **Delete Replica**.

AWS CLI

Example Delete a secret

The following `delete-secret` example deletes a secret. You can recover the secret with `restore-secret` until the date and time in the DeletionDate response field. To delete a secret that is replicated to other regions, first remove its replicas with `remove-regions-from-replication`, and then call `delete-secret`.

```
aws secretsmanager delete-secret \
    --secret-id MyTestSecret \
    --recovery-window-in-days 7
```

Example Delete a secret immediately

The following `delete-secret` example deletes a secret immediately without a recovery window. You can't recover this secret.

```
aws secretsmanager delete-secret \
    --secret-id MyTestSecret \
    --force-delete-without-recovery
```

Example Delete a replica secret

The following `remove-regions-from-replication` example deletes a replica secret in eu-west-3. To delete a primary secret that is replicated to other regions, first delete the replicas and then call `delete-secret`.

```
aws secretsmanager remove-regions-from-replication \
    --secret-id MyTestSecret \
    --remove-replica-regions eu-west-3
```

AWS SDK

To delete a secret, use the `DeleteSecret` command. To delete a version of a secret, use the `UpdateSecretVersionStage` command. To delete a replica, use the `StopReplicationToReplica` command. For more information, see the section called “AWS SDKs”.

Restore an AWS Secrets Manager secret

Secrets Manager considers a secret scheduled for deletion *deprecated* and you can no longer directly access it. After the recovery window has passed, Secrets Manager deletes the secret permanently. Once Secrets Manager deletes the secret, you can't recover it. Before the end of the recovery window, you can recover the secret and make it accessible again. This removes the `DeletionDate` field, which cancels the scheduled permanent deletion.

To restore a secret and the metadata in the console, you must have `secretsmanager:ListSecrets` and `secretsmanager:RestoreSecret` permissions.

Secrets Manager generates a CloudTrail log entry when you restore a secret. For more information, see the section called "Log with AWS CloudTrail ".

To restore a secret (console)

1. Open the Secrets Manager console at https://console.aws.amazon.com/secretsmanager/.
2. In the list of secrets, choose the secret you want to restore.

   If deleted secrets don't appear in your list of secrets, choose **Preferences** (). In the Preferences dialog box, select **Show secrets scheduled for deletion**, and then choose **Save**.
3. On the **Secret details** page, choose **Cancel deletion**.
4. In the **Cancel secret deletion** dialog box, choose **Cancel deletion**.

AWS CLI

Example Restore a previously deleted secret

The following `restore-secret` example restores a secret that was previously scheduled for deletion.

```
aws secretsmanager restore-secret \
    --secret-id MyTestSecret
```

AWS SDK

To restore a secret marked for deletion, use the `RestoreSecret` command. For more information, see the section called "AWS SDKs".

Replicate an AWS Secrets Manager secret to other AWS Regions

You can replicate your secrets in multiple AWS Regions to support applications spread across those Regions to meet Regional access and low latency requirements. If you later need to, you can

promote a replica secret to a standalone and then set it up for replication independently. Secrets Manager replicates the encrypted secret data and metadata such as tags and resource policies across the specified Regions.

The ARN for a replicated secret is the same as the primary secret except for the Region, for example:

- Primary secret: `arn:aws:secretsmanager:Region1:123456789012:secret:MySecret-a1b2c3`
- Replica secret: `arn:aws:secretsmanager:Region2:123456789012:secret:MySecret-a1b2c3`

For pricing information for replica secrets, see AWS Secrets Manager Pricing.

When you store database credentials for a source database that is replicated to other Regions, the secret contains connection information for the source database. If you then replicate the secret, the replicas are copies of the source secret and contain the same connection information. You can add additional key/value pairs to the secret for regional connection information.

If you turn on rotation for your primary secret, Secrets Manager rotates the secret in the primary Region, and the new secret value propagates to all of the associated replica secrets. You don't have to manage rotation individually for all of the replica secrets.

You can replicate secrets across all of your enabled AWS Regions. However, if you use Secrets Manager in special AWS Regions such as AWS GovCloud (US) or China Regions, you can only configure secrets and the replicas within these specialized AWS Regions. You can't replicate a secret in your enabled AWS Regions to a specialized Region or replicate secrets from a specialized region to a commercial region.

Before you can replicate a secret to another Region, you must enable that Region. For more information, see Managing AWS Regions.

It is possible to use a secret across multiple Regions without replicating it by calling the Secrets Manager endpoint in the Region where the secret is stored. For a list of endpoints, see the section called “Secrets Manager endpoints”. To use replication to improve your workload's resilience, see Disaster Recovery (DR) Architecture on AWS, Part I: Strategies for Recovery in the Cloud.

Secrets Manager generates a CloudTrail log entry when you replicate a secret. For more information, see the section called “Log with AWS CloudTrail ”.

To replicate a secret to other Regions (console)

1. Open the Secrets Manager console at https://console.aws.amazon.com/secretsmanager/.
2. From the list of secrets, choose your secret.
3. On the secret details page, on the **Replication** tab, do one of the following:
   - If your secret is not replicated, choose **Replicate secret**.
   - If your secret is replicated, in the **Replicate secret** section, choose **Add Region**.
4. In the **Add replica regions** dialog box, do the following:

   a. For **AWS Region**, choose the Region you want to replicate the secret to.

   b. (Optional) For **Encryption key**, choose a KMS key to encrypt the secret with. The key must be in the replica Region.

   c. (Optional) To add another Region, choose **Add more regions**.

   d. Choose **Replicate**.

   You return to the secret details page. In the **Replicate secret** section, the **Replication status** shows for each Region.

AWS CLI

Example Replicate a secret to another region

The following `replicate-secret-to-regions` example replicates a secret to eu-west-3. The replica is encrypted with the AWS managed key aws/secretsmanager.

```
aws secretsmanager replicate-secret-to-regions \
    --secret-id MyTestSecret \
    --add-replica-regions Region=eu-west-3
```

AWS SDK

To replicate a secret, use the `ReplicateSecretToRegions` command. For more information, see the section called “AWS SDKs”.

Troubleshooting

The following are some reasons that replication can fail.

A secret with the same name exists in the selected Region

To resolve this issue, you can overwrite the duplicate name secret in the replica Region. Retry replication, and then in the **Retry replication** dialog box, choose **Overwrite**.

No permissions available on the KMS key to complete the replication

Secrets Manager first decrypts the secret before re-encrypting with the new KMS key in the replica Region. If you don't have `kms:Decrypt` permission to the encryption key in the primary Region, you will encounter this error. To encrypt the replicated secret with a KMS key other than `aws/secretsmanager`, you need `kms:GenerateDataKey` and `kms:Encrypt` to the key. See the section called "Permissions for the KMS key".

The KMS key is disabled or not found

If the encryption key in the primary Region is disabled or deleted, Secrets Manager can't replicate the secret. This error can occur even if you have changed the encryption key, if the secret has custom labelled versions that were encrypted with the disabled or deleted encryption key. For information about how Secrets Manager does encryption, see the section called "Secret encryption and decryption". To work around this issue, you can recreate the secret versions so that Secrets Manager encrypts them with the current encryption key. For more information, see Change the encryption key for a secret. Then retry replication.

```
aws secretsmanager put-secret-value \
    --secret-id testDescriptionUpdate \
    --secret-string "SecretValue" \
    --version-stages "MyCustomLabel"
```

You have not enabled the Region where the replication occurs

For information about how to enable a Region, see Managing AWS Regions. in the *AWS Account Management Reference Guide*.

Promote a replica secret to a standalone secret in AWS Secrets Manager

A replica secret is a secret that is replicated from a primary in another AWS Region. It has the same secret value and metadata as the primary, but it can be encrypted with a different KMS key. A replica secret can't be updated independently from its primary secret, except for its encryption key.

Promoting a replica secret disconnects the replica secret from the primary secret and makes the replica secret a standalone secret. Changes to the primary secret won't replicate to the standalone secret.

You might want to promote a replica secret to a standalone secret as a disaster recovery solution if the primary secret becomes unavailable. Or you might want to promote a replica to a standalone secret if you want to turn on rotation for the replica.

If you promote a replica, be sure to update the corresponding applications to use the standalone secret.

Secrets Manager generates a CloudTrail log entry when you promote a secret. For more information, see the section called “Log with AWS CloudTrail ”.

To promote a replica secret (console)

1. Log in to the Secrets Manager at https://console.aws.amazon.com/secretsmanager/.
2. Navigate to the replica region.
3. On the **Secrets** page, choose the replica secret.
4. On the replica secret details page, choose **Promote to standalone secret**.
5. In the **Promote replica to standalone secret** dialog box, enter the Region and then choose **Promote replica**.

AWS CLI

Example Promote a replica secret to a primary

The following `stop-replication-to-replica` example removes the link between a replica secret to the primary. The replica secret is promoted to a primary secret in the replica region. You must call `stop-replication-to-replica` from within the replica region.

```
aws secretsmanager stop-replication-to-replica \
    --secret-id MyTestSecret
```

AWS SDK

To promote a replica to a standalone secret, use the `StopReplicationToReplica` command. You must call this command from the replica secret Region. For more information, see the section called “AWS SDKs”.

Tag AWS Secrets Manager secrets

Secrets Manager defines a *tag* as a label consisting of a key that you define and an optional value. You can use tags to make it easy to manage, search, and filter secrets and other resources in your AWS account. When you tag your secrets, use a standard naming scheme across all of your resources. For more information, see the Tagging Best Practices whitepaper.

You can grant or deny access to a secret by checking the tags attached to the secret. For more information, see the section called "Example: Control access to secrets using tags".

You can find secrets by tags in the console, AWS CLI, and SDKs. AWS also provides the Resource Groups tool to create a custom console that consolidates and organizes your resources based on their tags. To find secrets with a specific tag, see the section called "Find secrets". Secrets Manager doesn't support tag-based cost allocation.

Never store sensitive information for a secret in a tag.

For tag quotas and naming restrictions, see Service quotas for Tagging in the *AWS General Reference guide*. Tags are case sensitive.

Secrets Manager generates a CloudTrail log entry when you tag or untag a secret. For more information, see the section called "Log with AWS CloudTrail ".

To change tags for your secret (console)

1. Open the Secrets Manager console at https://console.aws.amazon.com/secretsmanager/.
2. From the list of secrets, choose your secret.
3. In the secret details page, on the **Tags** tab, choose **Edit tags**. Tag key names and values are case sensitive, and tag keys must be unique.

AWS CLI

Example Add a tag to a secret

The following `tag-resource` example shows how to attach a tag with shorthand syntax.

```
aws secretsmanager tag-resource \
            --secret-id MyTestSecret \
            --tags Key=FirstTag,Value=FirstValue
```

Example Add multiple tags to a secret

The following `tag-resource` example attaches two key-value tags to a secret.

```
aws secretsmanager tag-resource \
            --secret-id MyTestSecret \
            --tags '[{"Key": "FirstTag", "Value": "FirstValue"}, {"Key": "SecondTag",
 "Value": "SecondValue"}]'
```

Example Remove tags from a secret

The following `untag-resource` example removes two tags from a secret. For each tag, both key and value are removed.

```
aws secretsmanager untag-resource \
            --secret-id MyTestSecret \
            --tag-keys '[ "FirstTag", "SecondTag"]'
```

AWS SDK

To change tags for your secret, use `TagResource` or `UntagResource`. For more information, see the section called “AWS SDKs”.

Retrieve secrets from AWS Secrets Manager

You can retrieve your secrets:

- In code
- In other services
- In the AWS CLI
- In the AWS console

Secrets Manager generates a CloudTrail log entry when you retrieve a secret. For more information, see the section called “Log with AWS CloudTrail ”.

In code

In applications, you can retrieve your secrets by calling `GetSecretValue` or `BatchGetSecretValue`in any of the AWS SDKs. For examples, see Get a secret value in the *AWS SDK Code Examples Library*. However, we recommend that you cache your secret values by using client-side caching. Caching secrets improves speed and reduces your costs.

- For Java applications:
  - If you store database credentials in the secret, use the Secrets Manager SQL connection drivers to connect to a database using the credentials in the secret.
  - For other types of secrets, use the Secrets Manager Java-based caching component or call the SDK directly with `GetSecretValue`.
- For Python applications, use the Secrets Manager Python-based caching component or call the SDK directly with `get_secret_value` or `batch_get_secret_value`.
- For .NET applications, use the Secrets Manager .NET-based caching component or call the SDK directly with `GetSecretValue` or `BatchGetSecretValue`.
- For Go applications, use the Secrets Manager Go-based caching component or call the SDK directly with `GetSecretValue` or `BatchGetSecretValue`.
- For JavaScript applications, call the SDK directly with `getSecretValue` or `batchGetSecretValue`.
- For PHP applications, call the SDK directly with `GetSecretValue` or `BatchGetSecretValue`.

- For Ruby applications, call the SDK directly with `get_secret_value` or `batch_get_secret_value`.
- For GitHub Actions, see the section called "GitHub jobs".

Within other systems and AWS services

You can also retrieve secrets within the following:

- For AWS Batch, you can reference secrets in a job definition.
- For AWS CloudFormation, you can create secrets and reference secrets in a CloudFormation stack.
- For Amazon ECS, you can reference secrets in a container definition.
- For Amazon EKS, you can use AWS Secrets and Configuration Provider (ASCP) to mount secrets as files in Amazon EKS.
- For GitHub, you can use the Secrets Manager GitHub action to add secrets as environment variables in your GitHub jobs.
- For AWS IoT Greengrass, you can reference secrets in a Greengrass group.
- For AWS Lambda, you can reference secrets in a Lambda function.
- For Parameter Store, you can reference secrets in a parameter.

AWS CLI

Example Retrieve the encrypted secret value of a secret

The following `get-secret-value` example gets the current secret value.

```
aws secretsmanager get-secret-value \
    --secret-id MyTestSecret
```

Example Retrieve the previous secret value

The following `get-secret-value` example gets the previous secret value.

```
aws secretsmanager get-secret-value \
```

```
        --secret-id MyTestSecret
        --version-stage AWSPREVIOUS
```

AWS console

To retrieve a secret (console)

1. Open the Secrets Manager console at https://console.aws.amazon.com/secretsmanager/.
2. In the list of secrets, choose the secret you want to retrieve.
3. In the **Secret value** section, choose **Retrieve secret value**.

   Secrets Manager displays the current version (`AWSCURRENT`) of the secret. To see other versions of the secret, such as `AWSPREVIOUS` or custom labeled versions, use the the section called "AWS CLI".

Retrieve a group of secrets in a batch from AWS Secrets Manager

Secrets Manager offers the batch API `BatchGetSecretValue` to retrieve a group of secrets in one API call. To choose which secrets to retrieve, you can specify a list of secrets by name or ARN, or you can use filters. If Secrets Manager encounters errors such as `AccessDeniedException` while attempting to retrieve any of the secrets, you can see the errors in `Errors` in the response.

Permissions for retrieving secrets in a batch

You must have `secretsmanager:GetSecretValue` permission for each secret you want to retrieve. You must also have `secretsmanager:BatchGetSecretValue` permission. If you use filters, you must also have `secretsmanager:ListSecrets`. For an example permissions policy, see the section called "Permission to retrieve a group of secret values in a batch".

> **Important**
>
> If you have a VPCE policy that denies permission to retrieve an individual secret in the group you are retrieving, `BatchGetSecretValue` will not return any secret values, and it will return an error.

AWS CLI

Example Retrieve the secret value for a group of secrets listed by name

The following batch-get-secret-value example gets the secret value for three secrets.

```
aws secretsmanager batch-get-secret-value \
          --secret-id-list MySecret1 MySecret2 MySecret3
```

Example Retrieve the secret value for a group of secrets selected by filter

The following batch-get-secret-value example gets the secret value for the secrets that have a tag named "Test".

```
aws secretsmanager batch-get-secret-value \
          --filters Key="tag-key",Values="Test"
```

Connect to a SQL database with credentials in an AWS Secrets Manager secret

In Java applications, you can use the Secrets Manager SQL Connection drivers to connect to MySQL, PostgreSQL, Oracle, MSSQLServer, Db2, and Redshift databases using credentials stored in Secrets Manager. Each driver wraps the base JDBC driver, so you can use JDBC calls to access your database. However, instead of passing a username and password for the connection, you provide the ID of a secret. The driver calls Secrets Manager to retrieve the secret value, and then uses the credentials in the secret to connect to the database. The driver also caches the credentials using the Java client-side caching library, so future connections don't require a call to Secrets Manager. By default, the cache refreshes every hour and also when the secret is rotated. To configure the cache, see the section called “SecretCacheConfiguration”.

You can download the source code from GitHub.

To use the Secrets Manager SQL Connection drivers:

- Your application must be in Java 8 or higher.
- Your secret must be one of the following:

- A database secret in the expected JSON structure. To check the format, in the Secrets Manager console, view your secret and choose **Retrieve secret value**. Alternatively, in the AWS CLI, call get-secret-value.
- An Amazon RDS managed secret. For this type of secret, you must specify an endpoint and port when you establish the connection.
- An Amazon Redshift managed secret. For this type of secret, you must specify an endpoint and port when you establish the connection.

If your database is replicated to other Regions, to connect to a replica database in another Region, you specify the regional endpoint and port when you create the connection. You can store regional connection information in the secret as extra key/value pairs, in SSM Parameter Store parameters, or in your code configuration.

To add the driver to your project, in your Maven build file `pom.xml`, add the following dependency for the driver. For more information, see Secrets Manager SQL Connection Library on the Maven Central Repository website.

```
<dependency>
    <groupId>com.amazonaws.secretsmanager</groupId>
    <artifactId>aws-secretsmanager-jdbc</artifactId>
    <version>1.0.12</version>
</dependency>
```

The driver uses the *default credential provider chain*. If you run the driver on Amazon EKS, it might pick up the credentials of the node it is running on instead of the service account role. To address this, add version 1 of `com.amazonaws:aws-java-sdk-sts` to your Gradle or Maven project file as a dependency.

To set an AWS PrivateLink DNS endpoint URL and a region in the `secretsmanager.properties` file:

```
drivers.vpcEndpointUrl = endpoint URL
drivers.vpcEndpointRegion = endpoint region
```

To override the primary region, set the `AWS_SECRET_JDBC_REGION` environment variable or make the following change to the `secretsmanager.properties` file:

```
drivers.region = region
```

Examples:

- Establish a connection to a database
- Establish a connection by specifying the endpoint and port
- Use c3p0 connection pooling to establish a connection
- Use c3p0 connection pooling to establish a connection by specifying the endpoint and port

Establish a connection to a database

The following example shows how to establish a connection to a database using the credentials and connection information in a secret. Once you have the connection, you can use JDBC calls to access the database. For more information, see JDBC Basics on the Java documentation website.

MySQL

```
// Load the JDBC driver
Class.forName( "com.amazonaws.secretsmanager.sql.AWSSecretsManagerMySQLDriver" ).newInstance

// Retrieve the connection info from the secret using the secret ARN
String URL = "secretId";

// Populate the user property with the secret ARN to retrieve user and password from
 the secret
Properties info = new Properties( );
info.put( "user", "secretId" );

// Establish the connection
conn = DriverManager.getConnection(URL, info);
```

PostgreSQL

```
// Load the JDBC driver
Class.forName( "com.amazonaws.secretsmanager.sql.AWSSecretsManagerPostgreSQLDriver" ).newIns

// Retrieve the connection info from the secret using the secret ARN
String URL = "secretId";

// Populate the user property with the secret ARN to retrieve user and password from
 the secret
Properties info = new Properties( );
info.put( "user", "secretId" );
```

```
// Establish the connection
conn = DriverManager.getConnection(URL, info);
```

Oracle

```
// Load the JDBC driver
Class.forName( "com.amazonaws.secretsmanager.sql.AWSSecretsManagerOracleDriver" ).newInstanc

// Retrieve the connection info from the secret using the secret ARN
String URL = "secretId";

// Populate the user property with the secret ARN to retrieve user and password from
 the secret
Properties info = new Properties( );
info.put( "user", "secretId" );

// Establish the connection
conn = DriverManager.getConnection(URL, info);
```

MSSQLServer

```
// Load the JDBC driver
Class.forName( "com.amazonaws.secretsmanager.sql.AWSSecretsManagerMSSQLServerDriver" ).newIn

// Retrieve the connection info from the secret using the secret ARN
String URL = "secretId";

// Populate the user property with the secret ARN to retrieve user and password from
 the secret
Properties info = new Properties( );
info.put( "user", "secretId" );

// Establish the connection
conn = DriverManager.getConnection(URL, info);
```

Db2

```
// Load the JDBC driver
Class.forName( "com.amazonaws.secretsmanager.sql.AWSSecretsManagerDb2Driver" ).newInstance()

// Retrieve the connection info from the secret using the secret ARN
String URL = "secretId";
```

```
// Populate the user property with the secret ARN to retrieve user and password from
 the secret
Properties info = new Properties( );
info.put( "user", "secretId" );

// Establish the connection
conn = DriverManager.getConnection(URL, info);
```

Redshift

```
// Load the JDBC driver
Class.forName( "com.amazonaws.secretsmanager.sql.AWSSecretsManagerRedshiftDriver" ).newInsta

// Retrieve the connection info from the secret using the secret ARN
String URL = "secretId";

// Populate the user property with the secret ARN to retrieve user and password from
 the secret
Properties info = new Properties( );
info.put( "user", "secretId" );

// Establish the connection
conn = DriverManager.getConnection(URL, info);
```

Establish a connection by specifying the endpoint and port

The following example shows how to establish a connection to a database using the credentials in a secret with an endpoint and port that you specify.

Amazon RDS managed secrets don't include the endpoint and port of the database. To connect to a database using master credentials in a secret that's managed by Amazon RDS, you specify them in your code.

Secrets that are replicated to other Regions can improve latency for the connection to the regional database, but they do not contain different connection information from the source secret. Each replica is a copy of the source secret. To store regional connection information in the secret, add more key/value pairs for the endpoint and port information for the Regions.

Once you have the connection, you can use JDBC calls to access the database. For more information, see JDBC Basics on the Java documentation website.

MySQL

```
// Load the JDBC driver
Class.forName( "com.amazonaws.secretsmanager.sql.AWSSecretsManagerMySQLDriver" ).newInstance

// Set the endpoint and port. You can also retrieve it from a key/value pair in the
 secret.
String URL = "jdbc-secretsmanager:mysql://example.com:3306";

// Populate the user property with the secret ARN to retrieve user and password from
 the secret
Properties info = new Properties( );
info.put( "user", "secretId" );

// Establish the connection
conn = DriverManager.getConnection(URL, info);
```

PostgreSQL

```
// Load the JDBC driver
Class.forName( "com.amazonaws.secretsmanager.sql.AWSSecretsManagerPostgreSQLDriver" ).newIns

// Set the endpoint and port. You can also retrieve it from a key/value pair in the
 secret.
String URL = "jdbc-secretsmanager:postgresql://example.com:5432/database";

// Populate the user property with the secret ARN to retrieve user and password from
 the secret
Properties info = new Properties( );
info.put( "user", "secretId" );

// Establish the connection
conn = DriverManager.getConnection(URL, info);
```

Oracle

```
// Load the JDBC driver
Class.forName( "com.amazonaws.secretsmanager.sql.AWSSecretsManagerOracleDriver" ).newInstanc

// Set the endpoint and port. You can also retrieve it from a key/value pair in the
 secret.
String URL = "jdbc-secretsmanager:oracle:thin:@example.com:1521/ORCL";
```

```
// Populate the user property with the secret ARN to retrieve user and password from
 the secret
Properties info = new Properties( );
info.put( "user", "secretId" );

// Establish the connection
conn = DriverManager.getConnection(URL, info);
```

MSSQLServer

```
// Load the JDBC driver
Class.forName( "com.amazonaws.secretsmanager.sql.AWSSecretsManagerMSSQLServerDriver" ).newIn

// Set the endpoint and port. You can also retrieve it from a key/value pair in the
 secret.
String URL = "jdbc-secretsmanager:sqlserver://example.com:1433";

// Populate the user property with the secret ARN to retrieve user and password from
 the secret
Properties info = new Properties( );
info.put( "user", "secretId" );

// Establish the connection
conn = DriverManager.getConnection(URL, info);
```

Db2

```
// Load the JDBC driver
Class.forName( "com.amazonaws.com.amazonaws.secretsmanager.sql.AWSSecretsManagerDb2Driver" )

// Set the endpoint and port. You can also retrieve it from a key/value pair in the
 secret.
String URL = "jdbc-secretsmanager:db2://example.com:50000";

// Populate the user property with the secret ARN to retrieve user and password from
 the secret
Properties info = new Properties( );
info.put( "user", "secretId" );

// Establish the connection
conn = DriverManager.getConnection(URL, info);
```

Redshift

```
// Load the JDBC driver
Class.forName( "com.amazonaws.com.amazonaws.secretsmanager.sql.AWSSecretsManagerRedshiftDriv

// Set the endpoint and port. You can also retrieve it from a key/value pair in the
 secret.
String URL = "jdbc-secretsmanager:redshift://example.com:5439";

// Populate the user property with the secret ARN to retrieve user and password from
 the secret
Properties info = new Properties( );
info.put( "user", "secretId" );

// Establish the connection
conn = DriverManager.getConnection(URL, info);
```

Use c3p0 connection pooling to establish a connection

The following example shows how to establish a connection pool with a `c3p0.properties` file that uses the driver to retrieve credentials and connection information from the secret. For `user` and `jdbcUrl`, enter the secret ID to configure the connection pool. Then you can retrieve connections from the pool and use them as any other database connections. For more information, see JDBC Basics on the Java documentation website.

For more information about c3p0, see c3p0 on the Machinery For Change website.

MySQL

```
c3p0.user=secretId
c3p0.driverClass=com.amazonaws.secretsmanager.sql.AWSSecretsManagerMySQLDriver
c3p0.jdbcUrl=secretId
```

PostgreSQL

```
c3p0.user=secretId
c3p0.driverClass=com.amazonaws.secretsmanager.sql.AWSSecretsManagerPostgreSQLDriver
c3p0.jdbcUrl=secretId
```

Oracle

```
c3p0.user=secretId
c3p0.driverClass=com.amazonaws.secretsmanager.sql.AWSSecretsManagerOracleDriver
c3p0.jdbcUrl=secretId
```

MSSQLServer

```
c3p0.user=secretId
c3p0.driverClass=com.amazonaws.secretsmanager.sql.AWSSecretsManagerMSSQLServerDriver
c3p0.jdbcUrl=secretId
```

Db2

```
c3p0.user=secretId
c3p0.driverClass=com.amazonaws.secretsmanager.sql.AWSSecretsManagerDb2Driver
c3p0.jdbcUrl=secretId
```

Redshift

```
c3p0.user=secretId
c3p0.driverClass=com.amazonaws.secretsmanager.sql.AWSSecretsManagerRedshiftDriver
c3p0.jdbcUrl=secretId
```

Use c3p0 connection pooling to establish a connection by specifying the endpoint and port

The following example shows how to establish a connection pool with a `c3p0.properties` file that uses the the driver to retrieve credentials in a secret with an endpoint and port that you specify. Then you can retrieve connections from the pool and use them as any other database connections. For more information, see JDBC Basics on the Java documentation website.

Amazon RDS managed secrets don't include the endpoint and port of the database. To connect to a database using master credentials in a secret that's managed by Amazon RDS, you specify them in your code.

Secrets that are replicated to other Regions can improve latency for the connection to the regional database, but they do not contain different connection information from the source secret. Each

replica is a copy of the source secret. To store regional connection information in the secret, add more key/value pairs for the endpoint and port information for the Regions.

MySQL

```
c3p0.user=secretId
c3p0.driverClass=com.amazonaws.secretsmanager.sql.AWSSecretsManagerMySQLDriver
c3p0.jdbcUrl=jdbc-secretsmanager:mysql://example.com:3306
```

PostgreSQL

```
c3p0.user=secretId
c3p0.driverClass=com.amazonaws.secretsmanager.sql.AWSSecretsManagerPostgreSQLDriver
c3p0.jdbcUrl=jdbc-secretsmanager:postgresql://example.com:5432/database
```

Oracle

```
c3p0.user=secretId
c3p0.driverClass=com.amazonaws.secretsmanager.sql.AWSSecretsManagerOracleDriver
c3p0.jdbcUrl=jdbc-secretsmanager:oracle:thin:@example.com:1521/ORCL
```

MSSQLServer

```
c3p0.user=secretId
c3p0.driverClass=com.amazonaws.secretsmanager.sql.AWSSecretsManagerMSSQLServerDriver
c3p0.jdbcUrl=jdbc-secretsmanager:sqlserver://example.com:1433
```

Db2

```
c3p0.user=secretId
c3p0.driverClass=com.amazonaws.secretsmanager.sql.AWSSecretsManagerDb2Driver
c3p0.jdbcUrl=jdbc-secretsmanager:db2://example.com:50000
```

Redshift

```
c3p0.user=secretId
c3p0.driverClass=com.amazonaws.secretsmanager.sql.AWSSecretsManagerRedshiftDriver
c3p0.jdbcUrl=jdbc-secretsmanager:redshift://example.com:5439
```

Retrieve AWS Secrets Manager secrets in Java applications

When you retrieve a secret, you can use the Secrets Manager Java-based caching component to cache it for future use. Retrieving a cached secret is faster than retrieving it from Secrets Manager. Because there is a cost for calling Secrets Manager APIs, using a cache can reduce your costs. For all of the ways you can retrieve secrets, see Retrieve secrets.

The cache policy is Least Recently Used (LRU), so when the cache must discard a secret, it discards the least recently used secret. By default, the cache refreshes secrets every hour. You can configure how often the secret is refreshed in the cache, and you can hook into the secret retrieval to add more functionality.

The cache does not force garbage collection once cache references are freed. The cache implementation does not include cache invalidation. The cache implementation is focused around the cache itself, and is not security hardened or focused. If you require additional security such as encrypting items in the cache, use the interfaces and abstract methods provided.

To use the component, you must have the following:

- A Java 8 or higher development environment. See Java SE Downloads on the Oracle website.
- The AWS SDK 1.x for Java. You can use both versions of the AWS SDK for Java in your projects. For more information, see Using the SDK for Java 1.x and 2.x side-by-side.

To download the source code, see Secrets Manager Java-based caching client component on GitHub.

To add the component to your project, in your Maven pom.xml file, include the following dependency. For more information about Maven, see the Getting Started Guide on the Apache Maven Project website.

```
<dependency>
  <groupId>com.amazonaws.secretsmanager</groupId>
  <artifactId>aws-secretsmanager-caching-java</artifactId>
  <version>1.0.2</version>
</dependency>
```

Required permissions:

- `secretsmanager:DescribeSecret`

- `secretsmanager:GetSecretValue`

For more information, see Permissions reference.

Reference

- SecretCache
- SecretCacheConfiguration
- SecretCacheHook

Example Retrieve a secret

The following code example shows a Lambda function that retrieves a secret string. It follows the best practice of instantiating the cache outside of the function handler, so it doesn't keep calling the API if you call the Lambda function again.

```
package com.amazonaws.secretsmanager.caching.examples;

    import com.amazonaws.services.lambda.runtime.Context;
    import com.amazonaws.services.lambda.runtime.RequestHandler;
    import com.amazonaws.services.lambda.runtime.LambdaLogger;

    import com.amazonaws.secretsmanager.caching.SecretCache;

    public class SampleClass implements RequestHandler<String, String> {

         private final SecretCache cache  = new SecretCache();

         @Override public String handleRequest(String secretId,  Context context) {
             final String secret  = cache.getSecretString(secretId);

            // Use the secret, return success;

        }
    }
```

SecretCache

An in-memory cache for secrets requested from Secrets Manager. You use the section called "getSecretString" or the section called "getSecretBinary" to retrieve a secret from the cache. You

can configure the cache settings by passing in a the section called "SecretCacheConfiguration" object in the constructor.

For more information, including examples, see the section called "Java applications".

Constructors

`public SecretCache()`

Default constructor for a `SecretCache` object.

`public SecretCache(AWSSecretsManagerClientBuilder builder)`

Constructs a new cache using a Secrets Manager client created using the provided `AWSSecretsManagerClientBuilder`. Use this constructor to customize the Secrets Manager client, for example to use a specific region or endpoint.

`public SecretCache(AWSSecretsManager client)`

Constructs a new secret cache using the provided `AWSSecretsManagerClient`. Use this constructor to customize the Secrets Manager client, for example to use a specific region or endpoint.

`public SecretCache(SecretCacheConfiguration config)`

Constructs a new secret cache using the provided `the section called "SecretCacheConfiguration"`.

Methods

getSecretString

`public String getSecretString(final String secretId)`

Retrieves a string secret from Secrets Manager. Returns a `String`.

getSecretBinary

`public ByteBuffer getSecretBinary(final String secretId)`

Retrieves a binary secret from Secrets Manager. Returns a `ByteBuffer`.

refreshNow

```
public boolean refreshNow(final String secretId) throws
InterruptedException
```

Forces the cache to refresh. Returns `true` if the refresh completed without error, otherwise `false`.

close

```
public void close()
```

Closes the cache.

SecretCacheConfiguration

Cache configuration options for a the section called "SecretCache", such as max cache size and Time to Live (TTL) for cached secrets.

Constructor

```
public SecretCacheConfiguration
```

Default constructor for a `SecretCacheConfiguration` object.

Methods

getClient

```
public AWSSecretsManager getClient()
```

Returns the `AWSSecretsManagerClient` that the cache retrieves secrets from.

setClient

```
public void setClient(AWSSecretsManager client)
```

Sets the `AWSSecretsManagerClient` client that the cache retrieves secrets from.

getCacheHook

```
public SecretCacheHook getCacheHook()
```

Returns the the section called "SecretCacheHook" interface used to hook cache updates.

setCacheHook

```
public void setCacheHook(SecretCacheHook cacheHook)
```

Sets the the section called “SecretCacheHook” interface used to hook cache updates.

getMaxCacheSize

```
public int getMaxCacheSize()
```

Returns the maximum cache size. The default is 1024 secrets.

setMaxCacheSize

```
public void setMaxCacheSize(int maxCacheSize)
```

Sets the maximum cache size. The default is 1024 secrets.

getCacheItemTTL

```
public long getCacheItemTTL()
```

Returns the TTL in milliseconds for the cached items. When a cached secret exceeds this TTL, the cache retrieves a new copy of the secret from the `AWSSecretsManagerClient`. The default is 1 hour in milliseconds.

The cache refreshes the secret synchronously when the secret is requested after the TTL. If the synchronous refresh fails, the cache returns the stale secret.

setCacheItemTTL

```
public void setCacheItemTTL(long cacheItemTTL)
```

Sets the TTL in milliseconds for the cached items. When a cached secret exceeds this TTL, the cache retrieves a new copy of the secret from the `AWSSecretsManagerClient`. The default is 1 hour in milliseconds.

getVersionStage

```
public String getVersionStage()
```

Returns the version of secrets that you want to cache. For more information, see Secret versions. The default is `"AWSCURRENT"`.

setVersionStage

```
public void setVersionStage(String versionStage)
```

Sets the version of secrets that you want to cache. For more information, see Secret versions. The default is `"AWSCURRENT"`.

SecretCacheConfiguration withClient

```
public SecretCacheConfiguration withClient(AWSSecretsManager client)
```

Sets the `AWSSecretsManagerClient` to retrieve secrets from. Returns the updated `SecretCacheConfiguration` object with the new setting.

SecretCacheConfiguration withCacheHook

```
public SecretCacheConfiguration withCacheHook(SecretCacheHook cacheHook)
```

Sets the interface used to hook the in-memory cache. Returns the updated `SecretCacheConfiguration` object with the new setting.

SecretCacheConfiguration withMaxCacheSize

```
public SecretCacheConfiguration withMaxCacheSize(int maxCacheSize)
```

Sets the maximum cache size. Returns the updated `SecretCacheConfiguration` object with the new setting.

SecretCacheConfiguration withCacheItemTTL

```
public SecretCacheConfiguration withCacheItemTTL(long cacheItemTTL)
```

Sets the TTL in milliseconds for the cached items. When a cached secret exceeds this TTL, the cache retrieves a new copy of the secret from the `AWSSecretsManagerClient`. The default is 1 hour in milliseconds. Returns the updated `SecretCacheConfiguration` object with the new setting.

SecretCacheConfiguration withVersionStage

```
public SecretCacheConfiguration withVersionStage(String versionStage)
```

Sets the version of secrets that you want to cache. For more information, see Secret versions. Returns the updated `SecretCacheConfiguration` object with the new setting.

SecretCacheHook

An interface to hook into a the section called “SecretCache” to perform actions on the secrets being stored in the cache.

put

```
Object put(final Object o)
```

Prepare the object for storing in the cache.

Returns the object to store in the cache.

get

```
Object get(final Object cachedObject)
```

Derive the object from the cached object.

Returns the object to return from the cache

Retrieve AWS Secrets Manager secrets in Python applications

When you retrieve a secret, you can use the Secrets Manager Python-based caching component to cache it for future use. Retrieving a cached secret is faster than retrieving it from Secrets Manager. Because there is a cost for calling Secrets Manager APIs, using a cache can reduce your costs. For all of the ways you can retrieve secrets, see Retrieve secrets.

The cache policy is Least Recently Used (LRU), so when the cache must discard a secret, it discards the least recently used secret. By default, the cache refreshes secrets every hour. You can configure how often the secret is refreshed in the cache, and you can hook into the secret retrieval to add more functionality.

The cache does not force garbage collection once cache references are freed. The cache implementation does not include cache invalidation. The cache implementation is focused around the cache itself, and is not security hardened or focused. If you require additional security such as encrypting items in the cache, use the interfaces and abstract methods provided.

To use the component, you must have the following:

- Python 3.6 or later.
- botocore 1.12 or higher. See AWS SDK for Python and Botocore.
- setuptools_scm 3.2 or higher. See https://pypi.org/project/setuptools-scm/.

To download the source code, see Secrets Manager Python-based caching client component on GitHub.

To install the component, use the following command.

```
$ pip install aws-secretsmanager-caching
```

Required permissions:

- `secretsmanager:DescribeSecret`
- `secretsmanager:GetSecretValue`

For more information, see Permissions reference.

Reference

- SecretCache
- SecretCacheConfig
- SecretCacheHook
- @InjectSecretString
- @InjectKeywordedSecretString

Example Retrieve a secret

The following example shows how to get the secret value for a secret named *mysecret*.

```
import botocore
import botocore.session
from aws_secretsmanager_caching import SecretCache, SecretCacheConfig

client = botocore.session.get_session().create_client('secretsmanager')
cache_config = SecretCacheConfig()
cache = SecretCache( config = cache_config, client = client)
```

```
secret = cache.get_secret_string('mysecret')
```

SecretCache

An in-memory cache for secrets retrieved from Secrets Manager. You use the section called "get_secret_string" or the section called "get_secret_binary" to retrieve a secret from the cache. You can configure the cache settings by passing in a the section called "SecretCacheConfig" object in the constructor.

For more information, including examples, see the section called "Python applications".

```
cache = SecretCache(
    config = the section called "SecretCacheConfig",
    client = client
)
```

These are the available methods:

- get_secret_string
- get_secret_binary

get_secret_string

Retrieves the secret string value.

Request syntax

```
response = cache.get_secret_string(
    secret_id='string',
    version_stage='string' )
```

Parameters

- `secret_id` (*string*) -- [Required] The name or ARN of the secret.
- `version_stage` (*string*) -- The version of secrets that you want to retrieve. For more information, see Secret versions. The default is 'AWSCURRENT'.

Return type

string

get_secret_binary

Retrieves the secret binary value.

Request syntax

```
response = cache.get_secret_binary(
    secret_id='string',
    version_stage='string'
)
```

Parameters

- `secret_id` (*string*) -- [Required] The name or ARN of the secret.
- `version_stage` (*string*) -- The version of secrets that you want to retrieve. For more information, see Secret versions. The default is 'AWSCURRENT'.

Return type

base64-encoded string

SecretCacheConfig

Cache configuration options for a the section called “SecretCache” such as max cache size and Time to Live (TTL) for cached secrets.

Parameters

`max_cache_size` (*int*)

The maximum cache size. The default is `1024` secrets.

`exception_retry_delay_base` (*int*)

The number of seconds to wait after an exception is encountered before retrying the request. The default is 1.

`exception_retry_growth_factor` (*int*)pur

The growth factor to use for calculating the wait time between retries of failed requests. The default is 2.

`exception_retry_delay_max` (*int*)

The maximum amount of time in seconds to wait between failed requests. The default is `3600`.

`default_version_stage` (*str*)

The version of secrets that you want to cache. For more information, see Secret versions. The default is `'AWSCURRENT'`.

`secret_refresh_interval` (*int*)

The number of seconds to wait between refreshing cached secret information. The default is `3600`.

`secret_cache_hook` (*SecretCacheHook*)

An implementation of the `SecretCacheHook` abstract class. The default value is `None`.

SecretCacheHook

An interface to hook into a a the section called "SecretCache" to perform actions on the secrets being stored in the cache.

These are the available methods:

- put
- get

put

Prepares the object for storing in the cache.

Request syntax

```
response = hook.put(
    obj='secret_object'
)
```

Parameters

- `obj` (*object*) -- [Required] The secret or object that contains the secret.

Return type

object

get

Derives the object from the cached object.

Request syntax

```
response = hook.get(
    obj='secret_object'
)
```

Parameters

- obj (*object*) -- [Required] The secret or object that contains the secret.

Return type

object

@InjectSecretString

This decorator expects a secret ID string and the section called “SecretCache” as the first and second arguments. The decorator returns the secret string value. The secret must contain a string.

```
from aws_secretsmanager_caching import SecretCache
from aws_secretsmanager_caching import InjectKeywordedSecretString,
 InjectSecretString

cache = SecretCache()

@InjectSecretString ( 'mysecret' ,  cache )
def function_to_be_decorated( arg1,  arg2,  arg3):
```

@InjectKeywordedSecretString

This decorator expects a secret ID string and the section called “SecretCache” as the first and second arguments. The remaining arguments map parameters from the wrapped function to JSON keys in the secret. The secret must contain a string in JSON structure.

For a secret that contains this JSON:

```
{
```

```
  "username": "saanvi",
  "password": "EXAMPLE-PASSWORD"
}
```

The following example shows how to extract the JSON values for `username` and `password` from the secret.

```
from aws_secretsmanager_caching import SecretCache
  from aws_secretsmanager_caching import InjectKeywordedSecretString,
 InjectSecretString

  cache = SecretCache()

  @InjectKeywordedSecretString ( secret_id = 'mysecret' ,  cache = cache ,
 func_username = 'username' ,  func_password = 'password' )
  def function_to_be_decorated( func_username,  func_password):
       print( 'Do something with the func_username and func_password parameters')
```

Retrieve AWS Secrets Manager secrets in .NET applications

When you retrieve a secret, you can use the Secrets Manager .NET-based caching component to cache it for future use. Retrieving a cached secret is faster than retrieving it from Secrets Manager. Because there is a cost for calling Secrets Manager APIs, using a cache can reduce your costs. For all of the ways you can retrieve secrets, see Retrieve secrets.

The cache policy is Least Recently Used (LRU), so when the cache must discard a secret, it discards the least recently used secret. By default, the cache refreshes secrets every hour. You can configure how often the secret is refreshed in the cache, and you can hook into the secret retrieval to add more functionality.

The cache does not force garbage collection once cache references are freed. The cache implementation does not include cache invalidation. The cache implementation is focused around the cache itself, and is not security hardened or focused. If you require additional security such as encrypting items in the cache, use the interfaces and abstract methods provided.

To use the component, you must have the following:

- .NET Framework 4.6.2 or higher, or .NET Standard 2.0 or higher. See Download .NET on the Microsoft .NET website.
- The AWS SDK for .NET. See the section called “AWS SDKs”.

To download the source code, see Caching client for .NET on GitHub.

To use the cache, first instantiate it, then retrieve your secret by using `GetSecretString` or `GetSecretBinary`. On successive retrievals, the cache returns the cached copy of the secret.

To get the caching package

- Do one of the following:
  - Run the following .NET CLI command in your project directory.

    ```
    dotnet add package AWSSDK.SecretsManager.Caching --version 1.0.6
    ```

  - Add the following package reference to your `.csproj` file.

    ```
    <ItemGroup>
        <PackageReference Include="AWSSDK.SecretsManager.Caching" Version="1.0.6" /
    >
    </ItemGroup>
    ```

Required permissions:

- `secretsmanager:DescribeSecret`
- `secretsmanager:GetSecretValue`

For more information, see Permissions reference.

Reference

- SecretsManagerCache
- SecretCacheConfiguration
- ISecretCacheHook

Example Retrieve a secret

The following code example shows a method that retrieves a secret named *`MySecret`*.

```
using Amazon.SecretsManager.Extensions.Caching;

namespace LambdaExample
```

```
{
    public class CachingExample
    {
        private const string MySecretName ="MySecret";

        private SecretsManagerCache cache = new SecretsManagerCache();

        public async Task<Response>  FunctionHandlerAsync(string input, ILambdaContext
 context)
        {
            string MySecret = await cache.GetSecretString(MySecretName);

            // Use the secret, return success

        }
    }
}
```

Example Configure the time to live (TTL) cache refresh duration

The following code example shows a method that retrieves a secret named *MySecret* and sets the TTL cache refresh duration to 24 hours.

```
using Amazon.SecretsManager.Extensions.Caching;

namespace LambdaExample
{
    public class CachingExample
    {
        private const string MySecretName = "MySecret";

        private static SecretCacheConfiguration cacheConfiguration = new
 SecretCacheConfiguration
        {
            CacheItemTTL = 86400000
        };
        private SecretsManagerCache cache = new
 SecretsManagerCache(cacheConfiguration);
        public async Task<Response> FunctionHandlerAsync(string input, ILambdaContext
 context)
        {
            string mySecret = await cache.GetSecretString(MySecretName);
```

```
            // Use the secret, return success
        }
    }
}
```

SecretsManagerCache

An in-memory cache for secrets requested from Secrets Manager. You use the section called "GetSecretString" or the section called "GetSecretBinary" to retrieve a secret from the cache. You can configure the cache settings by passing in a the section called "SecretCacheConfiguration" object in the constructor.

For more information, including examples, see the section called ".NET applications".

Constructors

`public SecretsManagerCache()`

Default constructor for a `SecretsManagerCache` object.

`public SecretsManagerCache(IAmazonSecretsManager secretsManager)`

Constructs a new cache using a Secrets Manager client created using the provided AmazonSecretsManagerClient. Use this constructor to customize the Secrets Manager client, for example to use a specific region or endpoint.

Parameters

secretsManager

The AmazonSecretsManagerClient to retrieve secrets from.

`public SecretsManagerCache(SecretCacheConfiguration config)`

Constructs a new secret cache using the provided the section called "SecretCacheConfiguration". Use this constructor to configure the cache, for example the number of secrets to cache and how often it refreshes.

Parameters

config

A the section called "SecretCacheConfiguration" that contains configuration information for the cache.

```
public SecretsManagerCache(IAmazonSecretsManager secretsManager,
SecretCacheConfiguration config)
```

Constructs a new cache using a Secrets Manager client created using the provided AmazonSecretsManagerClient and a the section called “SecretCacheConfiguration”. Use this constructor to customize the Secrets Manager client, for example to use a specific region or endpoint as well as configure the cache, for example the number of secrets to cache and how often it refreshes.

Parameters

secretsManager

The AmazonSecretsManagerClient to retrieve secrets from.

config

A the section called “SecretCacheConfiguration” that contains configuration information for the cache.

Methods

GetSecretString

```
public async Task<String> GetSecretString(String secretId)
```

Retrieves a string secret from Secrets Manager.

Parameters

secretId

The ARN or name of the secret to retrieve.

GetSecretBinary

```
public async Task<byte[]> GetSecretBinary(String secretId)
```

Retrieves a binary secret from Secrets Manager.

Parameters

secretId

The ARN or name of the secret to retrieve.

RefreshNowAsync

```
public async Task<bool> RefreshNowAsync(String secretId)
```

Requests the secret value from Secrets Manager and updates the cache with any changes. If there is no existing cache entry, creates a new one. Returns `true` if the refresh is successful.

Parameters

secretId

The ARN or name of the secret to retrieve.

GetCachedSecret

```
public SecretCacheItem GetCachedSecret(string secretId)
```

Returns the cache entry for the specified secret if it exists in the cache. Otherwise, retrieves the secret from Secrets Manager and creates a new cache entry.

Parameters

secretId

The ARN or name of the secret to retrieve.

SecretCacheConfiguration

Cache configuration options for a the section called “SecretsManagerCache”, such as maximum cache size and Time to Live (TTL) for cached secrets.

Properties

CacheItemTTL

```
public uint CacheItemTTL { get; set; }
```

The TTL of a cache item in milliseconds. The default is `3600000` ms or 1 hour. The maximum is `4294967295` ms, which is approximately 49.7 days.

MaxCacheSize

```
public ushort MaxCacheSize { get; set; }
```

The maximum cache size. The default is 1024 secrets. The maximum is 65,535.

VersionStage

```
public string VersionStage { get; set; }
```

The version of secrets that you want to cache. For more information, see Secret versions. The default is `"AWSCURRENT"`.

Client

```
public IAmazonSecretsManager Client { get; set; }
```

The AmazonSecretsManagerClient to retrieve secrets from. If it is `null`, the cache instantiates a new client. The default is `null`.

CacheHook

```
public ISecretCacheHook CacheHook { get; set; }
```

A the section called “ISecretCacheHook”.

ISecretCacheHook

An interface to hook into a the section called “SecretsManagerCache” to perform actions on the secrets being stored in the cache.

Methods

Put

```
object Put(object o);
```

Prepare the object for storing in the cache.

Returns the object to store in the cache.

Get

```
object Get(object cachedObject);
```

Derive the object from the cached object.

Returns the object to return from the cache

Retrieve AWS Secrets Manager secrets in Go applications

When you retrieve a secret, you can use the Secrets Manager Go-based caching component to cache it for future use. Retrieving a cached secret is faster than retrieving it from Secrets Manager. Because there is a cost for calling Secrets Manager APIs, using a cache can reduce your costs. For all of the ways you can retrieve secrets, see Retrieve secrets.

The cache policy is Least Recently Used (LRU), so when the cache must discard a secret, it discards the least recently used secret. By default, the cache refreshes secrets every hour. You can configure how often the secret is refreshed in the cache, and you can hook into the secret retrieval to add more functionality.

The cache does not force garbage collection once cache references are freed. The cache implementation does not include cache invalidation. The cache implementation is focused around the cache itself, and is not security hardened or focused. If you require additional security such as encrypting items in the cache, use the interfaces and abstract methods provided.

To use the component, you must have the following:

- AWS SDK for Go. See the section called “AWS SDKs”.

To download the source code, see Secrets Manager Go caching client on GitHub.

To set up a Go development environment, see Golang Getting Started on the Go Programming Language website.

Required permissions:

- `secretsmanager:DescribeSecret`
- `secretsmanager:GetSecretValue`

For more information, see Permissions reference.

Reference

- type Cache
- type CacheConfig
- type CacheHook

Example Retrieve a secret

The following code example shows a Lambda function that retrieves a secret.

```
package main

import (
  "github.com/aws/aws-lambda-go/lambda"
  "github.com/aws/aws-secretsmanager-caching-go/secretcache"
)

var (
  secretCache, _ = secretcache.New()
)

func HandleRequest(secretId string) string {
  result, _ := secretCache.GetSecretString(secretId)

  // Use the secret, return success
}

 func main() {
  lambda. Start( HandleRequest)
}
```

type Cache

An in-memory cache for secrets requested from Secrets Manager. You use the section called "GetSecretString" or the section called "GetSecretBinary" to retrieve a secret from the cache.

The following example shows how to configure the cache settings.

```
// Create a custom secretsmanager client
client := getCustomClient()
```

```
// Create a custom CacheConfig struct
config := secretcache. CacheConfig{
    MaxCacheSize:  secretcache.DefaultMaxCacheSize + 10,
    VersionStage:  secretcache.DefaultVersionStage,
    CacheItemTTL:  secretcache.DefaultCacheItemTTL,
}

// Instantiate the cache
cache, _ := secretcache.New(
    func( c *secretcache.Cache) {  c. CacheConfig = config },
    func( c *secretcache.Cache) {  c. Client = client },
)
```

For more information, including examples, see the section called “Go applications”.

Methods

New

```
func New(optFns ...func(*Cache)) (*Cache, error)
```

New constructs a secret cache using functional options, uses defaults otherwise. Initializes a SecretsManager Client from a new session. Initializes CacheConfig to default values. Initialises LRU cache with a default max size.

GetSecretString

```
func (c *Cache) GetSecretString(secretId string) (string, error)
```

GetSecretString gets the secret string value from the cache for given secret ID. Returns the secret sting and an error if operation failed.

GetSecretStringWithStage

```
func (c *Cache) GetSecretStringWithStage(secretId string, versionStage
string) (string, error)
```

GetSecretStringWithStage gets the secret string value from the cache for given secret ID and version stage. Returns the secret sting and an error if operation failed.

GetSecretBinary

```
func (c *Cache) GetSecretBinary(secretId string) ([]byte, error) {
```

GetSecretBinary gets the secret binary value from the cache for given secret ID. Returns the secret binary and an error if operation failed.

GetSecretBinaryWithStage

```
func (c *Cache) GetSecretBinaryWithStage(secretId string, versionStage
string) ([]byte, error)
```

GetSecretBinaryWithStage gets the secret binary value from the cache for given secret ID and version stage. Returns the secret binary and an error if operation failed.

type CacheConfig

Cache configuration options for a Cache, such as maximum cache size, default version stage, and Time to Live (TTL) for cached secrets.

```
type CacheConfig struct {

    // The maximum cache size. The default is 1024 secrets.
    MaxCacheSize int

    // The TTL of a cache item in nanoseconds. The default is
    // 3.6e10^12 ns or 1 hour.
    CacheItemTTL int64

    // The version of secrets that you want to cache. The default
    // is "AWSCURRENT".
    VersionStage string

    // Used to hook in-memory cache updates.
    Hook CacheHook
}
```

type CacheHook

An interface to hook into a Cache to perform actions on the secret being stored in the cache.

Methods

Put

```
Put(data interface{}) interface{}
```

Prepares the object for storing in the cache.

Get

```
Get(data interface{}) interface{}
```

Derives the object from the cached object.

Use AWS Secrets Manager secrets in AWS Batch

AWS Batch helps you to run batch computing workloads on the AWS Cloud. With AWS Batch, you can inject sensitive data into your jobs by storing your sensitive data in AWS Secrets Manager secrets and then referencing them in your job definition. For more information, see Specifying sensitive data using Secrets Manager.

Retrieve an AWS Secrets Manager secret in an AWS CloudFormation resource

With AWS CloudFormation, you can retrieve a secret to use in another AWS CloudFormation resource. A common scenario is to first create a secret with a password generated by Secrets Manager, and then retrieve the username and password from the secret to use as credentials for a new database. For information about creating secrets with AWS CloudFormation, see *AWS CloudFormation*.

To retrieve a secret in a AWS CloudFormation template, you use a *dynamic reference*. When you create the stack, the dynamic reference pulls the secret value into the AWS CloudFormation resource, so you don't have to hardcode the secret information. Instead, you refer to the secret by name or ARN. You can use a dynamic reference for a secret in any resource property. You can't use a dynamic reference for a secret in resource metadata such as `AWS::CloudFormation::Init` because that would make the secret value visible in the console.

A dynamic reference for a secret has the following pattern:

```
{{resolve:secretsmanager:secret-id:SecretString:json-key:version-stage:version-id}}
```

secret-id

The name or ARN of the secret. To access a secret in your AWS account, you can use the secret name. To access a secret in a different AWS account, use the ARN of the secret.

json-key (Optional)

The key name of the key-value pair whose value you want to retrieve. If you don't specify a `json-key`, AWS CloudFormation retrieves the entire secret text. This segment may not include the colon character (`:`).

version-stage (Optional)

The version of the secret to use. Secrets Manager uses staging labels to keep track of different versions during the rotation process. If you use `version-stage` then don't specify `version-id`. If you don't specify either `version-stage` or `version-id`, then the default is the `AWSCURRENT` version. This segment may not include the colon character (`:`).

version-id (Optional)

The unique identifier of the version of the secret to use. If you specify `version-id`, then don't specify `version-stage`. If you don't specify either `version-stage` or `version-id`, then the default is the `AWSCURRENT` version. This segment may not include the colon character (`:`).

For more information, see Using dynamic references to specify Secrets Manager secrets.

> **Note**
>
> Do not create a dynamic reference using a backslash (`\`) as the final value. AWS CloudFormation can't resolve those references, which causes a resource failure.

Use AWS Secrets Manager secrets in Amazon Elastic Container Service

Amazon Elastic Container Service (Amazon ECS) is a fully managed container orchestration service that helps you easily deploy, manage, and scale containerized applications. You can inject sensitive data into your containers by referencing Secrets Manager secrets. For more information, see the following pages in the *Amazon Elastic Container Service Developer Guide*:

- Tutorial: Specifying sensitive data using Secrets Manager secrets
- Retrieve secrets programmatically through your application
- Retrieve secrets through environment variables
- Retrieve secrets for logging configuration

Use AWS Secrets Manager secrets in Amazon Elastic Kubernetes Service

To show secrets from Secrets Manager as files mounted in Amazon EKS pods, you can use the AWS Secrets and Configuration Provider (ASCP) for the Kubernetes Secrets Store CSI Driver. The ASCP works with Amazon Elastic Kubernetes Service (Amazon EKS) 1.17+ running an Amazon EC2 node group. AWS Fargate node groups are not supported. With the ASCP, you can store and manage your secrets in Secrets Manager and then retrieve them through your workloads running on Amazon EKS. If your secret contains multiple key/value pairs in JSON format, you can choose which ones to mount in Amazon EKS. The ASCP uses JMESPath syntax to query the key/value pairs in your secret. The ASCP also works with Parameter Store parameters.

You use IAM roles and policies to grant access to your secrets to specific Amazon EKS pods in a cluster.

To describe which files to create in the Amazon EKS pod and which secrets to put in them, you create a the section called "`SecretProviderClass`" YAML file. The `SecretProviderClass` must be in the same namespace as the Amazon EKS pod it references.

If you use a private Amazon EKS cluster, ensure that the VPC that the cluster is in has a Secrets Manager endpoint. The Secrets Store CSI Driver uses the endpoint to make calls to Secrets Manager. For information about creating an endpoint in a VPC, see VPC endpoint.

If you use Secrets Manager automatic rotation for your secrets, you can also use the Secrets Store CSI Driver rotation reconciler feature to ensure you are retrieving the latest secret from Secrets Manager. For more information, see Auto rotation of mounted contents and synced Kubernetes Secrets.

For a tutorial about how to use the ASCP, see the section called "Tutorial".

Install the ASCP

The ASCP is available on GitHub in the secrets-store-csi-provider-aws repository. The repo also contains example YAML files for creating and mounting a secret.

To install the ASCP

- To install the Secrets Store CSI Driver and ASCP by using Helm, use the following commands. To ensure the repo is pointing to the latest chart, use `helm repo update`.

```
helm repo add secrets-store-csi-driver https://kubernetes-sigs.github.io/secrets-
store-csi-driver/charts
helm install -n kube-system csi-secrets-store secrets-store-csi-driver/secrets-
store-csi-driver

helm repo add aws-secrets-manager https://aws.github.io/secrets-store-csi-driver-
provider-aws
helm install -n kube-system secrets-provider-aws aws-secrets-manager/secrets-store-
csi-driver-provider-aws
```

Alternatively, to install by using the YAML file in the deployment directory, use the following commands.

```
helm repo add secrets-store-csi-driver https://kubernetes-sigs.github.io/secrets-
store-csi-driver/charts
helm install -n kube-system csi-secrets-store secrets-store-csi-driver/secrets-
store-csi-driver
kubectl apply -f https://raw.githubusercontent.com/aws/secrets-store-csi-driver-
provider-aws/main/deployment/aws-provider-installer.yaml
```

Step 1: Set up access control

To grant your Amazon EKS pod access to secrets in Secrets Manager, you first create a permissions policy that grants `secretsmanager:GetSecretValue` and `secretsmanager:DescribeSecret` permission to the secrets that the pod needs to access. For example policies, see Permissions policy examples.

Then you create an IAM role for service account and attach the policy to it. For more information, see IAM role for service accounts.

The ASCP retrieves the pod identity and exchanges it for the IAM role. ASCP assumes the IAM role of the pod, which gives it access to the secrets you authorized. Other containers can't access the secrets unless you also associate them with the IAM role.

If you use a private Amazon EKS cluster, ensure that the VPC that the cluster is in has an AWS STS endpoint. For information about creating an endpoint, see Interface VPC endpoints in the *AWS Identity and Access Management User Guide*.

Step 2: Identify which secrets to mount

To determine which secrets the ASCP mounts in Amazon EKS as files on the filesystem, you create a `SecretProviderClass` YAML file. The `SecretProviderClass` YAML lists the secrets to mount and the file name to mount them as. The `SecretProviderClass` must be in the same namespace as the Amazon EKS pod it references.

The following examples show how to use `SecretProviderClass` to describe the secrets you want to mount and what to name the files mounted in the Amazon EKS pod. For more information, see the section called "`SecretProviderClass`".

Examples:

- Example: Mount secrets by name or ARN
- Example: Mount key/value pairs from a secret
- Example: Define a failover Region for a multi-Region secret
- Example: Choose a failover secret to mount

Example: Mount secrets by name or ARN

The following example shows a `SecretProviderClass` that mounts three files in Amazon EKS:

1. A secret specified by full ARN.
2. A secret specified by name.
3. A specific version of a secret.

```
apiVersion: secrets-store.csi.x-k8s.io/v1
kind: SecretProviderClass
metadata:
  name: aws-secrets
spec:
  provider: aws
  parameters:
    objects: |
        - objectName: "arn:aws:secretsmanager:us-east-2:111122223333:secret:MySecret2-
d4e5f6"
        - objectName: "MySecret3"
          objectType: "secretsmanager"
        - objectName: "MySecret4"
```

```
          objectType: "secretsmanager"
          objectVersionLabel: "AWSCURRENT"
```

Example: Mount key/value pairs from a secret

The following example shows a `SecretProviderClass` that mounts three files in Amazon EKS:

1. A secret specified by full ARN.
2. The `username` key/value pair from the same secret.
3. The `password` key/value pair from the same secret.

```
apiVersion: secrets-store.csi.x-k8s.io/v1
kind: SecretProviderClass
metadata:
  name: aws-secrets
spec:
  provider: aws
  parameters:
    objects: |
      - objectName: "arn:aws:secretsmanager:us-east-2:111122223333:secret:MySecret-
a1b2c3"
        jmesPath:
            - path: username
              objectAlias: dbusername
            - path: password
              objectAlias: dbpassword
```

Example: Define a failover Region for a multi-Region secret

To provide availability during connectivity outages or for disaster recovery configurations, the ASCP supports an automated failover feature to retrieve secrets from a secondary region.

The following example shows a `SecretProviderClass` that retrieves a secret that is replicated to multiple Regions. In this example, the ASCP tries to retrieve the secret from both `us-east-1` and `us-east-2`. If either Region returns a 4xx error, for example for an authentication issue, the ASCP does not mount either secret. If the secret is retrieved successfully from `us-east-1`, then the ASCP mounts that secret value. If the secret is not retrieved successfully from `us-east-1`, but it is retrieved successfully from `us-east-2`, then the ASCP mounts that secret value.

```
apiVersion: secrets-store.csi.x-k8s.io/v1
```

```
kind: SecretProviderClass
metadata:
  name: aws-secrets
spec:
  provider: aws
  parameters:
    region: us-east-1
    failoverRegion: us-east-2
    objects: |
      - objectName: "MySecret"
```

Example: Choose a failover secret to mount

The following example shows a `SecretProviderClass` that specifies which secret to mount in case of failover. The failover secret isn't a replica. In this example, the ASCP tries to retrieve the two secrets specified by `objectName`. If either returns a 4xx error, for example for an authentication issue, the ASCP does not mount either secret. If the secret is retrieved successfully from `us-east-1`, then the ASCP mounts that secret value. If the secret is not retrieved successfully from `us-east-1`, but it is retrieved successfully from `us-east-2`, then the ASCP mounts that secret value. The mounted file in Amazon EKS is named `MyMountedSecret`.

```
apiVersion: secrets-store.csi.x-k8s.io/v1
kind: SecretProviderClass
metadata:
  name: aws-secrets
spec:
  provider: aws
  parameters:
    region: us-east-1
    failoverRegion: us-east-2
    objects: |
      - objectName: "arn:aws:secretsmanager:us-east-1:111122223333:secret:MySecret-
a1b2c3"
        objectAlias: "MyMountedSecret"
        failoverObject:
          - objectName: "arn:aws:secretsmanager:us-
east-2:111122223333:secret:MyFailoverSecret-d4e5f6"
```

Troubleshoot

You can view most errors by describing the pod deployment.

To see error messages for your container

1. Get a list of pod names with the following command. If you aren't using the default namespace, use `-n <NAMESPACE>`.

```
kubectl get pods
```

2. To describe the pod, in the following command, for *<PODID>* use the pod ID from the pods you found in the previous step. If you aren't using the default namespace, use `-n <NAMESPACE>`.

```
kubectl describe pod/<PODID>
```

To see errors for the ASCP

- To find more information in the provider logs, in the following command, for *<PODID>* use the ID of the *csi-secrets-store-provider-aws* pod.

```
kubectl -n kube-system get pods
kubectl -n kube-system logs pod/<PODID>
```

Tutorial: Create and mount an AWS Secrets Manager secret in an Amazon EKS pod

In this tutorial, you create an example secret in Secrets Manager, and then you mount the secret in an Amazon EKS pod and deploy it.

Before you begin, install the ASCP: the section called “Install the ASCP”.

To create and mount a secret

1. Set the AWS Region and the name of your cluster as shell variables so you can use them in bash commands. For *<REGION>*, enter the AWS Region where your Amazon EKS cluster runs. For *<CLUSTERNAME>*, enter the name of your cluster.

```
REGION=<REGION>
CLUSTERNAME=<CLUSTERNAME>
```

2. Create a test secret. For more information, see *Create and manage secrets*.

```
aws --region "$REGION" secretsmanager  create-secret --name MySecret --secret-
string '{"username":"lijuan", "password":"hunter2"}'
```

3. Create a resource policy for the pod that limits its access to the secret you created in the previous step. For *<SECRETARN>*, use the ARN of the secret. Save the policy ARN in a shell variable.

```
POLICY_ARN=$(aws --region "$REGION" --query Policy.Arn --output text iam create-
policy --policy-name nginx-deployment-policy --policy-document '{
    "Version": "2012-10-17",
    "Statement": [ {
        "Effect": "Allow",
        "Action": ["secretsmanager:GetSecretValue",
 "secretsmanager:DescribeSecret"],
        "Resource": ["<SECRETARN>"]
    } ]
}')
```

4. Create an IAM OIDC provider for the cluster if you don't already have one. For more information, see Create an IAM OIDC provider for your cluster.

```
eksctl utils associate-iam-oidc-provider --region="$REGION" --
cluster="$CLUSTERNAME" --approve # Only run this once
```

5. Create the service account the pod uses and associate the resource policy you created in step 3 with that service account. For this tutorial, for the service account name, you use *nginx-deployment-sa*. For more information, see Create an IAM role for a service account.

```
eksctl create iamserviceaccount --name nginx-deployment-sa --region="$REGION" --
cluster "$CLUSTERNAME" --attach-policy-arn "$POLICY_ARN" --approve --override-
existing-serviceaccounts
```

6. Create the `SecretProviderClass` to specify which secret to mount in the pod. The following command uses `ExampleSecretProviderClass.yaml` in the ASCP GitHub repo examples directory to mount the secret you created in step 2. For information about creating your own `SecretProviderClass`, see the section called "`SecretProviderClass`".

```
kubectl apply -f https://raw.githubusercontent.com/aws/secrets-store-csi-driver-
provider-aws/main/examples/ExampleSecretProviderClass.yaml
```

7. Deploy your pod. The following command uses `ExampleDeployment.yaml` in the ASCP GitHub repo examples directory to mount the secret in `/mnt/secrets-store` in the pod.

```
kubectl apply -f https://raw.githubusercontent.com/aws/secrets-store-csi-driver-
provider-aws/main/examples/ExampleDeployment.yaml
```

8. To verify the secret has been mounted properly, use the following command and confirm that your secret value appears.

```
kubectl exec -it $(kubectl get pods | awk '/nginx-deployment/{print $1}' | head -1)
 cat /mnt/secrets-store/MySecret; echo
```

The secret value appears.

```
{"username":"lijuan", "password":"hunter2"}
```

SecretProviderClass

You use YAML to describe which secrets to mount in Amazon EKS using the ASCP. For examples, see Identify which secrets to mount.

```
apiVersion: secrets-store.csi.x-k8s.io/v1
kind: SecretProviderClass
metadata:
   name: <NAME>
spec:
  provider: aws
  parameters:
    region:
    failoverRegion:
    pathTranslation:
    objects:
```

The field `parameters` contains the details of the mount request:

region

(Optional) The AWS Region of the secret. If you don't use this field, the ASCP looks up the Region from the annotation on the node. This lookup adds overhead to mount requests, so we recommend that you provide the Region for clusters that use large numbers of pods.

If you also specify `failoverRegion`, the ASCP tries to retrieve the secret from both Regions. If either Region returns a 4xx error, for example for an authentication issue, the ASCP does not mount either secret. If the secret is retrieved successfully from `region`, then the ASCP mounts that secret value. If the secret is not retrieved successfully from `region`, but it is retrieved successfully from `failoverRegion`, then the ASCP mounts that secret value.

failoverRegion

(Optional) If you include this field, the ASCP tries to retrieve the secret from the Regions defined in `region` and this field. If either Region returns a 4xx error, for example for an authentication issue, the ASCP does not mount either secret. If the secret is retrieved successfully from `region`, then the ASCP mounts that secret value. If the secret is not retrieved successfully from `region`, but it is retrieved successfully from `failoverRegion`, then the ASCP mounts that secret value. For an example of how to use this field, see Define a failover Region for a multi-Region secret.

pathTranslation

(Optional) A single substitution character to use if the file name in Amazon EKS will contain the path separator character, such as slash (/) on Linux. The ASCP can't create a mounted file that contains a path separator character. Instead, the ASCP replaces the path separator character with a different character. If you don't use this field, the replacement character is underscore (_), so for example, `My/Path/Secret` mounts as `My_Path_Secret`.

To prevent character substitution, enter the string `False`.

objects

A string containing a YAML declaration of the secrets to be mounted. We recommend using a YAML multi-line string or pipe (|) character.

objectName

The name or full ARN of the secret. If you use the ARN, you can omit `objectType`. This field becomes the file name of the secret in the Amazon EKS pod unless you specify `objectAlias`. If you use an ARN, the Region in the ARN must match the field `region`. If you include a `failoverRegion`, this field represents the primary `objectName`.

objectType

Required if you don't use a Secrets Manager ARN for `objectName`. Can be either `secretsmanager` or `ssmparameter`.

objectAlias

(Optional) The file name of the secret in the Amazon EKS pod. If you don't specify this field, the `objectName` appears as the file name.

objectVersion

(Optional) The version ID of the secret. Not recommended because you must update the version ID every time you update the secret. By default the most recent version is used. If you include a `failoverRegion`, this field represents the primary `objectVersion`.

objectVersionLabel

(Optional) The alias for the version. The default is the most recent version AWSCURRENT. For more information, see the section called “Version”. If you include a `failoverRegion`, this field represents the primary `objectVersionLabel`.

jmesPath

(Optional) A map of the keys in the secret to the files to be mounted in Amazon EKS. To use this field, your secret value must be in JSON format. If you use this field, you must include the subfields `path` and `objectAlias`.

path

A key from a key/value pair in the JSON of the secret value. If the field contains a hyphen, use single quotes to escape it, for example: `path: '"hyphenated-path"'`

objectAlias

The file name to be mounted in the Amazon EKS pod. If the field contains a hyphen, use single quotes to escape it, for example: `objectAlias: '"hyphenated-alias"'`

failoverObject

(Optional) If you specify this field, the ASCP tries to retrieve both the secret specified in the primary `objectName` and the secret specified in the `failoverObject` `objectName` sub-field. If either returns a 4xx error, for example for an authentication issue, the ASCP does not mount either secret. If the secret is retrieved successfully from the primary `objectName`,

then the ASCP mounts that secret value. If the secret is not retrieved successfully from the primary `objectName`, but it is retrieved successfully from the failover `objectName`, then the ASCP mounts that secret value. If you include this field, you must include the field `objectAlias`. For an example of how to use this field, see Choose a failover secret to mount.

You typically use this field when the failover secret isn't a replica. For an example of how to specify a replica, see Define a failover Region for a multi-Region secret.

objectName

The name or full ARN of the failover secret. If you use an ARN, the Region in the ARN must match the field `failoverRegion`.

objectVersion

(Optional) The version ID of the secret. Must match the primary `objectVersion`. Not recommended because you must update the version ID every time you update the secret. By default the most recent version is used.

objectVersionLabel

(Optional) The alias for the version. The default is the most recent version AWSCURRENT. For more information, see the section called “Version”.

Use AWS Secrets Manager secrets in GitHub jobs

To use a secret in a GitHub job, you can use a GitHub action to retrieve secrets from AWS Secrets Manager and add them as masked Environment variables in your GitHub workflow. For more information about GitHub Actions, see Understanding GitHub Actions in the *GitHub Docs*.

When you add a secret to your GitHub environment, it is available to all other steps in your GitHub job. Follow the guidance in Security hardening for GitHub Actions to help prevent secrets in your environment from being misused.

You can set the entire string in the secret value as the environment variable value, or if the string is JSON, you can parse the JSON to set individual environment variables for each JSON key-value pair. If the secret value is a binary, the action converts it to a string.

To view the environment variables created from your secrets, turn on debug logging. For more information, see Enabling debug logging in the *GitHub Docs*.

To use the environment variables created from your secrets, see Environment variables in the *GitHub Docs*.

Prerequisites

To use this action, you first need to configure AWS credentials and set the AWS Region in your GitHub environment by using the `configure-aws-credentials` step. Follow the instructions in Configure AWS Credentials Action For GitHub Actions to **Assume role directly using GitHub OIDC provider**. This allows you to use short-lived credentials and avoid storing additional access keys outside of Secrets Manager.

The IAM role the action assumes must have the following permissions:

- `GetSecretValue` on the secrets you want to retrieve.
- `ListSecrets` on all secrets.
- (Optional) `Decrypt` on the KMS key if the secrets are encrypted with a customer managed key.

For more information, see *Authentication and access control*.

Usage

To use the action, add a step to your workflow that uses the following syntax.

```
- name: Step name
  uses: aws-actions/aws-secretsmanager-get-secrets@v1
  with:
    secret-ids: |
      secretId1
      ENV_VAR_NAME, secretId2
    parse-json-secrets: (Optional) true|false
```

Parameters

`secret-ids`

Secret ARNS, names, and name prefixes.

By default, the step creates each environment variable name from the secret name, transformed to include only uppercase letters, numbers, and underscores, and so that it doesn't begin with a number.

To set the environment variable name, enter it before the secret ID, followed by a comma. For example `ENV_VAR_1, secretId` creates an environment variable named **ENV_VAR_1** from the secret `secretId`. The environment variable name can consist of uppercase letters, numbers, and underscores.

To use a prefix, enter at least three characters followed by an asterisk. For example `dev*` matches all secrets with a name beginning in **dev**. The maximum number of matching secrets that can be retrieved is 100. If you set the variable name, and the prefix matches multiple secrets, then the action fails.

`parse-json-secrets`

(Optional) By default, the action sets the environment variable value to the entire JSON string in the secret value. Set `parse-json-secrets` to `true` to create environment variables for each key/value pair in the JSON.

Note that if the JSON uses case-sensitive keys such as "name" and "Name", the action will have duplicate name conflicts. In this case, set `parse-json-secrets` to `false` and parse the JSON secret value separately.

Environment variable naming

The environment variables created by the action are named the same as the secrets they comes from. If you parse the JSON of the secret, then the environment variable name includes both the secret name and the JSON key name, for example `MYSECRET_KEYNAME`.

Environment variables have stricter naming requirements than secrets, so this action transforms secret names to meet those requirements. For example, the action transforms lowercase letters to uppercase letters. Because of the transformed names, two environment variables might end up with the same name. For example, a secret named "MySecret" and a secret named "mysecret" would both become environment variables named "MYSECRET". In this case, the action will fail, because environment variable names must be unique. Instead, you must specify the name you want to use for the environment variable.

You can set the environment variable name by specifying an *alias*, as shown in the following example which creates a variable named `ENV_VAR_NAME`.

```
secret-ids: |
  ENV_VAR_NAME, secretId2
```

Blank aliases

- If you set `parse-json-secrets: true` and enter a blank alias, followed by a comma and then the secret ID, the action names the environment variable the same as the parsed JSON keys. The variable names do not include the secret name.

  If the secret doesn't contain valid JSON, then the action creates one environment variable and names it the same as the secret name.
- If you set `parse-json-secrets: false` and enter a blank alias, followed by a comma and the secret ID, the action names the environment variables as if you did not specify an alias.

The following example shows a blank alias.

```
,secret2
```

Examples

Example 1 Get secrets by name and by ARN

The following example creates environment variables for secrets identified by name and by ARN.

```
- name: Get secrets by name and by ARN
  uses: aws-actions/aws-secretsmanager-get-secrets@v1
  with:
    secret-ids: |
      exampleSecretName
      arn:aws:secretsmanager:us-east-2:123456789012:secret:test1-a1b2c3
      0/test/secret
      /prod/example/secret
      SECRET_ALIAS_1,test/secret
      SECRET_ALIAS_2,arn:aws:secretsmanager:us-east-2:123456789012:secret:test2-a1b2c3
      ,secret2
```

Environment variables created:

```
EXAMPLESECRETNAME: secretValue1
TEST1: secretValue2
_0_TEST_SECRET: secretValue3
_PROD_EXAMPLE_SECRET: secretValue4
SECRET_ALIAS_1: secretValue5
```

```
SECRET_ALIAS_2: secretValue6
SECRET2: secretValue7
```

Example 2 Get all secrets that begin with a prefix

The following example creates environment variables for all secrets with names that begin with *beta*.

```
- name: Get Secret Names by Prefix
  uses: aws-actions/aws-secretsmanager-get-secrets@v1
  with:
    secret-ids: |
      beta*    # Retrieves all secrets that start with 'beta'
```

Environment variables created:

```
BETASECRETNAME: secretValue1
BETATEST: secretValue2
BETA_NEWSECRET: secretValue3
```

Example 3 Parse JSON in secret

The following example creates environment variables by parsing the JSON in the secret.

```
- name: Get Secrets by Name and by ARN
  uses: aws-actions/aws-secretsmanager-get-secrets@v1
  with:
    secret-ids: |
      test/secret
      ,secret2
    parse-json-secrets: true
```

The secret `test/secret` has the following secret value.

```
{
  "api_user": "user",
  "api_key": "key",
  "config": {
    "active": "true"
  }
}
```

The secret `secret2` has the following secret value.

```
{
  "myusername": "alejandro_rosalez",
  "mypassword": "EXAMPLE_PASSWORD"
}
```

Environment variables created:

```
TEST_SECRET_API_USER: "user"
TEST_SECRET_API_KEY: "key"
TEST_SECRET_CONFIG_ACTIVE: "true"
MYUSERNAME: "alejandro_rosalez"
MYPASSWORD: "EXAMPLE_PASSWORD"
```

Use AWS Secrets Manager secrets in AWS IoT Greengrass

AWS IoT Greengrass is software that extends cloud capabilities to local devices. This enables devices to collect and analyze data closer to the source of information, react autonomously to local events, and communicate securely with each other on local networks.

AWS IoT Greengrass lets you authenticate with services and applications from Greengrass devices without hard-coding passwords, tokens, or other secrets. You can use AWS Secrets Manager to securely store and manage your secrets in the cloud. AWS IoT Greengrass extends Secrets Manager to Greengrass core devices, so your connectors and Lambda functions can use local secrets to interact with services and applications.

To integrate a secret into a Greengrass group, you create a group resource that references the Secrets Manager secret. This secret resource references the cloud secret by using the associated ARN. To learn how to create, manage, and use secret resources, see Working with Secret Resources in the AWS IoT Developer Guide.

To deploy secrets to the AWS IoT Greengrass Core, see Deploy secrets to the AWS IoT Greengrass core.

Use AWS Secrets Manager secrets in AWS Lambda functions

You can use the AWS Parameters and Secrets Lambda Extension to retrieve and cache AWS Secrets Manager secrets in Lambda functions without using an SDK. Retrieving a cached secret is faster

than retrieving it from Secrets Manager. Because there is a cost for calling Secrets Manager APIs, using a cache can reduce your costs. The extension can retrieve both Secrets Manager secrets and Parameter Store parameters. For information about Parameter Store, see Parameter Store integration with Lambda extensions in the *AWS Systems Manager User Guide*.

A Lambda extension is a companion process that adds to the capabilities of a Lambda function. For more information, see Lambda extensions in the *Lambda Developer Guide*. For information about using the extension in a container image, see Working with Lambda layers and extensions in container images . Lambda logs execution information about the extension along with the function by using Amazon CloudWatch Logs. By default, the extension logs a minimal amount of information to CloudWatch. To log more details, set the environment variable `PARAMETERS_SECRETS_EXTENSION_LOG_LEVEL` to `debug`.

To provide the in-memory cache for parameters and secrets, the extension exposes a local HTTP endpoint, localhost port 2773, to the Lambda environment. You can configure the port by setting the environment variable `PARAMETERS_SECRETS_EXTENSION_HTTP_PORT`.

Lambda instantiates separate instances corresponding to the concurrency level that your function requires. Each instance is isolated and maintains its own local cache of your configuration data. For more information about Lambda instances and concurrency, see Managing concurrency for a Lambda function in the *Lambda Developer Guide*.

To add the extension for ARM, you must use the `arm64` architecture for your Lambda function. For more information, see Lambda instruction set architectures in the *Lambda Developer Guide*. The extension supports ARM in the following Regions: Asia Pacific (Mumbai), US East (Ohio), Europe (Ireland), Europe (Frankfurt), Europe (Zurich), US East (N. Virginia), Europe (London), Europe (Spain), Asia Pacific (Tokyo), US West (Oregon), Asia Pacific (Singapore), Asia Pacific (Hyderabad), and Asia Pacific (Sydney).

The extension uses an AWS client. For information about configuring the AWS client, see Settings reference in the *AWS SDK and Tools Reference Guide*. If your Lambda function runs in a VPC, you need to create a VPC endpoint so that the extension can make calls to Secrets Manager. For more information, see *VPC endpoint*.

To use the AWS Parameters and Secrets Lambda Extension

1. Add the layer to your function by doing one of the following:
   - Open the AWS Lambda console at https://console.aws.amazon.com/lambda/.
     a. Choose your function, choose **Layers**, and then choose **Add a layer**.

b. On the **Add layer** page, for **AWS layers**, choose **AWS Parameters and Secrets Lambda Extension**, and then choose **Add**.

- Use the following AWS CLI command with the appropriate ARN for your Region. For a list of ARNs, see AWS Parameters and Secrets Lambda Extension ARNs in the *AWS Systems Manager User Guide*.

```
aws lambda update-function-configuration \
    --function-name my-function \
    --layers LayerARN
```

2. Grant permissions to the Lambda execution role to be able to access secrets:

   - `secretsmanager:GetSecretValue` permission for the secret. See the section called "Example: Permission to retrieve individual secret values".
   - (Optional) If the secret is encrypted with a customer managed key instead of the AWS managed key `aws/secretsmanager`, the execution role also needs `kms:Decrypt` permission for the KMS key.
   - You can use Attribute Based Access Control (ABAC) with the Lambda role to allow for more granular access to secrets in the account. For more information, see the section called "Example: Control access to secrets using tags" and the section called "Example: Limit access to identities with tags that match secrets' tags".

3. Configure the cache with Lambda environment variables.

4. To retrieve secrets from the extension cache, you first need to add the `X-AWS-Parameters-Secrets-Token` to the request header. Set the token to `AWS_SESSION_TOKEN`, which is provided by Lambda for all running functions. Using this header indicates that the caller is within the Lambda environment.

   The following Python example shows how to add the header.

```
import os
headers = {"X-Aws-Parameters-Secrets-Token": os.environ.get('AWS_SESSION_TOKEN')}
```

5. To retrieve a secret within the Lambda function, use one of the following HTTP GET requests:

   - To retrieve a secret, for `secretId`, use the ARN or name of the secret.

```
GET: /secretsmanager/get?secretId=secretId
```

- To retrieve the previous secret value or a specific version by staging label, for `secretId`, use the ARN or name of the secret, and for `versionStage`, use the staging label.

```
GET: /secretsmanager/get?secretId=secretId&versionStage=AWSPREVIOUS
```

- To retrieve a specific secret version by ID, for `secretId`, use the ARN or name of the secret, and for `versionId`, use the version ID.

```
GET: /secretsmanager/get?secretId=secretId&versionId=versionId
```

Example Retrieve a secret (Python)

The following Python example shows how to retrieve a secret and parse the result using `json.loads`.

```
secrets_extension_endpoint = "http://localhost:" + \
    secrets_extension_http_port + \
    "/secretsmanager/get?secretId=" + \
    <secret_name>

  r = requests.get(secrets_extension_endpoint, headers=headers)

  secret = json.loads(r.text)["SecretString"] # load the Secrets Manager response
 into a Python dictionary, access the secret
```

AWS Parameters and Secrets Lambda Extension environment variables

You can configure the extension with the following environment variables.

For information about how to use environment variables, see Using Lambda environment variables in the *Lambda Developer Guide*.

`PARAMETERS_SECRETS_EXTENSION_CACHE_ENABLED`

Set to true to cache parameters and secrets. Set to false for no caching. Default is true.

`PARAMETERS_SECRETS_EXTENSION_CACHE_SIZE`

The maximum number of secrets and parameters to cache. Must be a value from 0 to 1000. A value of 0 means there is no caching. This variable is ignored if both `SSM_PARAMETER_STORE_TTL` and `SECRETS_MANAGER_TTL` are 0. Default is 1000.

`PARAMETERS_SECRETS_EXTENSION_HTTP_PORT`

The port for the local HTTP server. Default is 2773.

`PARAMETERS_SECRETS_EXTENSION_LOG_LEVEL`

The level of logging the extension provides: `debug`, `info`, `warn`, `error`, or none. Set to debug to see the cache configuration. Default is `info`.

`PARAMETERS_SECRETS_EXTENSION_MAX_CONNECTIONS`

Maximum number of connections for HTTP clients that the extension uses to make requests to Parameter Store or Secrets Manager. This is a per-client configuration. Default is 3.

`SECRETS_MANAGER_TIMEOUT_MILLIS`

Timeout for requests to Secrets Manager in milliseconds. A value of 0 means there is no timeout. Default is 0.

`SECRETS_MANAGER_TTL`

TTL of a secret in the cache in seconds. A value of 0 means there is no caching. The maximum is 300 seconds. This variable is ignored if `PARAMETERS_SECRETS_CACHE_SIZE` is 0. Default is 300 seconds.

`SSM_PARAMETER_STORE_TIMEOUT_MILLIS`

Timeout for requests to Parameter Store in milliseconds. A value of 0 means there is no timeout. Default is 0.

`SSM_PARAMETER_STORE_TTL`

TTL of a parameter in the cache in seconds. A value of 0 means there is no caching. The maximum is 300 seconds. This variable is ignored if `PARAMETERS_SECRETS_CACHE_SIZE` is 0. Default is 300 seconds.

Use AWS Secrets Manager secrets in Parameter Store

AWS Systems Manager Parameter Store provides secure, hierarchical storage for configuration data management and secrets management. You can store data such as passwords, database strings, and license codes as parameter values. However, Parameter Store doesn't provide automatic rotation services for stored secrets. Instead, Parameter Store enables you to store your secret in Secrets Manager, and then reference the secret as a Parameter Store parameter.

When you configure Parameter Store with Secrets Manager, the `secret-id` Parameter Store requires a forward slash (/) before the name-string.

For more information, see Referencing AWS Secrets Manager Secrets from Parameter Store Parameters in the *AWS Systems Manager User Guide*.

Rotate AWS Secrets Manager secrets

Rotation is the process of periodically updating a secret. When you rotate a secret, you update the credentials in both the secret and the database or service. In Secrets Manager, you can set up automatic rotation for your secrets.

Topics

How rotation works

> **Tip**
>
> For some Secrets managed by other services, you use *managed rotation*. To use Managed rotation, you first create the secret through the managing service.

Secrets Manager rotation uses an AWS Lambda function to update the secret and the database or service. For information about the costs of using a Lambda function, see Pricing.

To rotate a secret, Secrets Manager calls a Lambda function according to the schedule you set up. You can set a schedule to rotate after a period of time, for example every 30 days, or you can create a cron expression. See Schedule expressions. If you also manually update your secret value while automatic rotation is set up, then Secrets Manager considers that a valid rotation when it calculates the next rotation date.

For security, Secrets Manager only permits a Lambda rotation function to rotate the secret directly. The rotation function can't call a second Lambda function to rotate the secret.

Secrets Manager uses staging labels to label secret versions during rotation. During rotation, Secrets Manager calls the same function several times, each time with different parameters. Secrets Manager invokes the function with the following JSON request structure of parameters:

```
{
    "Step" : "request.type",
    "SecretId" : "string",
    "ClientRequestToken" : "string"
}
```

The rotation function does the work of rotating the secret. There are four steps to rotating a secret, which correspond to the following four steps in the Lambda rotation function:

1. **Create a new version of the secret (`createSecret`)**

   The first step of rotation is to create a new version of the secret. In the database rotation templates provided by Secrets Manager, the Lambda rotation function generates a 32 character password for the new version. The new version can contain a new password, a new username and password, or more secret information. The Lambda rotation function labels the new version `AWSPENDING`.

2. **Change the credentials in the database or service (`setSecret`)**

   Next, the Lambda rotation function changes the credentials in the database or service to match the new credentials in the `AWSPENDING` version of the secret. Depending on your rotation strategy, this step can create a new user with the same permissions as the existing user.

   Rotation functions for Amazon RDS (except Oracle and Db2) and Amazon DocumentDB automatically use Secure Socket Layer (SSL) or Transport Layer Security (TLS) to connect to your database, if it is available. Otherwise they use an unencrypted connection.

   > **Note**
   >
   > If you set up automatic secret rotation before December 20, 2021, your rotation function might be based on an older template that did not support SSL/TLS. See Determine when your rotation function was created. If it was created before December 20, 2021, to support connections that use SSL/TLS, you need to recreate your rotation function.

3. **Test the new secret version (`testSecret`)**

   Next, the Lambda rotation function tests the `AWSPENDING` version of the secret by using it to access the database or service. Rotation functions based on Rotation function templates test the new secret by using read access. Depending on the type of access your applications need, you can update the function to include other access such as write access.

4. **Finish the rotation (`finishSecret`)**

   Finally, the Lambda rotation function moves the label `AWSCURRENT` from the previous secret version to this version, which also removes the `AWSPENDING` label in the same API call. You shouldn't remove `AWSPENDING` before this point, and you shouldn't remove it by using a a separate API call, because that can indicate to Secrets Manager that the rotation did not complete successfully. Secrets Manager adds the `AWSPREVIOUS` staging label to the previous version, so that you retain the last known good version of the secret.

During rotation, Secrets Manager logs events that indicate the state of rotation. For more information, see the section called “Log with AWS CloudTrail ”.

If any rotation step fails, Secrets Manager retries the entire rotation process multiple times.

When rotation is successful, the `AWSPENDING` staging label might be attached to the same version as the `AWSCURRENT` version, or it might not be attached to any version. If the `AWSPENDING` staging label is present but not attached to the same version as `AWSCURRENT`, then any later invocation of rotation assumes that a previous rotation request is still in progress and returns an error. When rotation is unsuccessful, the `AWSPENDING` staging label might be attached to an empty secret version. For more information, see Troubleshoot rotation.

After rotation is successful, applications that Retrieve secrets from AWS Secrets Manager from Secrets Manager automatically get the updated credentials. For more details about how each step of rotation works, see the the section called “Rotation function templates”.

Managed rotation for AWS Secrets Manager secrets

Some services offer *managed rotation*, where the service configures and manages rotation for you. With managed rotation, you don't use an AWS Lambda function to update the secret and the credentials in the database. The following services offer managed rotation:

- Amazon ECS Service Connect offers managed rotation for AWS Private Certificate Authority TLS certificates. For more information, see TLS with Service Connect in the *Amazon Elastic Container Service Developer Guide*.
- Amazon RDS offers managed rotation for master user credentials. For more information, see Password management with Amazon RDS and AWS Secrets Manager in the *Amazon RDS User Guide*.
- Amazon Aurora offers managed rotation for master user credentials. For more information, see Password management with Amazon Aurora and AWS Secrets Manager in the *Amazon Aurora User Guide*.
- Amazon Redshift offers managed rotation for admin passwords. For more information, see Managing Amazon Redshift admin passwords using AWS Secrets Manager in the *Amazon Redshift Management Guide*.

For all other types of secrets, see Rotate secrets.

Rotation for managed secrets typically completes within one minute. During rotation, new connections that retrieve the secret may get the previous version of the credentials. In applications, we strongly recommend that you follow the best practice of using a database user created with the minimal privileges required for your application, rather than using the master user. For application users, for highest availability, you can use the Alternating users rotation strategy.

To change the schedule for managed rotation (console)

1. Open the managed secret in the Secrets Manager console. You can follow a link from the managing service, or search for the secret in the Secrets Manager console.
2. Under **Rotation schedule**, enter your schedule in UTC time zone in either the **Schedule expression builder** or as a **Schedule expression**. Secrets Manager stores your schedule as a `rate()` or `cron()` expression. The rotation window automatically starts at midnight unless you specify a **Start time**. You can rotate a secret as often as every four hours. For more information, see Schedule expressions.
3. (Optional) For **Window duration**, choose the length of the window during which you want Secrets Manager to rotate your secret, for example **3h** for a three hour window. The window must not extend into the next rotation window. If you don't specify **Window duration**, for a rotation schedule in hours, the window automatically closes after one hour. For a rotation schedule in days, the window automatically closes at the end of the day.
4. Choose **Save**.

To change the schedule for managed rotation (AWS CLI)

- Call `rotate-secret`. The following example rotates the secret between 16:00 and 18:00 UTC on the 1st and 15th day of the month. For more information, see Schedule expressions.

```
aws secretsmanager rotate-secret \
    --secret-id MySecret \
    --rotation-rules "{\"ScheduleExpression\": \"cron(0 16 1,15 * ? *)\",
 \"Duration\": \"2h\"}"
```

Set up automatic rotation for Amazon RDS, Amazon Aurora, Amazon Redshift, or Amazon DocumentDB secrets using the console

Rotation is the process of periodically updating a secret. When you rotate a secret, you update the credentials in both the secret and the database. In Secrets Manager, you can set up automatic rotation for your database secrets.

Secrets Manager uses Lambda functions to rotate secrets. For an overview, see the section called "How rotation works".

> **Tip**
>
> For some Secrets managed by other services, you use *managed rotation*. To use Managed rotation, you first create the secret through the managing service.

To set up rotation using the console, you need to first choose a rotation strategy. Then you configure the secret for rotation, which creates a Lambda rotation function if you don't already have one. The console also sets permissions for the Lambda function execution role. The last step is to make sure that the Lambda rotation function can access both Secrets Manager and your database through the network.

To turn on automatic rotation, you must have permission to create the IAM execution role and attach a permission policy to it. You need both `iam:CreateRole` and `iam:AttachRolePolicy` permissions.

> **Warning**
>
> Granting an identity both `iam:CreateRole` and `iam:AttachRolePolicy` permissions allows the identity to grant themselves any permissions.

Steps:

Step 1: Choose a rotation strategy and (optionally) create a superuser secret

For Amazon RDS, Amazon Redshift, and Amazon DocumentDB, Secrets Manager offers two rotation strategies:

Single user rotation strategy

This strategy updates credentials for one user in one secret. For Amazon RDS Db2 instances, because users can't change their own passwords, you must provide admin credentials in a separate secret. **This is the simplest rotation strategy, and it is appropriate for most use cases.** In particular, we recommend you use this strategy for credentials for one-time (ad hoc) or interactive users.

When the secret rotates, open database connections are not dropped. While rotation is happening, there is a short period of time between when the password in the database changes and when the secret is updated. During this time, there is a low risk of the database denying calls that use the rotated credentials. You can mitigate this risk with an appropriate retry strategy. After rotation, new connections use the new credentials.

Alternating users rotation strategy

This strategy updates credentials for two users in one secret. You create the first user, and during the first rotation, the rotation function clones it to create the second user. Every time the secret rotates, the rotation function alternates which user's password it updates. Because most users don't have permission to clone themselves, you must provide the credentials for a `superuser` in another secret. We recommend using the single-user rotation strategy when cloned users in your database don't have the same permissions as the original user, and for credentials for one-time (ad hoc) or interactive users.

This strategy is appropriate for databases with permission models where one role owns the database tables and a second role has permission to access the database tables. It is also appropriate for applications that require high availability. If an application retrieves the secret during rotation, the application still gets a valid set of credentials. After rotation, both `user` and `user_clone` credentials are valid. There is even less chance of applications getting a deny during this type of rotation than single user rotation. If the database is hosted on a server farm where the password change takes time to propagate to all servers, there is a risk of the database denying calls that use the new credentials. You can mitigate this risk with an appropriate retry strategy.

Secrets Manager creates the cloned user with the same permissions as the original user. If you change the original user's permissions after the clone is created, you must also change the cloned user's permissions.

> **Important**
>
> If you choose the *alternating users strategy*, you must Create a database secret and store database superuser credentials in it. You need a secret with superuser credentials because rotation clones the first user, and most users do not have that permission.

Step 2: Configure rotation and create a rotation function

Rotation functions for Amazon RDS (except Oracle and Db2) and Amazon DocumentDB automatically use Secure Socket Layer (SSL) or Transport Layer Security (TLS) to connect to your database, if it is available. Otherwise they use an unencrypted connection.

To turn on rotation for an Amazon RDS, Amazon DocumentDB, or Amazon Redshift secret

1. Open the Secrets Manager console at https://console.aws.amazon.com/secretsmanager/.
2. On the **Secrets** page, choose your secret.
3. On the **Secret details** page, in the **Rotation configuration** section, choose **Edit rotation**.
4. In the **Edit rotation configuration** dialog box, do the following:

   a. Turn on **Automatic rotation**.

   b. Under **Rotation schedule**, enter your schedule in UTC time zone in either the **Schedule expression builder** or as a **Schedule expression**. Secrets Manager stores your schedule as a `rate()` or `cron()` expression. The rotation window automatically starts at midnight unless you specify a **Start time**. You can rotate a secret as often as every four hours. For more information, see Schedule expressions.

   c. (Optional) For **Window duration**, choose the length of the window during which you want Secrets Manager to rotate your secret, for example **3h** for a three hour window. The window must not extend into the next rotation window. If you don't specify **Window duration**, for a rotation schedule in hours, the window automatically closes after one hour. For a rotation schedule in days, the window automatically closes at the end of the day.

   d. (Optional) Choose **Rotate immediately when the secret is stored** to rotate your secret when you save your changes. If you clear the checkbox, then the first rotation will begin on the schedule you set.

      If rotation fails, for example because Steps 3 and 4 are not yet completed, Secrets Manager retries the rotation process multiple times.

   e. Under **Rotation function**, do one of the following:

      - Choose **Create a new Lambda function** and enter a name for your new function. Secrets Manager adds `SecretsManager` to the beginning of the function name. Secrets Manager creates the function based on the appropriate template and sets the necessary permissions for the Lambda execution role.
      - Choose **Use an existing Lambda function** to reuse a rotation function you used for another secret. The rotation functions listed under **Recommended VPC configurations** have the same VPC and security group as the database, which helps the function access the database.

f. For **Rotation strategy**, choose the **Single user** or **Alternating users** strategy. For more information, see the section called "Step 1: Choose a rotation strategy and (optionally) create a superuser secret".

5. Choose **Save**.

Step 3: (Optional) Set additional permissions conditions on the rotation function

In the resource policy for your rotation function, we recommend that you include the context key `aws:SourceAccount` to help prevent Lambda from being used as a confused deputy. For some AWS services, to avoid the confused deputy scenario, AWS recommends that you use both the `aws:SourceArn` and `aws:SourceAccount` global condition keys. However, if you include the `aws:SourceArn` condition in your rotation function policy, the rotation function can only be used to rotate the secret specified by that ARN. We recommend that you include only the context key `aws:SourceAccount` so that you can use the rotation function for multiple secrets.

To update your rotation function resource policy

1. In the Secrets Manager console, choose your secret, and then on the details page, under **Rotation configuration**, choose the Lambda rotation function. The Lambda console opens.
2. Follow the instructions at Using resource-based policies for Lambda to add a `aws:sourceAccount` condition.

```
"Condition": {
    "StringEquals": {
        "AWS:SourceAccount": "123456789012"
    }
},
```

If the secret is encrypted with a KMS key other than the AWS managed key `aws/secretsmanager`, Secrets Manager grants the Lambda execution role permission to use the key. You can use the SecretARN encryption context to limit the use of the decrypt function, so the rotation function role only has access to decrypt the secret it is responsible for rotating.

To update your rotation function execution role

1. From the Lambda rotation function, choose **Configuration**, and then under **Execution role**, choose the **Role name**.
2. Follow the instructions at Modifying a role permissions policy to add a `kms:EncryptionContext:SecretARN` condition.

```
"Condition": {
    "StringEquals": {
        "kms:EncryptionContext:SecretARN": "SecretARN"
    }
},
```

Step 4: Set up network access for the rotation function

To be able to rotate a secret, the Lambda rotation function must be able to access both the secret and the database or service.

To access a secret

Your Lambda rotation function must be able to access a Secrets Manager endpoint. If your Lambda function can access the internet, then you can use a public endpoint. To find an endpoint, see the section called "Secrets Manager endpoints".

If your Lambda function runs in a VPC that doesn't have internet access, we recommend you configure Secrets Manager service private endpoints within your VPC. Your VPC can then intercept requests addressed to the public regional endpoint and redirect them to the private endpoint. For more information, see VPC endpoint.

Alternatively, you can enable your Lambda function to access a Secrets Manager public endpoint by adding a NAT gateway or an internet gateway to your VPC, which allows traffic from your VPC to reach the public endpoint. This exposes your VPC to more risk because an IP address for the gateway can be attacked from the public Internet.

To access the database or service

If your database or service is running on an Amazon EC2 instance in a VPC, we recommend that you configure your Lambda function to run in the same VPC. Then the rotation function can communicate directly with your service. For more information, see Configuring VPC access.

To allow the Lambda function to access the database or service, you must make sure that the security groups attached to your Lambda rotation function allow outbound connections to the database or service. You must also make sure that the security groups attached to your database or service allow inbound connections from the Lambda rotation function.

For alternating users rotation where the superuser secret is managed by another AWS service, the Lambda rotation function must be able to call the service endpoint to get the database connection information. We recommend that you configure a VPC endpoint for the database service. For more information, see:

- Amazon RDS API and interface VPC endpoints in the *Amazon RDS User Guide*.
- Working with VPC endpoints in the *Amazon Redshift Management Guide*.

Step 5: (Optional) Customize the rotation function

In rare cases, you might want to customize the rotation function. For example, with alternating users rotation, Secrets Manager creates the cloned user by copying the runtime configuration parameters of the first user. If you want to include more attributes, or change which ones are granted to the cloned user, you need to update the code in the `set_secret` function.

For another example, for Amazon RDS MySQL, in alternating users rotation, Secrets Manager creates a cloned user with a name no longer than 16 characters. You can modify the rotation function to allow longer usernames. MySQL version 5.7 and higher supports usernames up to 32 characters, however Secrets Manager appends "_clone" (six characters) to the end of the username, so you must keep the username to a maximum of 26 characters.

To open your Lambda rotation function for editing

1. In the Secrets Manager console, choose your secret.
2. In the **Rotation configuration** section, under **Lambda rotation function**, choose your rotation function.

   The Lambda console opens.

   - To change the code in the function, scroll down to the **Code source** section.
   - For MySQL version 5.7 and higher, for alternating users rotation, to change the maximum username length, under **Environment variables**, change `USERNAME_CHARACTER_LIMIT`.

Next steps

See the section called “Troubleshoot rotation”.

Set up automatic rotation for AWS Secrets Manager secrets using the console

Rotation is the process of periodically updating a secret. When you rotate a secret, you update the credentials in both the secret and the database or service that the secret is for.

Secrets Manager uses Lambda functions to rotate secrets. For an overview, see the section called “How rotation works”.

You can also use the AWS CLI to set up rotation. For more information, see Automatic rotation (AWS CLI).

To set up rotation using the console, you first configure the secret for rotation. During that step, you also create an empty Lambda rotation function. Next, you set permissions for the rotation function and for the Lambda execution role. Then you write the rotation function code. The last step is to make sure that the Lambda rotation function can access both Secrets Manager and your database or service through the network.

For database secrets, see the section called “Automatic rotation for database secrets (console)”.

To turn on automatic rotation, you must have permission to create the IAM execution role and attach a permission policy to it. You need both `iam:CreateRole` and `iam:AttachRolePolicy` permissions.

> **Warning**
>
> Granting an identity both `iam:CreateRole` and `iam:AttachRolePolicy` permissions allows the identity to grant themselves any permissions.

Steps:

- Step 1: Configure the secret for rotation
- Step 2: Set permissions for the rotation function
- Step 3: (Optional) Set an additional permissions condition on the rotation function

Step 1: Configure the secret for rotation

In this step, you set a rotation schedule for your secret and create an empty rotation function. Your secret will not be rotated until you finish writing the rotation function. If you schedule rotation before the rotation function is written, or if it fails for any reason, Secrets Manager will retry the rotation function multiple times.

To configure rotation and create an empty rotation function

1. Open the Secrets Manager console at https://console.aws.amazon.com/secretsmanager/.
2. On the **Secrets** page, choose your secret.
3. On the **Secret details** page, in the **Rotation configuration** section, choose **Edit rotation**. In the **Edit rotation configuration** dialog box, do the following:

    a. Turn on **Automatic rotation**.

    b. Under **Rotation schedule**, enter your schedule in UTC time zone in either the **Schedule expression builder** or as a **Schedule expression**. Secrets Manager stores your schedule as a `rate()` or `cron()` expression. The rotation window automatically starts at midnight unless you specify a **Start time**. You can rotate a secret as often as every four hours. For more information, see Schedule expressions.

    c. (Optional) For **Window duration**, choose the length of the window during which you want Secrets Manager to rotate your secret, for example **3h** for a three hour window. The window must not extend into the next rotation window. If you don't specify **Window duration**, for a rotation schedule in hours, the window automatically closes after one hour. For a rotation schedule in days, the window automatically closes at the end of the day.

    d. (Optional) Choose **Rotate immediately when the secret is stored** to rotate your secret when you save your changes. If you clear the checkbox, then the first rotation will begin on the schedule you set.

    e. Under **Rotation function**, choose **Create function**. The Lambda console opens in a new window.

- In the Lambda console, on the **Create function** page, do one of the following:
  - If you see **Browse serverless app repository**, choose it.

    A. Under **Public applications**, in the search box, enter **SecretsManagerRotationTemplate**.

    B. Choose **Show apps that create custom IAM roles or resource policies**.

    C. Choose the **SecretsManagerRotationTemplate** tile.

    D. On the **Review, configure and deploy** page, in the **Application settings** tile, fill in the required fields, and then choose **Deploy**. For a list of endpoints, see the section called “Secrets Manager endpoints”.
  - If you don't see **Browse serverless app repository**, your AWS Region might not support the AWS Serverless Application Repository. Choose **Author from scratch**.

    A. For **Function name**, enter a name for your rotation function.

    B. For **Runtime**, choose **Python 3.9**.

    C. When the new Lambda function opens, scroll down to choose **Configuration**, and then on the left choose **Permissions**.

    D. Scroll down to **Resource-based policy** and choose **Add permissions** to grant permission for Secrets Manager to invoke the function. To attach a resource policy to a Lambda function, see Using resource-based policies for Lambda.

    The following policy shows how to allow Secrets Manager to invoke the Lambda function.

```
{
    "Version": "2012-10-17",
    "Id": "default",
    "Statement": [
    {
        "Effect": "Allow",
        "Principal": {
            "Service": "secretsmanager.amazonaws.com"
            },
        "Action": "lambda:InvokeFunction",
        "Resource": "LambdaRotationFunctionARN"
    }
    ]
```

```
}
```

f. Switch back to the Secrets Manager console to attach the new rotation function to your secret.

g. For **Lambda rotation function**, choose the refresh button. Then in the list of functions, choose your new function.

h. Choose **Save**.

Step 2: Set permissions for the rotation function

The Lambda rotation function needs permission to access the secret in Secrets Manager, and it needs permission to access your database or service. In this step, you grant these permissions to the Lambda execution role. If the secret is encrypted with a KMS key other than the AWS managed key `aws/secretsmanager`, then you need to grant the Lambda execution role permission to use the key. You can use the SecretARN encryption context to limit the use of the decrypt function, so the rotation function role only has access to decrypt the secret it is responsible for rotating. For policy examples, see Permissions for rotation.

For instructions, see Lambda execution role in the *AWS Lambda Developer Guide*.

Step 3: (Optional) Set an additional permissions condition on the rotation function

In the resource policy for your rotation function, we recommend that you include the context key `aws:SourceAccount` to help prevent Lambda from being used as a confused deputy. For some AWS services, to avoid the confused deputy scenario, AWS recommends that you use both the `aws:SourceArn` and `aws:SourceAccount` global condition keys. However, if you include the `aws:SourceArn` condition in your rotation function policy, the rotation function can only be used to rotate the secret specified by that ARN. We recommend that you include only the context key `aws:SourceAccount` so that you can use the rotation function for multiple secrets.

To update your rotation function resource policy

1. In the Secrets Manager console, choose your secret, and then on the details page, under **Rotation configuration**, choose the Lambda rotation function. The Lambda console opens.
2. Follow the instructions at Using resource-based policies for Lambda to add a `aws:sourceAccount` condition.

```
"Condition": {
    "StringEquals": {
        "AWS:SourceAccount": "123456789012"
    }
},
```

Step 4: Set up network access for the rotation function

To be able to rotate a secret, the Lambda rotation function must be able to access the secret. If your secret contains credentials, then the Lambda function must also be able to access the source of those credentials, such as a database or service.

To access a secret

Your Lambda rotation function must be able to access a Secrets Manager endpoint. If your Lambda function can access the internet, then you can use a public endpoint. To find an endpoint, see the section called "Secrets Manager endpoints".

If your Lambda function runs in a VPC that doesn't have internet access, we recommend you configure Secrets Manager service private endpoints within your VPC. Your VPC can then intercept requests addressed to the public regional endpoint and redirect them to the private endpoint. For more information, see VPC endpoint.

Alternatively, you can enable your Lambda function to access a Secrets Manager public endpoint by adding a NAT gateway or an internet gateway to your VPC, which allows traffic from your VPC to reach the public endpoint. This exposes your VPC to more risk because an IP address for the gateway can be attacked from the public Internet.

(Optional) To access the database or service

For secrets such as API keys, there is no source database or service that you need to update along with the secret.

If your database or service is running on an Amazon EC2 instance in a VPC, we recommend that you configure your Lambda function to run in the same VPC. Then the rotation function can communicate directly with your service. For more information, see Configuring VPC access.

To allow the Lambda function to access the database or service, you must make sure that the security groups attached to your Lambda rotation function allow outbound connections to

the database or service. You must also make sure that the security groups attached to your database or service allow inbound connections from the Lambda rotation function.

Step 5: Write the rotation function code

The rotation function you created in Step 1 is a starting point for your function. You write the code for your specific use case. For a function that can rotate an Amazon ElastiCache secret, you can copy the code from the appropriate template supplied by Secrets Manager.

As you write your function, be cautious about including debugging or logging statements. These statements can cause information in your function to be written to Amazon CloudWatch, so you need to make sure the log doesn't include any sensitive information collected during development.

For security, Secrets Manager only permits a Lambda rotation function to rotate the secret directly. The rotation function can't call a second Lambda function to rotate the secret.

For examples of log statements, see the the section called “Rotation function templates” source code.

If you use external binaries and libraries, for example to connect to a resource, you need to manage patching them and keeping them up-to-date.

For debugging suggestions, see Testing and debugging serverless applications.

To open your Lambda rotation function for editing

1. In the Secrets Manager console, choose your secret.
2. In the **Rotation configuration** section, under **Lambda rotation function**, choose your rotation function.

   The Lambda console opens.

   - To change the code in the function, scroll down to the **Code source** section.
   - For MySQL version 5.7 and higher, for alternating users rotation, to change the maximum username length, under **Environment variables**, change `USERNAME_CHARACTER_LIMIT`.

If your function doesn't already have it, copy the code from the SecretsManagerRotationTemplate.

There are four steps to rotating a secret, which correspond to the following four methods of a Lambda rotation function.

Methods

- create_secret
- set_secret
- test_secret
- finish_secret

`create_secret`

In `create_secret`, you first check if a secret exists by calling `get_secret_value` with the passed-in `ClientRequestToken`. If there's no secret, you create a new secret with `create_secret` and the token as the `VersionId`. Then you can generate a new secret value with `get_random_password`. You must ensure the new secret value only includes characters that are valid for the database or service. Exclude characters by using the `ExcludeCharacters` parameter. Call `put_secret_value` to store it with the staging label `AWSPENDING`. Storing the new secret value in `AWSPENDING` helps ensure idempotency. If rotation fails for any reason, you can refer to that secret value in subsequent calls. See How do I make my Lambda function idempotent.

As you test your function, use the AWS CLI to see version stages: call `describe-secret` and look at `VersionIdsToStages`.

`set_secret`

In `set_secret`, you change the credential in the database or service to match the new secret value in the `AWSPENDING` version of the secret.

If you pass statements to a service that interprets statements, like a database, use query parameterization For more information, see Query Parameterization Cheat Sheet on the *OWASP web site*.

The rotation function is a privileged deputy that has the authorization to access and modify customer credentials in both the Secrets Manager secret and the target resource. To prevent a potential confused deputy attack, you need to make sure that an attacker cannot use the function to access other resources. Before you update the credential:

- Check that the credential in the `AWSCURRENT` version of the secret is valid. If the `AWSCURRENT` credential isn't valid, abandon the rotation attempt.
- Check that the `AWSCURRENT` and `AWSPENDING` secret values are for the same resource. For a username and password, check that the `AWSCURRENT` and `AWSPENDING` usernames are the same.

- Check that the destination service resource is the same. For a database, check that the AWSCURRENT and AWSPENDING host names are the same.

test_secret

In test_secret, you test the AWSPENDING version of the secret by using it to access the database or service.

finish_secret

In finish_secret, you use update_secret_version_stage to move the staging label AWSCURRENT from the previous secret version to the new secret version. Secrets Manager automatically adds the AWSPREVIOUS staging label to the previous version, so that you retain the last known good version of the secret.

Next steps

See the section called "Troubleshoot rotation".

Set up automatic rotation for AWS Secrets Manager secrets using the AWS CLI

Rotation is the process of periodically updating a secret. When you rotate a secret, you update the credentials in both the secret and the database or service that the secret is for.

Secrets Manager uses Lambda functions to rotate secrets. For an overview, see the section called "How rotation works".

You can also use the console to set up rotation. For more information, see Automatic rotation (console).

To set up rotation using the AWS CLI, if you are rotating an Amazon RDS, Amazon Redshift, or Amazon DocumentDB secret, you first need to choose a the section called "Rotation strategy". If you choose the *alternating users strategy*, you must store a separate secret with credentials for a database superuser. Next, you write the rotation function code. Secrets Manager provides templates you can base your function on. Then you create a Lambda function with your code and set permissions for both the Lambda function and the Lambda execution role. The next step is to make sure that the Lambda rotation function can access both Secrets Manager and your database or service through the network. Finally, you configure the secret for rotation.

To turn on automatic rotation, you must have permission to create the IAM execution role and attach a permission policy to it. You need both `iam:CreateRole` and `iam:AttachRolePolicy` permissions.

> **Warning**
>
> Granting an identity both `iam:CreateRole` and `iam:AttachRolePolicy` permissions allows the identity to grant themselves any permissions.

Steps:

(Optional) Step 1: Create a superuser secret

For Amazon RDS, Amazon Redshift, and Amazon DocumentDB, Secrets Manager offers two rotation strategies:

Single user rotation strategy

This strategy updates credentials for one user in one secret. For Amazon RDS Db2 instances, because users can't change their own passwords, you must provide admin credentials in a separate secret. **This is the simplest rotation strategy, and it is appropriate for most use cases.** In particular, we recommend you use this strategy for credentials for one-time (ad hoc) or interactive users.

When the secret rotates, open database connections are not dropped. While rotation is happening, there is a short period of time between when the password in the database changes and when the secret is updated. During this time, there is a low risk of the database denying calls that use the rotated credentials. You can mitigate this risk with an appropriate retry strategy. After rotation, new connections use the new credentials.

Alternating users rotation strategy

This strategy updates credentials for two users in one secret. You create the first user, and during the first rotation, the rotation function clones it to create the second user. Every time the secret rotates, the rotation function alternates which user's password it updates. Because most users don't have permission to clone themselves, you must provide the credentials for a `superuser` in another secret. We recommend using the single-user rotation strategy when cloned users in your database don't have the same permissions as the original user, and for credentials for one-time (ad hoc) or interactive users.

This strategy is appropriate for databases with permission models where one role owns the database tables and a second role has permission to access the database tables. It is also appropriate for applications that require high availability. If an application retrieves the secret during rotation, the application still gets a valid set of credentials. After rotation, both `user` and `user_clone` credentials are valid. There is even less chance of applications getting a deny during this type of rotation than single user rotation. If the database is hosted on a server farm where the password change takes time to propagate to all servers, there is a risk of the database denying calls that use the new credentials. You can mitigate this risk with an appropriate retry strategy.

Secrets Manager creates the cloned user with the same permissions as the original user. If you change the original user's permissions after the clone is created, you must also change the cloned user's permissions.

> **Important**
>
> If you choose the *alternating users strategy*, you must Create a database secret and store database superuser credentials in it. You need a secret with superuser credentials because rotation clones the first user, and most users do not have that permission.

Step 2: Write the rotation function code

To rotate a secret, you need a rotation function. A rotation function is a Lambda function that Secrets Manager calls to rotate your secret.

For a function that can rotate an Amazon RDS, Amazon Aurora, Amazon Redshift, Amazon DocumentDB, or Amazon ElastiCache secret, you can copy the code from the appropriate template supplied by Secrets Manager.

For all other types of secrets, use the generic rotation template as a starting point to write your own rotation function.

Save your rotation function in a ZIP file *my-function.zip* along with any required dependencies.

As you write your function, be cautious about including debugging or logging statements. These statements can cause information in your function to be written to Amazon CloudWatch, so you need to make sure the log doesn't include any sensitive information collected during development.

For security, Secrets Manager only permits a Lambda rotation function to rotate the secret directly. The rotation function can't call a second Lambda function to rotate the secret.

For examples of log statements, see the the section called “Rotation function templates” source code.

If you use external binaries and libraries, for example to connect to a resource, you need to manage patching them and keeping them up-to-date.

For debugging suggestions, see Testing and debugging serverless applications.

To open your Lambda rotation function for editing

1. In the Secrets Manager console, choose your secret.
2. In the **Rotation configuration** section, under **Lambda rotation function**, choose your rotation function.

   The Lambda console opens.

   - To change the code in the function, scroll down to the **Code source** section.
   - For MySQL version 5.7 and higher, for alternating users rotation, to change the maximum username length, under **Environment variables**, change `USERNAME_CHARACTER_LIMIT`.

If your function doesn't already have it, copy the code from the SecretsManagerRotationTemplate.

There are four steps to rotating a secret, which correspond to the following four methods of a Lambda rotation function.

Methods

- create_secret
- set_secret

- test_secret
- finish_secret

create_secret

In `create_secret`, you first check if a secret exists by calling `get_secret_value` with the passed-in `ClientRequestToken`. If there's no secret, you create a new secret with `create_secret` and the token as the `VersionId`. Then you can generate a new secret value with `get_random_password`. You must ensure the new secret value only includes characters that are valid for the database or service. Exclude characters by using the `ExcludeCharacters` parameter. Call `put_secret_value` to store it with the staging label `AWSPENDING`. Storing the new secret value in `AWSPENDING` helps ensure idempotency. If rotation fails for any reason, you can refer to that secret value in subsequent calls. See How do I make my Lambda function idempotent.

As you test your function, use the AWS CLI to see version stages: call `describe-secret` and look at `VersionIdsToStages`.

set_secret

In `set_secret`, you change the credential in the database or service to match the new secret value in the `AWSPENDING` version of the secret.

If you pass statements to a service that interprets statements, like a database, use query parameterization For more information, see Query Parameterization Cheat Sheet on the *OWASP web site*.

The rotation function is a privileged deputy that has the authorization to access and modify customer credentials in both the Secrets Manager secret and the target resource. To prevent a potential confused deputy attack, you need to make sure that an attacker cannot use the function to access other resources. Before you update the credential:

- Check that the credential in the `AWSCURRENT` version of the secret is valid. If the `AWSCURRENT` credential isn't valid, abandon the rotation attempt.
- Check that the `AWSCURRENT` and `AWSPENDING` secret values are for the same resource. For a username and password, check that the `AWSCURRENT` and `AWSPENDING` usernames are the same.
- Check that the destination service resource is the same. For a database, check that the `AWSCURRENT` and `AWSPENDING` host names are the same.

`test_secret`

In `test_secret`, you test the `AWSPENDING` version of the secret by using it to access the database or service.

`finish_secret`

In `finish_secret`, you use `update_secret_version_stage` to move the staging label `AWSCURRENT` from the previous secret version to the new secret version. Secrets Manager automatically adds the `AWSPREVIOUS` staging label to the previous version, so that you retain the last known good version of the secret.

Step 3: Create the Lambda function and execution role

A Lambda execution role is a role that Lambda assumes when the function is invoked.

To create a Lambda rotation function and execution role

1. Create a trust policy for the Lambda execution role and save it as a JSON file. For examples, see Permissions for rotation. The policy must:
   - Allow the role to call Secrets Manager operations on the secret.
   - Allow the role to use the KMS key if the secret is encrypted with a key other than `aws/secretsmanager`.
   - Allow the role to call the service that the secret is for.
2. Create the Lambda execution role and apply the trust policy by calling `iam create-role`.

```
aws iam create-role \
    --role-name rotation-lambda-role \
    --assume-role-policy-document file://trust-policy.json
```

3. (Optional) For a secret that contains Amazon RDS or Aurora credentials, if you are using the alternating users strategy and the superuser secret is managed by Amazon RDS, then you must allow the rotation function to call read-only APIs on Amazon RDS so that it can get the connection information for the database. To do this, attach the AWS managed policy AmazonRDSReadOnlyAccess to the Lambda function execution role by calling `iam attach-role-policy`.

```
aws iam attach-role-policy \
    --policy-arn arn:aws:iam::aws:policy/AmazonRDSReadOnlyAccess \
```

```
    --role-name rotation-lambda-role
```

4. Create the Lambda function from the ZIP file by calling lambda create-function.

```
aws lambda create-function \
    --function-name my-rotation-function \
    --runtime python3.9 \
    --zip-file fileb://my-function.zip \
    --handler my-handler \
    --role arn:aws:iam::123456789012:role/service-role/rotation-lambda-role
```

5. Set a resource policy on the Lambda function to allow Secrets Manager to invoke it by calling lambda add-permission. The example command includes source-account to help prevent Lambda from being used as a confused deputy.

```
aws lambda add-permission \
    --function-name my-rotation-function \
    --action lambda:InvokeFunction \
    --statement-id SecretsManager \
    --principal secretsmanager.amazonaws.com \
    --source-account 123456789012
```

Step 4: Set up network access

To be able to rotate a secret, the Lambda rotation function must be able to access both the secret and the database or service.

To access a secret

Your Lambda rotation function must be able to access a Secrets Manager endpoint. If your Lambda function can access the internet, then you can use a public endpoint. To find an endpoint, see the section called “Secrets Manager endpoints”.

If your Lambda function runs in a VPC that doesn't have internet access, we recommend you configure Secrets Manager service private endpoints within your VPC. Your VPC can then intercept requests addressed to the public regional endpoint and redirect them to the private endpoint. For more information, see VPC endpoint.

Alternatively, you can enable your Lambda function to access a Secrets Manager public endpoint by adding a NAT gateway or an internet gateway to your VPC, which allows traffic

from your VPC to reach the public endpoint. This exposes your VPC to more risk because an IP address for the gateway can be attacked from the public Internet.

To access the database or service

If your database or service is running on an Amazon EC2 instance in a VPC, we recommend that you configure your Lambda function to run in the same VPC. Then the rotation function can communicate directly with your service. For more information, see Configuring VPC access.

To allow the Lambda function to access the database or service, you must make sure that the security groups attached to your Lambda rotation function allow outbound connections to the database or service. You must also make sure that the security groups attached to your database or service allow inbound connections from the Lambda rotation function.

For alternating users rotation where the superuser secret is managed by another AWS service, the Lambda rotation function must be able to call the service endpoint to get the database connection information. We recommend that you configure a VPC endpoint for the database service. For more information, see:

- Amazon RDS API and interface VPC endpoints in the *Amazon RDS User Guide*.
- Working with VPC endpoints in the *Amazon Redshift Management Guide*.

Step 5: Configure the secret for rotation

To turn on automatic rotation for your secret, call `rotate-secret`. You can set a rotation schedule with a `cron()` or `rate()` schedule expression, and you can set a rotation window duration. You can rotate a secret as often as every four hours. For more information, see Schedule expressions.

```
aws secretsmanager rotate-secret \
    --secret-id MySecret \
    --rotation-lambda-arn arn:aws:lambda:Region:123456789012:function:my-rotation-
function \
    --rotation-rules "{\"ScheduleExpression\": \"cron(0 16 1,15 * ? *)\", \"Duration\":
 \"2h\"}"
```

Next steps

See the section called “Troubleshoot rotation”.

Rotate an AWS Secrets Manager secret immediately

You can only rotate a secret that has rotation configured. To determine whether a secret has been configured for rotation, in the console, view the secret and scroll down to the **Rotation configuration** section. If **Rotation status** is **Enabled**, then the secret is configured for rotation. Or in the AWS CLI, call `describe-secret`. If the response has a `RotationLambdaARN` and `RotationRules`, then the secret is configured for rotation. If not, you can set up automatic rotation:

- Automatic rotation for database secrets (console)
- Automatic rotation (console)
- Automatic rotation (AWS CLI)

To rotate a secret immediately (console)

1. Open the Secrets Manager console at https://console.aws.amazon.com/secretsmanager/.
2. Choose your secret.
3. On the secret details page, under **Rotation configuration**, choose **Rotate secret immediately**.
4. In the **Rotate secret** dialog box, choose **Rotate**.

AWS CLI

Example Rotate a secret immediately

The following `rotate-secret` example starts an immediate rotation. The output shows the VersionId of the new secret version created by rotation. The secret must already have rotation configured.

```
aws secretsmanager rotate-secret \
    --secret-id MyTestSecret
```

AWS Secrets Manager rotation function templates

Secrets Manager provides rotation function templates for:

- Amazon RDS and Amazon Aurora
- Amazon DocumentDB (with MongoDB compatibility)

- Amazon Redshift
- Amazon ElastiCache
- Other types of secrets

To use the templates, see:

- Rotate Amazon RDS, Amazon Aurora Amazon Redshift, and Amazon DocumentDB credentials
- Other types of credentials (console instructions)
- Other types of credentials (AWS CLI instructions)

The templates support Python 3.9.

To write your own rotation function, see Write a rotation function.

Amazon RDS and Amazon Aurora

Topics

Amazon RDS Db2 single user

- **Template name:** SecretsManagerRDSDb2RotationSingleUser

- **Rotation strategy:** Rotation strategy: single user.
- **`SecretString` structure:** the section called "Amazon RDS Db2 secret structure".
- **Source code:** https://github.com/aws-samples/aws-secrets-manager-rotation-lambdas/tree/master/SecretsManagerRDSDb2RotationSingleUser/lambda_function.py
- **Dependency:** python-ibmdb

Amazon RDS Db2 alternating users

- **Template name:** SecretsManagerRDSDb2RotationMultiUser
- **Rotation strategy:** the section called "Alternating users".
- **`SecretString` structure:** the section called "Amazon RDS Db2 secret structure".
- **Source code:** https://github.com/aws-samples/aws-secrets-manager-rotation-lambdas/tree/master/SecretsManagerRDSDb2RotationMultiUser/lambda_function.py
- **Dependency:** python-ibmdb

Amazon RDS MariaDB single user

- **Template name:** SecretsManagerRDSMariaDBRotationSingleUser
- **Rotation strategy:** Rotation strategy: single user.
- **`SecretString` structure:** the section called "Amazon RDS MariaDB secret structure".
- **Source code:** https://github.com/aws-samples/aws-secrets-manager-rotation-lambdas/tree/master/SecretsManagerRDSMariaDBRotationSingleUser/lambda_function.py
- **Dependency:** PyMySQL 1.0.2

Amazon RDS MariaDB alternating users

- **Template name:** SecretsManagerRDSMariaDBRotationMultiUser
- **Rotation strategy:** the section called "Alternating users".
- **`SecretString` structure:** the section called "Amazon RDS MariaDB secret structure".
- **Source code:** https://github.com/aws-samples/aws-secrets-manager-rotation-lambdas/tree/master/SecretsManagerRDSMariaDBRotationMultiUser/lambda_function.py
- **Dependency:** PyMySQL 1.0.2

Amazon RDS and Amazon Aurora MySQL single user

- **Template name:** SecretsManagerRDSMySQLRotationSingleUser
- **Rotation strategy:** the section called "Single user".
- **Expected `SecretString` structure:** the section called "Amazon RDS and Amazon Aurora MySQL secret structure".
- **Source code:** https://github.com/aws-samples/aws-secrets-manager-rotation-lambdas/tree/master/SecretsManagerRDSMySQLRotationSingleUser/lambda_function.py
- **Dependency:** PyMySQL 1.0.2

Amazon RDS and Amazon Aurora MySQL alternating users

- **Template name:** SecretsManagerRDSMySQLRotationMultiUser
- **Rotation strategy:** the section called "Alternating users".
- **Expected `SecretString` structure:** the section called "Amazon RDS and Amazon Aurora MySQL secret structure".
- **Source code:** https://github.com/aws-samples/aws-secrets-manager-rotation-lambdas/tree/master/SecretsManagerRDSMySQLRotationMultiUser/lambda_function.py
- **Dependency:** PyMySQL 1.0.2

Amazon RDS Oracle single user

- **Template name:** SecretsManagerRDSOracleRotationSingleUser
- **Rotation strategy:** the section called "Single user".
- **Expected `SecretString` structure:** the section called "Amazon RDS Oracle secret structure".
- **Source code:** https://github.com/aws-samples/aws-secrets-manager-rotation-lambdas/tree/master/SecretsManagerRDSOracleRotationSingleUser/lambda_function.py
- **Dependency:** python-oracledb 2.0.1

Amazon RDS Oracle alternating users

- **Template name:** SecretsManagerRDSOracleRotationMultiUser
- **Rotation strategy:** the section called "Alternating users".

- **Expected `SecretString` structure:** the section called “Amazon RDS Oracle secret structure”.
- **Source code:** https://github.com/aws-samples/aws-secrets-manager-rotation-lambdas/tree/master/SecretsManagerRDSOracleRotationMultiUser/lambda_function.py
- **Dependency:** python-oracledb 2.0.1

Amazon RDS and Amazon Aurora PostgreSQL single user

- **Template name:** SecretsManagerRDSPostgreSQLRotationSingleUser
- **Rotation strategy:** Rotation strategy: single user.
- **Expected `SecretString` structure:** the section called “Amazon RDS and Amazon Aurora PostgreSQL secret structure”.
- **Source code:** https://github.com/aws-samples/aws-secrets-manager-rotation-lambdas/tree/master/SecretsManagerRDSPostgreSQLRotationSingleUser/lambda_function.py
- **Dependency:** PyGreSQL 5.0.7

Amazon RDS and Amazon Aurora PostgreSQL alternating users

- **Template name:** SecretsManagerRDSPostgreSQLRotationMultiUser
- **Rotation strategy:** the section called “Alternating users”.
- **Expected `SecretString` structure:** the section called “Amazon RDS and Amazon Aurora PostgreSQL secret structure”.
- **Source code:** https://github.com/aws-samples/aws-secrets-manager-rotation-lambdas/tree/master/SecretsManagerRDSPostgreSQLRotationMultiUser/lambda_function.py
- **Dependency:** PyGreSQL 5.0.7

Amazon RDS Microsoft SQLServer single user

- **Template name:** SecretsManagerRDSSQLServerRotationSingleUser
- **Rotation strategy:** the section called “Single user”.
- **Expected `SecretString` structure:** the section called “Amazon RDS Microsoft SQLServer secret structure”.
- **Source code:** https://github.com/aws-samples/aws-secrets-manager-rotation-lambdas/tree/master/SecretsManagerRDSSQLServerRotationSingleUser/lambda_function.py

- **Dependency:** Pymssql 2.2.2

Amazon RDS Microsoft SQLServer alternating users

- **Template name:** SecretsManagerRDSSQLServerRotationMultiUser
- **Rotation strategy:** the section called "Alternating users".
- **Expected `SecretString` structure:** the section called "Amazon RDS Microsoft SQLServer secret structure".
- **Source code:** https://github.com/aws-samples/aws-secrets-manager-rotation-lambdas/tree/master/SecretsManagerRDSSQLServerRotationMultiUser/lambda_function.py
- **Dependency:** Pymssql 2.2.2

Amazon DocumentDB (with MongoDB compatibility)

Amazon DocumentDB single user

- **Template name:** SecretsManagerMongoDBRotationSingleUser
- **Rotation strategy:** the section called "Single user".
- **Expected `SecretString` structure:** the section called "Amazon DocumentDB secret structure".
- **Source code:** https://github.com/aws-samples/aws-secrets-manager-rotation-lambdas/tree/master/SecretsManagerMongoDBRotationSingleUser/lambda_function.py
- **Dependency:** Pymongo 3.2

Amazon DocumentDB alternating users

- **Template name:** SecretsManagerMongoDBRotationMultiUser
- **Rotation strategy:** the section called "Alternating users".
- **Expected `SecretString` structure:** the section called "Amazon DocumentDB secret structure".
- **Source code:** https://github.com/aws-samples/aws-secrets-manager-rotation-lambdas/tree/master/SecretsManagerMongoDBRotationMultiUser/lambda_function.py
- **Dependency:** Pymongo 3.2

Amazon Redshift

Amazon Redshift single user

- **Template name:** SecretsManagerRedshiftRotationSingleUser
- **Rotation strategy:** the section called "Single user".
- **Expected `SecretString` structure:** the section called "Amazon Redshift secret structure".
- **Source code:** https://github.com/aws-samples/aws-secrets-manager-rotation-lambdas/tree/master/SecretsManagerRedshiftRotationSingleUser/lambda_function.py
- **Dependency:** PyGreSQL 5.0.7

Amazon Redshift alternating users

- **Template name:** SecretsManagerRedshiftRotationMultiUser
- **Rotation strategy:** the section called "Alternating users".
- **Expected `SecretString` structure:** the section called "Amazon Redshift secret structure".
- **Source code:** https://github.com/aws-samples/aws-secrets-manager-rotation-lambdas/tree/master/SecretsManagerRedshiftRotationMultiUser/lambda_function.py
- **Dependency:** PyGreSQL 5.0.7

Amazon ElastiCache

To use this template, see Automatically rotating passwords for users in the *Amazon ElastiCache User Guide*.

- **Template name:** SecretsManagerElasticacheUserRotation
- **Expected `SecretString` structure:** the section called "Amazon ElastiCache secret structure".
- **Source code:** https://github.com/aws-samples/aws-secrets-manager-rotation-lambdas/tree/master/SecretsManagerElasticacheUserRotation/lambda_function.py

Other types of secrets

Secrets Manager provides this template as a starting point for you to create a rotation function for any type of secret.

- **Template name:** SecretsManagerRotationTemplate
- **Source code:** https://github.com/aws-samples/aws-secrets-manager-rotation-lambdas/tree/master/SecretsManagerRotationTemplate/lambda_function.py

As you write your function, be cautious about including debugging or logging statements. These statements can cause information in your function to be written to Amazon CloudWatch, so you need to make sure the log doesn't include any sensitive information collected during development.

For security, Secrets Manager only permits a Lambda rotation function to rotate the secret directly. The rotation function can't call a second Lambda function to rotate the secret.

For examples of log statements, see the the section called “Rotation function templates” source code.

If you use external binaries and libraries, for example to connect to a resource, you need to manage patching them and keeping them up-to-date.

For debugging suggestions, see Testing and debugging serverless applications.

There are four steps to rotating a secret, which correspond to the following four methods of a Lambda rotation function.

Methods

- create_secret
- set_secret
- test_secret
- finish_secret

`create_secret`

In `create_secret`, you first check if a secret exists by calling `get_secret_value` with the passed-in `ClientRequestToken`. If there's no secret, you create a new secret with `create_secret` and the token as the `VersionId`. Then you can generate a new secret value with `get_random_password`. You must ensure the new secret value only includes characters that are valid for the database or service. Exclude characters by using the `ExcludeCharacters` parameter. Call `put_secret_value` to store it with the staging label `AWSPENDING`. Storing the new secret

value in AWSPENDING helps ensure idempotency. If rotation fails for any reason, you can refer to that secret value in subsequent calls. See How do I make my Lambda function idempotent.

As you test your function, use the AWS CLI to see version stages: call describe-secret and look at VersionIdsToStages.

set_secret

In set_secret, you change the credential in the database or service to match the new secret value in the AWSPENDING version of the secret.

If you pass statements to a service that interprets statements, like a database, use query parameterization For more information, see Query Parameterization Cheat Sheet on the *OWASP web site*.

The rotation function is a privileged deputy that has the authorization to access and modify customer credentials in both the Secrets Manager secret and the target resource. To prevent a potential confused deputy attack, you need to make sure that an attacker cannot use the function to access other resources. Before you update the credential:

- Check that the credential in the AWSCURRENT version of the secret is valid. If the AWSCURRENT credential isn't valid, abandon the rotation attempt.
- Check that the AWSCURRENT and AWSPENDING secret values are for the same resource. For a username and password, check that the AWSCURRENT and AWSPENDING usernames are the same.
- Check that the destination service resource is the same. For a database, check that the AWSCURRENT and AWSPENDING host names are the same.

test_secret

In test_secret, you test the AWSPENDING version of the secret by using it to access the database or service.

finish_secret

In finish_secret, you use update_secret_version_stage to move the staging label AWSCURRENT from the previous secret version to the new secret version. Secrets Manager automatically adds the AWSPREVIOUS staging label to the previous version, so that you retain the last known good version of the secret.

Schedule expressions in Secrets Manager rotation

When you turn on automatic rotation, you can use a **cron()** or **rate()** expression to set the schedule for rotating your secret. With a rate expression, you can create a rotation schedule that repeats on an interval of hours or days. With a cron expression, you can create rotation schedules that are more detailed than a rotation interval. Secrets Manager rotation schedules use UTC time zone. You can rotate a secret as often as every four hours. Secrets Manager rotates your secret at any time during the rotation window.

To turn on rotation, see:

- the section called “Automatic rotation for database secrets (console)”
- the section called “Automatic rotation (console)”
- the section called “Automatic rotation (AWS CLI)”

Rate expressions

Secrets Manager rate expressions have the following format, where *`Value`* is a positive integer and *`Unit`* can be `hour`, `hours`, `day`, or `days`:

```
rate(Value Unit)
```

You can rotate a secret as often as every four hours. Examples:

- `rate(4 hours)` means the secret is rotated every four hours.
- `rate(1 day)` means the secret is rotated every day.
- `rate(10 days)` means the secret is rotated every 10 days.

For a rate in *hours*, the default rotation window starts at midnight and closes after one hour. You can set the **Window duration** to change the rotation window. The rotation window must not extend into the next rotation window. One way to check this is to confirm that the rotation window is less than or equal to the number of hours between rotations.

For a rate in *days*, the default rotation window starts at midnight and closes at the end of the day. You can set the **Window duration** to change the rotation window. The rotation window must not extend into the next UTC day. One way to check this is to confirm that the start hour plus the window duration is less than or equal to 24 hours.

Cron expressions

Cron expressions have the following format:

```
cron(Minutes Hours Day-of-month Month Day-of-week Year)
```

A cron expression that includes increments of hours resets each day. For example, `cron(0 4/12 * * ? *)` means 4:00 AM, 4:00 PM, and then the next day 4:00 AM, 4:00 PM. Secrets Manager rotation schedules use UTC time zone.

For a schedule in hours, the default rotation window closes after one hour. You can set the **Window duration** to change the rotation window. The rotation window must not go into the next rotation window. You can rotate a secret as often as every four hours.

Example schedule	Expression
Every eight hours starting at midnight.	`cron(0 /8 * * ? *)`
Every eight hours starting at 8:00 AM.	`cron(0 8/8 * * ? *)`
Every ten hours, starting at 2:00 AM. The rotation windows will start at 2:00, 12:00, and 22:00, and then the next day at 2:00, 12:00, and 22:00.	`cron(0 2/10 * * ? *)`
Every day at 10:00 AM.	`cron(0 10 * * ? *)`
Every Saturday at 6:00 PM.	`cron(0 18 ? * SAT *)`
The first day of every month at 8:00 AM.	`cron(0 8 1 * ? *)`
Every three months on the first Sunday at 1:00 AM.	`cron(0 1 ? 1/3 SUN#1 *)`
The last day of every month at 5:00 PM.	`cron(0 17 L * ? *)`
Monday through Friday at 8:00 AM.	`cron(0 8 ? * MON-FRI *)`
First and 15th day of every month at 4:00 PM.	`cron(0 16 1,15 * ? *)`

Example schedule	Expression
First Sunday of every month at midnight.	`cron(0 0 ? * SUN#1 *)`

Cron expression requirements in Secrets Manager

Secrets Manager has some restrictions on what you can use for cron expressions. A cron expression for Secrets Manager must have **0** in the minutes field because Secrets Manager rotation windows start on the hour. It must have ***** in the year field, because Secrets Manager does not support rotation schedules that are more than a year apart. The following table shows the options you can use.

Fields	Values	Wildcards
Minutes	Must be 0	None
Hours	0–23	Use **/** (forward slash) to specify increments. For example `2/10` means every 10 hours beginning at 2:00 AM. You can rotate a secret as often as every four hours.
Day-of-month	1–31	Use **,** (comma) to include additional values. For example `1,15` means the first and 15th day of the month. Use **-** (dash) to specify a range. For example 1–15 means days 1 through 15 of the month. Use ***** (asterisk) to includes all values in the field. For example `*` means every day of the month.

Fields	Values	Wildcards
		The **?** (question mark) wildcard specifies one or another. You can't specify the `Day-of-month` and `Day-of-week` fields in the same cron expression. If you specify a value in one of the fields, you must use a **?** (question mark) in the other. Use **/** (forward slash) to specify increments. For example, `1/2` means every two days starting on day 1, in other words, day 1, 3, 5, and so on. Use **L** to specify the last day of the month. Use ***DAY*L** to specify the last named day of the month. For example `SUNL` means the last Sunday of the month.

Fields	Values	Wildcards
Month	1–12 or JAN–DEC	Use **,** (comma) to include additional values. For example, `JAN,APR,JUL,OCT` means January, April, July, and October. Use **-** (dash) to specify a range. For example `1–3` means months 1 through 3 of the year. Use ***** (asterisk) to includes all values in the field. For example `*` means every month. Use **/** (forward slash) to specify increments. For example, `1/3` means every third month, starting on month 1, in other words month 1, 4, 7, and 10.

Fields	Values	Wildcards
Day-of-week	1–7 or SUN–SAT	Use **#** to specify the day of the week within a month. For example, `TUE#3` means the third Tuesday of the month. Use **,** (comma) to include additional values. For example `1,4` means the first and fourth day of the week. Use **-** (dash) to specify a range. For example `1–4` means days 1 through 4 of the week. Use ***** (asterisk) to includes all values in the field. For example `*` means every day of the week. The **?** (question mark) wildcard specifies one or another. You can't specify the `Day-of-month` and `Day-of-week` fields in the same cron expression. If you specify a value in one of the fields, you must use a **?** (question mark) in the other. Use **/** (forward slash) to specify increments. For example, `1/2` means every second day of the week, starting on the first day, so day 1, 3, 5, and 7.

Fields	Values	Wildcards
		Use **L** to specify the last day of the week.
Year	Must be *	None

Troubleshoot AWS Secrets Manager rotation

For many services, Secrets Manager uses a Lambda function to rotate secrets. For more information, see the section called “How rotation works”. The Lambda rotation function interacts with the database or service the secret is for as well as Secrets Manager. When rotation doesn't work the way you expect, you should first check the CloudWatch logs.

> **Note**
>
> Some services can manage secrets for you, including managing automatic rotation. For more information, see the section called “Managed rotation”.

To view the CloudWatch logs for your Lambda function

1. Open the Secrets Manager console at https://console.aws.amazon.com/secretsmanager/.
2. Choose your secret, and then on the details page, under **Rotation configuration**, choose the Lambda rotation function. The Lambda console opens.
3. On the **Monitor** tab, choose **Logs**, and then choose **View logs in CloudWatch**.

   The CloudWatch console opens and displays the logs for your function.

To interpret the logs

- No activity after "Found credentials in environment variables"
- No activity after "createSecret"
- Error: "Access to KMS is not allowed"
- Error: "Key is missing from secret JSON"
- Error: "setSecret: Unable to log into database"
- Error: "Unable to import module 'lambda_function'"

- Upgrade an existing rotation function from Python 3.7 to 3.9

No activity after "Found credentials in environment variables"

If there is no activity after "Found credentials in environment variables", and the task duration is long, for example the default Lambda timeout of 30000ms, then the Lambda function may be timing out while trying to reach the Secrets Manager endpoint.

Your Lambda rotation function must be able to access a Secrets Manager endpoint. If your Lambda function can access the internet, then you can use a public endpoint. To find an endpoint, see the section called “Secrets Manager endpoints”.

If your Lambda function runs in a VPC that doesn't have internet access, we recommend you configure Secrets Manager service private endpoints within your VPC. Your VPC can then intercept requests addressed to the public regional endpoint and redirect them to the private endpoint. For more information, see VPC endpoint.

Alternatively, you can enable your Lambda function to access a Secrets Manager public endpoint by adding a NAT gateway or an internet gateway to your VPC, which allows traffic from your VPC to reach the public endpoint. This exposes your VPC to more risk because an IP address for the gateway can be attacked from the public Internet.

No activity after "createSecret"

The following are issues that can cause rotation to stop after createSecret:

The VPC Network ACLs do not allow HTTPS traffic in and out.

For more information, see Control traffic to subnets using Network ACLs in the *Amazon VPC User Guide*.

Lambda function timeout configuration is too short to perform the task.

For more information, see Configuring Lambda function options in the *AWS Lambda Developer Guide*.

The Secrets Manager VPC endpoint does not allow the VPC CIDRs on ingress in the assigned security groups.

For more information, see Control traffic to resources using security groups in the *Amazon VPC User Guide*.

The Secrets Manager VPC endpoint policy does not allow Lambda to use the VPC endpoint.

For more information, see *VPC endpoint*.

The secret uses alternating users rotation, the superuser secret is managed by Amazon RDS, and the Lambda function can't access the RDS API.

For alternating users rotation where the superuser secret is managed by another AWS service, the Lambda rotation function must be able to call the service endpoint to get the database connection information. We recommend that you configure a VPC endpoint for the database service. For more information, see:

- Amazon RDS API and interface VPC endpoints in the *Amazon RDS User Guide*.
- Working with VPC endpoints in the *Amazon Redshift Management Guide*.

Error: "Access to KMS is not allowed"

If you see `ClientError: An error occurred (AccessDeniedException) when calling the GetSecretValue operation: Access to KMS is not allowed`, the rotation function does not have permission to decrypt the secret using the KMS key that was used to encrypt the secret. There might be a condition in the permissions policy that limits the encryption context to a specific secret. For information about the required permission, see the section called “Policy statement for customer managed key”.

Error: "Key is missing from secret JSON"

A Lambda rotation function requires the secret value to be in a specific JSON structure. If you see this error, then the JSON might be missing a key that the rotation function tried to access. For information about the JSON structure for each type of secret, see the section called “JSON structure of a secret”.

Error: "setSecret: Unable to log into database"

The following are issues that can cause this error:

The rotation function can't access the database.

If the task duration is long, for example over 5000ms, then the Lambda rotation function might not be able to access the database over the network.

If your database or service is running on an Amazon EC2 instance in a VPC, we recommend that you configure your Lambda function to run in the same VPC. Then the rotation function can communicate directly with your service. For more information, see Configuring VPC access.

To allow the Lambda function to access the database or service, you must make sure that the security groups attached to your Lambda rotation function allow outbound connections to the database or service. You must also make sure that the security groups attached to your database or service allow inbound connections from the Lambda rotation function.

The credentials in the secret are incorrect.

If the task duration is short, then the Lambda rotation function might not be able to authenticate with the credentials in the secret. Check the credentials by logging in manually with the information in the `AWSCURRENT` and `AWSPREVIOUS` versions of the secret using the AWS CLI command `get-secret-value`.

The database uses `scram-sha-256` to encrypt passwords.

If your database is Aurora PostgreSQL version 13 or later and uses `scram-sha-256` to encrypt passwords, but the rotation function uses `libpq` version 9 or older which does not support `scram-sha-256`, then the rotation function can't connect to the database.

To determine which database users use `scram-sha-256` encryption

- See *Checking for users with non-SCRAM passwords* in the blog SCRAM Authentication in RDS for PostgreSQL 13.

To determine which version of `libpq` your rotation function uses

1. On a Linux-based computer, on the Lambda console, navigate to your rotation function and download the deployment bundle. Uncompress the zip file into a work directory.
2. At a command line, in the work directory, run:

   ```
   readelf -a libpq.so.5 | grep RUNPATH
   ```
3. If you see the string *`PostgreSQL-9.4.x`*, or any major version less than 10, then the rotation function doesn't support `scram-sha-256`.
   - Output for a rotation function that doesn't support `scram-sha-256`:

     ```
     0x000000000000001d (RUNPATH) Library runpath: [/
     local/p4clients/pkgbuild-a1b2c/workspace/build/
     ```

```
PostgreSQL/PostgreSQL-9.4.x_client_only.123456.0/AL2_x86_64/
DEV.STD.PTHREAD/build/private/tmp/brazil-path/build.libfarm/lib:/
local/p4clients/pkgbuild-a1b2c/workspace/src/PostgreSQL/build/
private/install/lib]
```

- Output for a rotation function that supports `scram-sha-256`:

```
0x000000000000001d (RUNPATH) Library runpath: [/
local/p4clients/pkgbuild-a1b2c/workspace/build/
PostgreSQL/PostgreSQL-10.x_client_only.123456.0/AL2_x86_64/
DEV.STD.PTHREAD/build/private/tmp/brazil-path/build.libfarm/lib:/
local/p4clients/pkgbuild-a1b2c/workspace/src/PostgreSQL/build/
private/install/lib]
```

> **Note**
>
> If you set up automatic secret rotation before December 30, 2021, your rotation function bundled an older version of `libpq` that doesn't support `scram-sha-256`. To support `scram-sha-256`, you need to recreate your rotation function.

The database requires SSL/TLS access.

If your database requires an SSL/TLS connection, but the rotation function uses an unencrypted connection, then the rotation function can't connect to the database. Rotation functions for Amazon RDS (except Oracle and Db2) and Amazon DocumentDB automatically use Secure Socket Layer (SSL) or Transport Layer Security (TLS) to connect to your database, if it is available. Otherwise they use an unencrypted connection.

> **Note**
>
> If you set up automatic secret rotation before December 20, 2021, your rotation function might be based on an older template that did not support SSL/TLS. To support connections that use SSL/TLS, you need to recreate your rotation function.

To determine when your rotation function was created

1. In the Secrets Manager console https://console.aws.amazon.com/secretsmanager/, open your secret. In the **Rotation configuration** section, under **Lambda rotation function**, you see the **Lambda function ARN**, for example, `arn:aws:lambda:`*`aws-region`*`:`*`123456789012`*`:function:`*`SecretsManagerMyRotationFunction`*. Copy the function name from the end of the ARN, in this example *`SecretsManagerMyRotationFunction`* .
2. In the AWS Lambda console https://console.aws.amazon.com/lambda/, under **Functions**, paste your Lambda function name in the search box, choose Enter, and then choose the Lambda function.
3. In the function details page, on the **Configuration** tab, under **Tags**, copy the value next to the key **aws:cloudformation:stack-name**.
4. In the AWS CloudFormation console https://console.aws.amazon.com/cloudformation, under **Stacks**, paste the key value in the search box, and then choose Enter.
5. The list of stacks filters so that only the stack that created the Lambda rotation function appears. In the **Created date** column, view the date the stack was created. This is the date the Lambda rotation function was created.

Error: "Unable to import module 'lambda_function'"

You might receive this error if you're running an earlier Lambda function that was automatically upgraded from Python 3.7 to a newer version of Python. To resolve the error, you can change the Lambda function version back to Python 3.7, and then the section called “Upgrade an existing rotation function from Python 3.7 to 3.9”. For more information, see Why did my Secrets Manager Lambda function rotation fail with a “pg module not found“ error? in *AWS re:Post*.

Upgrade an existing rotation function from Python 3.7 to 3.9

Some rotation functions created before November 2022 used Python 3.7. The AWS SDK for Python stopped supporting Python 3.7 in December 2023. For more information, see Python support policy updates for AWS SDKs and Tools. To switch to a new rotation function that uses Python 3.9, you can add a runtime property to an existing rotation function or recreate the rotation function.

To find which Lambda rotation functions use Python 3.7

1. Sign in to the AWS Management Console and open the AWS Lambda console at https://console.aws.amazon.com/lambda/.
2. In the list of **Functions**, filter for **`SecretsManager`**.
3. In the filtered list of functions, under **Runtime**, look for Python 3.7.

To upgrade to Python 3.9:

- Option 1: Recreate the rotation function using AWS CloudFormation
- Option 2: Update the runtime for the existing rotation function using AWS CloudFormation
- Option 3: For AWS CDK users, upgrade the CDK library

Option 1: Recreate the rotation function using AWS CloudFormation

When you use the Secrets Manager console to turn on rotation, Secrets Manager uses AWS CloudFormation to create the necessary resources, including the Lambda rotation function. If you used the console to turn on rotation, or you created the rotation function using a AWS CloudFormation stack, you can use the same AWS CloudFormation stack to recreate the rotation function with a new name. The new function uses the more recent version of Python.

To find the AWS CloudFormation stack that created the rotation function

- On the Lambda function details page, on the **Configuration** tab, choose **Tags**. View the ARN next to **aws:cloudformation:stack-id**.

  The stack name is embedded in the ARN, as shown in the following example.

  - ARN: `arn:aws:cloudformation:us-west-2:408736277230:stack/`**`SecretsManagerRDSMySQLRotationSingleUser5c2-SecretRotationScheduleHostedRotationLambda`**`-3CUDHZMDMBO8/79fc9050-2eef-11ed-`
  - Stack name: **`SecretsManagerRDSMySQLRotationSingleUser5c2-SecretRotationScheduleHostedRotationLambda`**

To recreate a rotation function (AWS CloudFormation)

1. In AWS CloudFormation, search for the stack by name, and then choose **Update**.

If a dialog box appears recommending you update the root stack, choose **Go to root stack**, and then choose **Update**.

2. On the **Update stack** page, choose **Edit template in designer**, and then choose **View in Designer**.
3. In the designer, in the template code, in `SecretRotationScheduleHostedRotationLambda`, replace the value for `"functionName": "SecretsManagerTestRotationRDS"` with a new function name, for example in JSON, **`"functionName": "SecretsManagerTestRotationRDSupdated"`**
4. Continue through the AWS CloudFormation stack workflow and then choose **Submit**.

Option 2: Update the runtime for the existing rotation function using AWS CloudFormation

When you use the Secrets Manager console to turn on rotation, Secrets Manager uses AWS CloudFormation to create the necessary resources, including the Lambda rotation function. If you used the console to turn on rotation, or you created the rotation function using a AWS CloudFormation stack, you can use the same AWS CloudFormation stack to update the runtime for the rotation function.

To find the AWS CloudFormation stack that created the rotation function

- On the Lambda function details page, on the **Configuration** tab, choose **Tags**. View the ARN next to **aws:cloudformation:stack-id**.

  The stack name is embedded in the ARN, as shown in the following example.

  - ARN: `arn:aws:cloudformation:us-west-2:408736277230:stack/`**`SecretsManagerRDSMySQLRotationSingleUser5c2-SecretRotationScheduleHostedRotationLambda`**`-3CUDHZMDMBO8/79fc9050-2eef-11ed-`
  - Stack name: **`SecretsManagerRDSMySQLRotationSingleUser5c2-SecretRotationScheduleHostedRotationLambda`**

To update the runtime for a rotation function (AWS CloudFormation)

1. In AWS CloudFormation, search for the stack by name, and then choose **Update**.

If a dialog box appears recommending you update the root stack, choose **Go to root stack**, and then choose **Update**.

2. On the **Update stack** page, choose **Edit template in designer**, and then choose **View in Designer**.
3. In the designer, in the template code, in the properties for the `SecretRotationScheduleHostedRotationLambda`, in JSON add **`"Runtime": "python3.9"`**
4. Continue through the AWS CloudFormation stack workflow and then choose **Submit**.

Option 3: For AWS CDK users, upgrade the CDK library

If you used the AWS CDK prior to version v2.94.0 to set up rotation for your secret, you can update the Lambda function by upgrading to v2.94.0 or later. For more information, see the AWS Cloud Development Kit (AWS CDK) v2 Developer Guide.

AWS Secrets Manager secrets managed by other AWS services

Many AWS services store and use secrets in AWS Secrets Manager. In some cases, these secrets are *managed secrets*, which means that the service that created them helps manage them. For example, some managed secrets include managed rotation, so you don't have to configure rotation yourself. The managing service might also restrict you from updating secrets or deleting them without a recovery period, which helps prevent outages because the managing service depends on the secret.

Managed secrets use a naming convention that includes the managing service ID to help identify them.

```
Secret name: ServiceID!MySecret
Secret ARN : arn:aws:us-east-1:ServiceID!MySecret-a1b2c3
```

IDs for services that manage secrets

- `appflow` – the section called “Amazon AppFlow”
- `databrew` – the section called “AWS Glue DataBrew”
- `datasync` – the section called “AWS DataSync”
- `directconnect` – the section called “AWS Direct Connect”
- `ecs-sc` – the section called “Amazon Elastic Container Service”
- `events` – the section called “Amazon EventBridge”
- `marketplace-deployment` – the section called “AWS Marketplace”
- `opsworks-cm` – the section called “AWS OpsWorks for Chef Automate”
- `rds` – the section called “Amazon RDS and Aurora”
- `redshift` – the section called “Amazon Redshift”
- `sqlworkbench` – the section called “Amazon Redshift query editor v2”

To find secrets that are managed by other AWS services, see Find managed secrets.

For a full list of services that use secrets, see the section called “AWS services that use AWS Secrets Manager secrets”.

Amazon AppFlow

In Amazon AppFlow, when you configure an SaaS application as a source or destination, you create a connection. This includes information required for connecting to the SaaS applications, such as authentication tokens, user names, and passwords. Amazon AppFlow stores your connection data in a Secrets Manager managed secret with the prefix `appflow`. The cost of storing the secret is included with the charge for Amazon AppFlow. For more information, see Data protection in Amazon AppFlow in the *Amazon AppFlow User Guide*.

AWS Glue DataBrew

AWS Glue DataBrew provides the `DETERMINISTIC_DECRYPT`, `DETERMINISTIC_ENCRYPT`, and `CRYPTOGRAPHIC_HASH` recipe steps to perform transformations on personally identifiable information (PII) in a dataset, which use an encryption key stored in a Secrets Manager secret. If you use the DataBrew *default secret* to store the encryption key, DataBrew creates a managed secret with the prefix `databrew`. The cost of storing the secret is included with the charge for using DataBrew.

AWS DataSync

To collect information about an on-premises storage system, AWS DataSync Discovery uses the credentials for the storage system's management interface. DataSync stores those credentials in a Secrets Manager managed secret with the prefix `datasync`. You are charged for that secret. For more information, see Adding your on-premises storage system to DataSync Discovery in the *AWS DataSync User Guide*.

AWS Direct Connect

AWS Direct Connect stores a connectivity association key name and connectivity association key pair (CKN/CAK pair) in a managed secret with the prefix `directconnect`. The cost of the secret is included with the charge for AWS Direct Connect. To update the secret, you must use AWS Direct Connect rather than Secrets Manager. For more information, see Associate a MACsec CKN/CAK with a LAG in the *AWS Direct Connect User Guide*.

Amazon Elastic Container Service

When you use Amazon ECS Service Connect, Amazon ECS uses Secrets Manager secrets to store AWS Private Certificate Authority TLS certificates. The cost of storing the secret is included with the charges for Amazon ECS. To update the secret, you must use Amazon ECS rather than Secrets Manager. For more information, see TLS with Service Connect in the *Amazon Elastic Container Service Developer Guide*.

Amazon EventBridge

When you create an Amazon EventBridge API destination, EventBridge stores the connection for it in a Secrets Manager managed secret with the prefix `events`. The cost of storing the secret is included with the charge for using an API destination. To update the secret, you must use EventBridge rather than Secrets Manager. For more information, see API destinations in the *Amazon EventBridge User Guide*.

AWS Marketplace

When you use AWS Marketplace Quick Launch, AWS Marketplace distributes your software along with the license key. AWS Marketplace stores the license key in your account as a Secrets Manager managed secret. The cost of storing the secret is included with the charges for AWS Marketplace. To update the secret, you must use AWS Marketplace rather than Secrets Manager. For more information, see Configure Quick Launch in the *AWS Marketplace Seller Guide*.

AWS OpsWorks for Chef Automate

When you create a new server in AWS OpsWorks CM, OpsWorks CM stores information for the server in a Secrets Manager managed secret with the prefix `opsworks-cm`. The cost of the secret is included in the charge for AWS OpsWorks. For more information, see Integration with AWS Secrets Manager in the *AWS OpsWorks User Guide*.

Amazon RDS and Aurora

To manage master user credentials for Amazon Relational Database Service (Amazon RDS), including Aurora, Amazon RDS can create a managed secret for you. You are charged for that secret. Amazon RDS also manages rotation for these credentials. For more information, see

Password management with Amazon RDS and AWS Secrets Manager in the *Amazon RDS User Guide* and Password management with Amazon Aurora and AWS Secrets Manager in the *Amazon Aurora User Guide*.

For other Amazon RDS credentials, see the section called "Create a database secret".

Amazon Redshift

To manage admin credentials for Amazon Redshift, Amazon Redshift can create a managed secret for you. You are charged for that secret. Amazon Redshift also manages rotation for these credentials. For more information, see Managing Amazon Redshift admin passwords using AWS Secrets Manager in the *Amazon Redshift Management Guide*.

For other Amazon Redshift credentials, see the section called "Create a database secret". To use a secret for credentials when you call the Data API, see Using the Amazon Redshift Data API. To use a secret when you use the Amazon Redshift query editor to connect to a database, see Querying a database using the query editor in the *Amazon Redshift Management Guide* and the section called "Amazon Redshift query editor v2".

Amazon Redshift query editor v2

When you use the Amazon Redshift query editor v2 to connect to a database, Amazon Redshift can store your credentials in a Secrets Manager managed secret with the prefix `sqlworkbench`. The cost of storing the secret is included with the charge for using Amazon Redshift. To update the secret, you must use Amazon Redshift rather than Secrets Manager. For more information, see Working with query editor v2 in the *Amazon Redshift Management Guide*.

Using an AWS Secrets Manager VPC endpoint

We recommend that you run as much of your infrastructure as possible on private networks that are not accessible from the public internet. You can establish a private connection between your VPC and Secrets Manager by creating an *interface VPC endpoint*. Interface endpoints are powered by AWS PrivateLink, a technology that enables you to privately access Secrets Manager APIs without an internet gateway, NAT device, VPN connection, or AWS Direct Connect connection. Instances in your VPC don't need public IP addresses to communicate with Secrets Manager APIs. Traffic between your VPC and Secrets Manager does not leave the AWS network. For more information, see Interface VPC endpoints (AWS PrivateLink) in the *Amazon VPC User Guide*.

When Secrets Manager rotates a secret by using a Lambda rotation function, for example a secret that contains database credentials, the Lambda function makes requests to both the database and Secrets Manager. When you turn on automatic rotation by using the console, Secrets Manager creates the Lambda function in the same VPC as your database. We recommend that you create a Secrets Manager endpoint in the same VPC so that requests from the Lambda rotation function to Secrets Manager don't leave the Amazon network.

If you enable private DNS for the endpoint, you can make API requests to Secrets Manager using its default DNS name for the Region, for example, `secretsmanager.us-east-1.amazonaws.com`. For more information, see Accessing a service through an interface endpoint in the *Amazon VPC User Guide*.

You can make sure that requests to Secrets Manager come from the VPC access by including a condition in your permissions policies. For more information, see the section called “Example: Permissions and VPCs”.

You can use AWS CloudTrail logs to audit your use of secrets through the VPC endpoint.

To create a VPC endpoint for Secrets Manager

1. See Creating an interface endpoint in the *Amazon VPC User Guide*. Use the service name: com.amazonaws.*region*.secretsmanager
2. To control access to the endpoint, see Control access to VPC endpoints using endpoint policies.

Shared subnets

You can't create, describe, modify, or delete VPC endpoints in subnets that are shared with you. However, you can use the VPC endpoints in subnets that are shared with you. For information about VPC sharing, see Share your VPC with other accounts in the *Amazon Virtual Private Cloud User Guide*.

Create AWS Secrets Manager secrets in AWS CloudFormation

You can create secrets in a CloudFormation stack by using the `AWS::SecretsManager::Secret` resource in a CloudFormation template, as shown in Create a secret.

To create an admin secret for Amazon RDS or Aurora, we recommend you use `ManageMasterUserPassword` in `AWS::RDS::DBCluster`. Then Amazon RDS creates the secret and manages rotation for you. For more information, see Managed rotation.

For Amazon Redshift and Amazon DocumentDB credentials, first create a secret with a password generated by Secrets Manager, and then use a dynamic reference to retrieve the username and password from the secret to use as credentials for a new database. Next, use the `AWS::SecretsManager::SecretTargetAttachment` resource to add details about the database to the secret that Secrets Manager needs to rotate the secret. Finally, to turn on automatic rotation, use the `AWS::SecretsManager::RotationSchedule` resource and provide a rotation function and a schedule. See the following examples:

- Create a secret with Amazon Redshift credentials
- Create a secret with Amazon DocumentDB credentials

To attach a resource policy to your secret, use the `AWS::SecretsManager::ResourcePolicy` resource.

For information about creating resources with AWS CloudFormation, see Learn template basics in the AWS CloudFormation User Guide. You can also use the AWS Cloud Development Kit (AWS CDK). For more information, see AWS Secrets Manager Construct Library.

Create an AWS Secrets Manager secret with AWS CloudFormation

This example creates a secret named **`CloudFormationCreatedSecret-`*`a1b2c3d4e5f6`***. The secret value is the following JSON, with a 32-character password that is generated when the secret is created.

```
{
```

```
    "password": "EXAMPLE-PASSWORD",
    "username": "saanvi"
}
```

This example uses the following CloudFormation resource:

- AWS::SecretsManager::Secret

For information about creating resources with AWS CloudFormation, see Learn template basics in the AWS CloudFormation User Guide.

JSON

```
{
    "Resources": {
        "CloudFormationCreatedSecret": {
            "Type": "AWS::SecretsManager::Secret",
            "Properties": {
                "Description": "Simple secret created by AWS CloudFormation.",
                "GenerateSecretString": {
                    "SecretStringTemplate": "{\"username\": \"saanvi\"}",
                    "GenerateStringKey": "password",
                    "PasswordLength": 32
                }
            }
        }
    }
}
```

YAML

```
Resources:
  CloudFormationCreatedSecret:
    Type: 'AWS::SecretsManager::Secret'
    Properties:
      Description: Simple secret created by AWS CloudFormation.
      GenerateSecretString:
        SecretStringTemplate: '{"username": "saanvi"}'
        GenerateStringKey: password
        PasswordLength: 32
```

Create an AWS Secrets Manager secret with automatic rotation and an Amazon RDS MySQL DB instance with AWS CloudFormation

To create an admin secret for Amazon RDS or Aurora, we recommend you use `ManageMasterUserPassword`, as shown in the example *Create a Secrets Manager secret for a master password* in `AWS::RDS::DBCluster`. Then Amazon RDS creates the secret and manages rotation for you. For more information, see Managed rotation.

Create an AWS Secrets Manager secret and an Amazon Redshift cluster with AWS CloudFormation

To create an admin secret for Amazon Redshift, we recommend you use the examples on `AWS::Redshift::Cluster`. Then Amazon Redshift creates the secret and manages rotation for you. For more information, see Managed rotation.

Create an AWS Secrets Manager secret and an Amazon DocumentDB instance with AWS CloudFormation

This example creates a secret and an Amazon DocumentDB instance using the credentials in the secret as the user and password. The secret has a resource-based policy attached that defines who can access the secret. The template also creates a Lambda rotation function from the Rotation function templates and configures the secret to automatically rotate between 8:00 AM and 10:00 AM UTC on the first day of every month. As a security best practice, the instance is in an Amazon VPC.

This example uses the following CloudFormation resources for Secrets Manager:

- `AWS::SecretsManager::Secret`
- `AWS::SecretsManager::SecretTargetAttachment`
- `AWS::SecretsManager::RotationSchedule`

For information about creating resources with AWS CloudFormation, see Learn template basics in the AWS CloudFormation User Guide.

JSON

```
{
   "AWSTemplateFormatVersion":"2010-09-09",
   "Transform":"AWS::SecretsManager-2020-07-23",
   "Resources":{
      "TestVPC":{
         "Type":"AWS::EC2::VPC",
         "Properties":{
            "CidrBlock":"10.0.0.0/16",
            "EnableDnsHostnames":true,
            "EnableDnsSupport":true
         }
      },
      "TestSubnet01":{
         "Type":"AWS::EC2::Subnet",
         "Properties":{
            "CidrBlock":"10.0.96.0/19",
            "AvailabilityZone":{
               "Fn::Select":[
                  "0",
                  {
                     "Fn::GetAZs":{
                        "Ref":"AWS::Region"
                     }
                  }
               ]
            },
            "VpcId":{
               "Ref":"TestVPC"
            }
         }
      },
      "TestSubnet02":{
         "Type":"AWS::EC2::Subnet",
         "Properties":{
            "CidrBlock":"10.0.128.0/19",
            "AvailabilityZone":{
               "Fn::Select":[
                  "1",
                  {
                     "Fn::GetAZs":{
                        "Ref":"AWS::Region"
```

```
                    }
                }
            ]
         },
         "VpcId":{
            "Ref":"TestVPC"
         }
      }
   },
   "SecretsManagerVPCEndpoint":{
      "Type":"AWS::EC2::VPCEndpoint",
      "Properties":{
         "SubnetIds":[
            {
               "Ref":"TestSubnet01"
            },
            {
               "Ref":"TestSubnet02"
            }
         ],
         "SecurityGroupIds":[
            {
               "Fn::GetAtt":[
                  "TestVPC",
                  "DefaultSecurityGroup"
               ]
            }
         ],
         "VpcEndpointType":"Interface",
         "ServiceName":{
            "Fn::Sub":"com.amazonaws.${AWS::Region}.secretsmanager"
         },
         "PrivateDnsEnabled":true,
         "VpcId":{
            "Ref":"TestVPC"
         }
      }
   },
   "MyDocDBClusterRotationSecret":{
      "Type":"AWS::SecretsManager::Secret",
      "Properties":{
         "GenerateSecretString":{
            "SecretStringTemplate":"{\"username\": \"someadmin\",\"ssl\": true}",
            "GenerateStringKey":"password",
```

```
               "PasswordLength":16,
               "ExcludeCharacters":"\"@/\\"
            },
            "Tags":[
               {
                  "Key":"AppName",
                  "Value":"MyApp"
               }
            ]
         }
      },
      "MyDocDBCluster":{
         "Type":"AWS::DocDB::DBCluster",
         "Properties":{
            "DBSubnetGroupName":{
               "Ref":"MyDBSubnetGroup"
            },
            "MasterUsername":{
               "Fn::Sub":"{{resolve:secretsmanager:
${MyDocDBClusterRotationSecret}::username}}"
            },
            "MasterUserPassword":{
               "Fn::Sub":"{{resolve:secretsmanager:
${MyDocDBClusterRotationSecret}::password}}"
            },
            "VpcSecurityGroupIds":[
               {
                  "Fn::GetAtt":[
                     "TestVPC",
                     "DefaultSecurityGroup"
                  ]
               }
            ]
         }
      },
      "DocDBInstance":{
         "Type":"AWS::DocDB::DBInstance",
         "Properties":{
            "DBClusterIdentifier":{
               "Ref":"MyDocDBCluster"
            },
            "DBInstanceClass":"db.r5.large"
         }
      },
```

```
    "MyDBSubnetGroup":{
       "Type":"AWS::DocDB::DBSubnetGroup",
       "Properties":{
          "DBSubnetGroupDescription":"",
          "SubnetIds":[
             {
                "Ref":"TestSubnet01"
             },
             {
                "Ref":"TestSubnet02"
             }
          ]
       }
    },
    "SecretDocDBClusterAttachment":{
       "Type":"AWS::SecretsManager::SecretTargetAttachment",
       "Properties":{
          "SecretId":{
             "Ref":"MyDocDBClusterRotationSecret"
          },
          "TargetId":{
             "Ref":"MyDocDBCluster"
          },
          "TargetType":"AWS::DocDB::DBCluster"
       }
    },
    "MySecretRotationSchedule":{
       "Type":"AWS::SecretsManager::RotationSchedule",
       "DependsOn":"SecretDocDBClusterAttachment",
       "Properties":{
          "SecretId":{
             "Ref":"MyDocDBClusterRotationSecret"
          },
          "HostedRotationLambda":{
             "RotationType":"MongoDBSingleUser",
             "RotationLambdaName":"MongoDBSingleUser",
             "VpcSecurityGroupIds":{
                "Fn::GetAtt":[
                   "TestVPC",
                   "DefaultSecurityGroup"
                ]
             },
             "VpcSubnetIds":{
                "Fn::Join":[
```

```
                    ",",
                    [
                       {
                          "Ref":"TestSubnet01"
                       },
                       {
                          "Ref":"TestSubnet02"
                       }
                    ]
                 ]
              }
           },
           "RotationRules":{
             "Duration": "2h",
             "ScheduleExpression": "cron(0 8 1 * ? *)"
           }
        }
     }
  }
}
```

YAML

```
AWSTemplateFormatVersion: '2010-09-09'
Transform: AWS::SecretsManager-2020-07-23
Resources:
  TestVPC:
    Type: AWS::EC2::VPC
    Properties:
      CidrBlock: 10.0.0.0/16
      EnableDnsHostnames: true
      EnableDnsSupport: true
  TestSubnet01:
    Type: AWS::EC2::Subnet
    Properties:
      CidrBlock: 10.0.96.0/19
      AvailabilityZone:
        Fn::Select:
        - '0'
        - Fn::GetAZs:
            Ref: AWS::Region
      VpcId:
        Ref: TestVPC
```

```
  TestSubnet02:
    Type: AWS::EC2::Subnet
    Properties:
      CidrBlock: 10.0.128.0/19
      AvailabilityZone:
        Fn::Select:
        - '1'
        - Fn::GetAZs:
            Ref: AWS::Region
      VpcId:
        Ref: TestVPC
  SecretsManagerVPCEndpoint:
    Type: AWS::EC2::VPCEndpoint
    Properties:
      SubnetIds:
      - Ref: TestSubnet01
      - Ref: TestSubnet02
      SecurityGroupIds:
      - Fn::GetAtt:
        - TestVPC
        - DefaultSecurityGroup
      VpcEndpointType: Interface
      ServiceName:
        Fn::Sub: com.amazonaws.${AWS::Region}.secretsmanager
      PrivateDnsEnabled: true
      VpcId:
        Ref: TestVPC
  MyDocDBClusterRotationSecret:
    Type: AWS::SecretsManager::Secret
    Properties:
      GenerateSecretString:
        SecretStringTemplate: '{\"username\": \"someadmin\",\"ssl\": true}'
        GenerateStringKey: password
        PasswordLength: 16
        ExcludeCharacters: "\"@/\\"
      Tags:
      - Key: AppName
        Value: MyApp
  MyDocDBCluster:
    Type: AWS::DocDB::DBCluster
    Properties:
      DBSubnetGroupName:
        Ref: MyDBSubnetGroup
      MasterUsername:
```

```
        Fn::Sub: "{{resolve:secretsmanager:${MyDocDBClusterRotationSecret}::username}}"
      MasterUserPassword:
        Fn::Sub: "{{resolve:secretsmanager:${MyDocDBClusterRotationSecret}::password}}"
      VpcSecurityGroupIds:
      - Fn::GetAtt:
        - TestVPC
        - DefaultSecurityGroup
  DocDBInstance:
    Type: AWS::DocDB::DBInstance
    Properties:
      DBClusterIdentifier:
        Ref: MyDocDBCluster
      DBInstanceClass: db.r5.large
  MyDBSubnetGroup:
    Type: AWS::DocDB::DBSubnetGroup
    Properties:
      DBSubnetGroupDescription: ''
      SubnetIds:
      - Ref: TestSubnet01
      - Ref: TestSubnet02
  SecretDocDBClusterAttachment:
    Type: AWS::SecretsManager::SecretTargetAttachment
    Properties:
      SecretId:
        Ref: MyDocDBClusterRotationSecret
      TargetId:
        Ref: MyDocDBCluster
      TargetType: AWS::DocDB::DBCluster
  MySecretRotationSchedule:
    Type: AWS::SecretsManager::RotationSchedule
    DependsOn: SecretDocDBClusterAttachment
    Properties:
      SecretId:
        Ref: MyDocDBClusterRotationSecret
      HostedRotationLambda:
        RotationType: MongoDBSingleUser
        RotationLambdaName: MongoDBSingleUser
        VpcSecurityGroupIds:
          Fn::GetAtt:
          - TestVPC
          - DefaultSecurityGroup
        VpcSubnetIds:
          Fn::Join:
          - ","
```

```
          - - Ref: TestSubnet01
            - Ref: TestSubnet02
      RotationRules:
        Duration: 2h
        ScheduleExpression: 'cron(0 8 1 * ? *)'
```

How Secrets Manager uses AWS CloudFormation

When you use the console to turn on rotation, Secrets Manager uses AWS CloudFormation to create resources for rotation. If you create a new rotation function during that process, AWS CloudFormation creates an `AWS::Serverless::Function` based on the appropriate Rotation function templates. Then AWS CloudFormation sets the `RotationSchedule`, which sets the rotation function and rotation rules for the secret. You can view the AWS CloudFormation stack by choosing **View stack** in the banner after you turn on automatic rotation.

For information about turning on automatic rotation, see *Rotate secrets*.

Create AWS Secrets Manager secrets in AWS Cloud Development Kit (AWS CDK)

To create, manage, and retrieve secrets in a CDK app, you can use the AWS Secrets Manager Construct Library, which contains `ResourcePolicy`, `RotationSchedule`, `Secret`, `SecretRotation`, and `SecretTargetAttachment` constructs.

For examples, see:

- Create a secret
- Import a secret
- Retrieve a secret
- Grant permission to use the secret
- Rotate a secret
- Rotate a database secret
- Replicate a secret to other Regions

For more information about the CDK, see the AWS Cloud Development Kit (AWS CDK) v2 Developer Guide.

Monitor AWS Secrets Manager secrets

AWS provides monitoring tools to watch Secrets Manager secrets, report when something is wrong, and take automatic actions when appropriate. You can use the logs if you need to investigate any unexpected usage or change, and then you can roll back unwanted changes. You can also set automated checks for inappropriate usage of secrets and any attempts to delete secrets.

Topics

Log AWS Secrets Manager events with AWS CloudTrail

AWS CloudTrail records all API calls for Secrets Manager as events, including calls from the Secrets Manager console, as well as several other events for rotation and secret version deletion. For a list of the log entries Secrets Manager records, see CloudTrail entries.

You can use the CloudTrail console to view the last 90 days of recorded events. For an ongoing record of events in your AWS account, including events for Secrets Manager, create a trail so that CloudTrail delivers log files to an Amazon S3 bucket. See Creating a trail for your AWS account. You can also configure CloudTrail to receive CloudTrail log files from multiple AWS accounts and AWS Regions.

You can configure other AWS services to further analyze and act upon the data collected in CloudTrail logs. See AWS service integrations with CloudTrail logs. You can also get notifications when CloudTrail publishes new log files to your Amazon S3 bucket. See Configuring Amazon SNS notifications for CloudTrail.

To retrieve Secrets Manager events from CloudTrail logs (console)

1. Open the CloudTrail console at https://console.aws.amazon.com/cloudtrail/.
2. Ensure that the console points to the region where your events occurred. The console shows only those events that occurred in the selected region. Choose the region from the drop-down list in the upper-right corner of the console.

3. In the left-hand navigation pane, choose **Event history**.
4. Choose **Filter** criteria and/or a **Time range** to help you find the event that you're looking for. For example, to see all Secrets Manager events, for **Select attribute**, choose **Event source**. Then, for **Enter event source**, choose **`secretsmanager.amazonaws.com`**.
5. To see additional details, choose the expand arrow next to event. To see all of the information available, choose **View event**.

AWS CLI

Example Retrieve Secrets Manager events from CloudTrail logs

The following `lookup-events` example looks up Secrets Manager events.

```
aws cloudtrail lookup-events \
    --region us-east-1 \
    --lookup-attributes
 AttributeKey=EventSource,AttributeValue=secretsmanager.amazonaws.com
```

AWS CloudTrail entries for Secrets Manager

AWS Secrets Manager writes entries to your AWS CloudTrail log for all Secrets Manager operations and for other events related to rotation and deletion. For information about taking action on these events, see Match Secrets Manager events with EventBridge.

Log entry types

- Log entries for Secrets Manager operations
- Log entries for deletion
- Log entries for replication
- Log entries for rotation

Log entries for Secrets Manager operations

Events that are generated by calls to Secrets Manager operations have `"detail-type": ["AWS API Call via CloudTrail"]`.

> **Note**
>
> Before February 2024, some Secrets Manager operations reported events that contained "aRN" instead of "arn" for the secret ARN. For more information, see AWS re:Post.

The following are CloudTrail entries generated when you or a service call Secrets Manager operations through the API, SDK, or CLI.

BatchGetSecretValue

Generated by the BatchGetSecretValue operation. For information about retrieving secrets, see *Retrieve secrets*.

CancelRotateSecret

Generated by the CancelRotateSecret operation. For information about rotation, see *Rotate secrets*.

CreateSecret

Generated by the CreateSecret operation. For information about creating secrets, see *Create and manage secrets*.

DeleteResourcePolicy

Generated by the DeleteResourcePolicy operation. For information about permissions, see *Authentication and access control*.

DeleteSecret

Generated by the DeleteSecret operation. For information about deleting secrets, see the section called “Delete a secret”.

DescribeSecret

Generated by the DescribeSecret operation.

GetRandomPassword

Generated by the GetRandomPassword operation.

GetResourcePolicy

Generated by the GetResourcePolicy operation. For information about permissions, see *Authentication and access control*.

GetSecretValue

Generated by the GetSecretValue and BatchGetSecretValue operations. For information about retrieving secrets, see *Retrieve secrets*.

ListSecrets

Generated by the ListSecrets operation. For information about listing secrets, see the section called "Find secrets".

ListSecretVersionIds

Generated by the ListSecretVersionIds operation.

PutResourcePolicy

Generated by the PutResourcePolicy operation. For information about permissions, see *Authentication and access control*.

PutSecretValue

Generated by the PutSecretValue operation. For information about updating a secret, see the section called "Modify a secret".

RemoveRegionsFromReplication

Generated by the RemoveRegionsFromReplication operation. For information about replicating a secret, see the section called "Replicate a secret to other Regions".

ReplicateSecretToRegions

Generated by the ReplicateSecretToRegions operation. For information about replicating a secret, see the section called "Replicate a secret to other Regions".

RestoreSecret

Generated by the RestoreSecret operation. For information about restoring a deleted secret, see the section called "Restore a secret".

RotateSecret

Generated by the RotateSecret operation. For information about rotation, see *Rotate secrets*.

StopReplicationToReplica

Generated by the StopReplicationToReplica operation. For information about replicating a secret, see the section called "Replicate a secret to other Regions".

TagResource

Generated by the TagResource operation. For information about tagging a secret, see the section called “Tag secrets”.

UntagResource

Generated by the UntagResource operation. For information about untagging a secret, see the section called “Tag secrets”.

UpdateSecret

Generated by the UpdateSecret operation. For information about updating a secret, see the section called “Modify a secret”.

UpdateSecretVersionStage

Generated by the UpdateSecretVersionStage operation. For information about version stages, see the section called “Version”.

ValidateResourcePolicy

Generated by the ValidateResourcePolicy operation. For information about permissions, see *Authentication and access control*.

Log entries for deletion

In addition to events for Secrets Manager operations, Secrets Manager generates the following events related to deletion. These events have `"detail-type": ["AWS Service Event via CloudTrail"]`.

CancelSecretVersionDelete

Generated by the Secrets Manager service. If you call `DeleteSecret` on a secret that has versions, and then later call `RestoreSecret`, Secrets Manager logs this event for each secret version that was restored. For information about restoring a deleted secret, see the section called “Restore a secret”.

EndSecretVersionDelete

Generated by the Secrets Manager service when a secret version is deleted. For more information, see the section called “Delete a secret”.

StartSecretVersionDelete

Generated by the Secrets Manager service when Secrets Manager starts deletion for a secret version. For information about deleting secrets, see the section called “Delete a secret”.

SecretVersionDeletion

Generated by the Secrets Manager service when Secrets Manager deletes a deprecated secret version. For more information, see Secret versions.

Log entries for replication

In addition to events for Secrets Manager operations, Secrets Manager generates the following events related to replication. These events have `"detail-type": ["AWS Service Event via CloudTrail"]`.

ReplicationFailed

Generated by the Secrets Manager service when replication fails. For information about replicating a secret, see the section called “Replicate a secret to other Regions”.

ReplicationStarted

Generated by the Secrets Manager service when Secrets Manager starts replicating a secret. For information about replicating a secret, see the section called “Replicate a secret to other Regions”.

ReplicationSucceeded

Generated by the Secrets Manager service when a secret is successfully replicated. For information about replicating a secret, see the section called “Replicate a secret to other Regions”.

Log entries for rotation

In addition to events for Secrets Manager operations, Secrets Manager generates the following events related to rotation. These events have `"detail-type": ["AWS Service Event via CloudTrail"]`.

RotationStarted

Generated by the Secrets Manager service when Secrets Manager starts rotating a secret. For information about rotation, see *Rotate secrets*.

RotationAbandoned

Generated by the Secrets Manager service when Secrets Manager abandons a rotation attempt and removes the `AWSPENDING` label from an existing version of a secret. Secrets Manager abandons rotation when you create a new version of a secret during rotation. For information about rotation, see *Rotate secrets*.

RotationFailed

Generated by the Secrets Manager service when rotation fails. For information about rotation, see the section called "Troubleshoot rotation".

RotationSucceeded

Generated by the Secrets Manager service when a secret is successfully rotated. For information about rotation, see *Rotate secrets*.

TestRotationStarted

Generated by the Secrets Manager service when Secrets Manager starts testing rotation for a secret that is not scheduled for immediate rotation. For information about rotation, see *Rotate secrets*.

TestRotationSucceeded

Generated by the Secrets Manager service when Secrets Manager successfully tests rotation for a secret that is not scheduled for immediate rotation. For information about rotation, see *Rotate secrets*.

TestRotationFailed

Generated by the Secrets Manager service when Secrets Manager tests rotation for a secret that is not scheduled for immediate rotation and rotation failed. For information about rotation, see the section called "Troubleshoot rotation".

Match AWS Secrets Manager events with Amazon EventBridge

In Amazon EventBridge, you can match Secrets Manager events from CloudTrail log entries. You can configure EventBridge rules that look for these events and then send new generated

events to a target to take action. For a list of CloudTrail entries that Secrets Manager logs, see CloudTrail entries. For instructions to set up EventBridge, see Getting started with EventBridge in the *EventBridge User Guide*.

Match all changes to a specified secret

The following example shows an EventBridge event pattern that matches log entries for changes to a secret.

```
{
    "source": ["aws.secretsmanager"],
    "detail-type": ["AWS API Call via CloudTrail"],
    "detail": {
        "eventSource": ["secretsmanager.amazonaws.com"],
        "eventName": ["DeleteResourcePolicy", "PutResourcePolicy", "RotateSecret",
 "TagResource", "UntagResource", "UpdateSecret"],
        "responseElements": {
            "arn": ["arn:aws:secretsmanager:us-west-2:012345678901:secret:mySecret-
a1b2c3"]
        }
    }
}
```

Match events when a secret value rotates

The following example shows an EventBridge event pattern that matches CloudTrail log entries for secret value changes that occur from manual updates or automatic rotation. Because some of these events are from Secrets Manager operations and some are generated by the Secrets Manager service, you must include the `detail-type` for both.

```
{
    "source": ["aws.secretsmanager"],
    "$or": [
        { "detail-type": ["AWS API Call via CloudTrail"] },
        { "detail-type": ["AWS Service Event via CloudTrail"] }
    ],
    "detail": {
        "eventSource": ["secretsmanager.amazonaws.com"],
        "eventName": ["PutSecretValue", "UpdateSecret", "RotationSucceeded"]
    }
}
```

Monitor AWS Secrets Manager with Amazon CloudWatch

You can monitor AWS Secrets Manager using Amazon CloudWatch, which collects raw data and processes it into readable, near real-time metrics. These statistics are kept for 15 months, so that you can access historical information and gain a better perspective on how your web application or service is performing. You can also set alarms that watch for certain thresholds, and send notifications or take actions when those thresholds are met. For more information, see the Amazon CloudWatch User Guide.

For Secrets Manager, you can use CloudWatch to alert you when your request rate for APIs or the number of secrets in your account reaches a specific threshold. You can also use CloudWatch to monitor estimated Secrets Manager charges. For more information, see Creating a billing alarm to monitor your estimated AWS charges.

Topics

Secrets Manager metrics and dimensions

The `AWS/SecretsManager` namespace includes the following metrics.

Metric	Description
`ResourceCount`	The number of secrets in your account, including secrets that are marked for deletion. The metric is published hourly. Units: Count

Dimensions for the Secrets Manager metrics.

Dimension	Description
`Service`	The name of the AWS service containing the resource. For Secrets Manager, the value for this dimension is `Secrets Manager`.
`Type`	The type of entity that is being reported. For Secrets Manager, the value for this dimension is `Resource`.
`Resource`	The type of resource that is running. For Secrets Manager, the value for this dimension is `SecretCount` .
`Class`	None.

Secrets Manager API requests that you can monitor using CloudWatch metrics include `GetSecretValue`, `DescribeSecret`, `ListSecrets`, and others. To find metrics, in the CloudWatch console, choose **All metrics**, and then in the search box, enter your search term, for example **`secrets`**.

Create alarms to monitor Secrets Manager metrics

You can create a CloudWatch alarm that sends an Amazon SNS message when the value of the metric changes and causes the alarm to change state. An alarm watches a metric over a time period you specify, and performs actions based on the value of the metric relative to a given threshold over a number of time periods. Alarms invoke actions for sustained state changes only. CloudWatch alarms do not invoke actions simply because they are in a particular state; the state must have changed and been maintained for a specified number of periods.

For more information, see Using Amazon CloudWatch alarms and Create a CloudWatch alarm based on anomaly detection.

Amazon CloudWatch Synthetics canaries

Amazon CloudWatch Synthetics canaries are configurable scripts that run on a schedule to monitor your endpoints and APIs. Canaries follow the same routes and perform the same actions as a customer, which makes it possible for you to continually verify your customer experience even when you don't have any customer traffic on your applications.

For an example of how to integrate Secrets Manager, see Integrating your canary with other AWS services.

Monitor AWS Secrets Manager secrets scheduled for deletion by using Amazon CloudWatch

You can use a combination of AWS CloudTrail, Amazon CloudWatch Logs, and Amazon Simple Notification Service (Amazon SNS) to create an alarm that notifies you of any attempts to access a secret pending deletion. If you receive a notification from an alarm, you might want to cancel deletion of the secret to give yourself more time to determine if you really want to delete it. Your investigation might result in the secret being restored because you still need the secret. Alternatively, you might need to update the user with details of the new secret to use.

The following procedures explain how to receive a notification when a request for the `GetSecretValue` operation that results in a specific error message written to your CloudTrail log files. Other API operations can be performed on the secret without triggering the alarm. This CloudWatch alarm detects usage that might indicate a person or application using outdated credentials.

Before you begin these procedures, you must turn on CloudTrail in the AWS Region and account where you intend to monitor AWS Secrets ManagerAPI requests. For instructions, go to Creating a trail for the first time in the *AWS CloudTrail User Guide*.

Step 1: Configure CloudTrail log file delivery to CloudWatch logs

You must configure delivery of your CloudTrail log files to CloudWatch Logs. You do this so CloudWatch Logs can monitor them for Secrets Manager API requests to retrieve a secret pending deletion.

To configure CloudTrail log file delivery to CloudWatch Logs

1. Open the CloudTrail console at https://console.aws.amazon.com/cloudtrail/.
2. On the top navigation bar, choose the AWS Region to monitor secrets.
3. In the left navigation pane, choose **Trails**, and then choose the name of the trail to configure for CloudWatch.
4. On the **Trails Configuration** page, scroll down to the **CloudWatch Logs** section, and then choose the edit icon
   (✎).

5. For **New or existing log group**, type a name for the log group, such as **`CloudTrail/MyCloudWatchLogGroup`**.
6. For **IAM role**, you can use the default role named **CloudTrail_CloudWatchLogs_Role**. This role has a default role policy with the required permissions to deliver CloudTrail events to the log group.
7. Choose **Continue** to save your configuration.
8. On the **AWS CloudTrail will deliver CloudTrail events associated with API activity in your account to your CloudWatch Logs log group** page, choose **Allow**.

Step 2: Create the CloudWatch alarm

To receive a notification when a Secrets Manager `GetSecretValue` API operation requests to access a secret pending deletion, you must create a CloudWatch alarm and configure notification.

To create a CloudWatch alarm

1. Sign in to the CloudWatch console at https://console.aws.amazon.com/cloudwatch/.
2. On the top navigation bar, choose the AWS Region where you want to monitor secrets.
3. In the left navigation pane, choose **Logs**.
4. In the list of **Log Groups**, select the check box next to the log group you created in the previous procedure, such as **CloudTrail/MyCloudWatchLogGroup**. Then choose **Create Metric Filter**.
5. For **Filter Pattern**, type or paste the following:

   ```
   { $.eventName = "GetSecretValue" && $.errorMessage = "*secret because it was marked
    for deletion*" }
   ```

   Choose **Assign Metric**.
6. On the **Create Metric Filter and Assign a Metric** page, do the following:

   a. For **Metric Namespace**, type **`CloudTrailLogMetrics`**.

   b. For **Metric Name**, type **`AttemptsToAccessDeletedSecrets`**.

   c. Choose **Show advanced metric settings**, and then if necessary for **Metric Value**, type **1**.

   d. Choose **Create Filter**.
7. In the filter box, choose **Create Alarm**.

8. In the **Create Alarm** window, do the following:

   a. For **Name**, type **`AttemptsToAccessDeletedSecretsAlarm`**.

   b. **Whenever:**, for **is:**, choose **>=**, and then type **1**.

   c. Next to **Send notification to:**, do one of the following:

      - To create and use a new Amazon SNS topic, choose **New list**, and then type a new topic name. For **Email list:**, type at least one email address. You can type more than one email address by separating them with commas.
      - To use an existing Amazon SNS topic, choose the name of the topic to use. If a list doesn't exist, choose **Select list**.

   d. Choose **Create Alarm**.

Step 3: Test the CloudWatch alarm

To test your alarm, create a secret and then schedule it for deletion. Then, try to retrieve the secret value. You shortly receive an email at the address you configured in the alarm. It alerts you to the use of a secret scheduled for deletion.

Compliance validation for AWS Secrets Manager

Your compliance responsibility when using Secrets Manager is determined by the sensitivity of your data, your company's compliance objectives, and applicable laws and regulations. AWS provides the following resources to help with compliance:

- Security and Compliance Quick Start Guides – These deployment guides discuss architectural considerations and provide steps for deploying security- and compliance-focused baseline environments on AWS.
- Architecting for HIPAA Security and Compliance Whitepaper – This whitepaper describes how companies can use AWS to create HIPAA-compliant applications.
- AWS Compliance Resources – This collection of workbooks and guides might apply to your industry and location.
- *AWS Config* assesses how well your resource configurations comply with internal practices, industry guidelines, and regulations. For more information, see the section called “Audit secrets for compliance”.
- AWS Security Hub provides a comprehensive view of your security state within AWS that helps you check your compliance with security industry standards and best practices. For information about using Security Hub to evaluate Secrets Manager resources, see AWS Secrets Manager controls in the *AWS Security Hub User Guide*.
- *IAM Access Analyzer* analyzes policies, including condition statements in a policy, that allow an external entity to access a secret. For more information, see Previewing access with Access Analyzer.
- *AWS Systems Manager* provides predefined runbooks for Secrets Manager. For more information, see Systems Manager Automation runbook reference for Secrets Manager.

AWS Secrets Manager has undergone auditing for the following standards and can be part of your solution when you need to obtain compliance certification.

AWS has expanded its Health Insurance Portability and Accountability Act (HIPAA) compliance program to include AWS Secrets Manager as a HIPAA-eligible service. If you have an executed Business Associate Agreement (BAA) with AWS, you can use Secrets Manager to help build your HIPAA-compliant applications. AWS offers a HIPAA-focused whitepaper for customers who are interested in learning more about

	how they can leverage AWS for the processing and storage of health information. For more information, see HIPAA Compliance.
	AWS Secrets Manager has an Attestation of Compliance for Payment Card Industry (PCI) Data Security Standard (DSS) version 3.2 at Service Provider Level 1. Customers who use AWS products and services to store, process, or transmit cardholder data can use AWS Secrets Manager as they manage their own PCI DSS compliance certification. For more information about PCI DSS, including how to request a copy of the AWS PCI Compliance Package, see PCI DSS Level 1.
	AWS Secrets Manager has successfully completed compliance certification for ISO/IEC 27001, ISO/IEC 27017, ISO/IEC 27018, and ISO 9001. For more information, see ISO 27001, ISO 27017, ISO 27018, ISO 9001.
	System and Organization Control (SOC) reports are independent third-party examination reports that demonstrate how Secrets Manager achieves key compliance controls and objectives. The purpose of these reports is to help you and your auditors understand the AWS controls that are established to support operations and compliance. For more information, see SOC Compliance.
	The Federal Risk and Authorization Management Program (FedRAMP) is a government-wide program that provides a standardized approach to security assessment, authorization, and continuous monitoring for cloud products and services. The FedRAMP Program also provides provisional authorizations for services and regions for East/West and GovCloud to consume government or regulated data. For more information, see FedRAMP Compliance.
	The Department of Defense (DoD) Cloud Computing Security Requirements Guide (SRG) provides a standardized assessment and authorization process for cloud service providers (CSPs) to gain a DoD provisional authorization, so that they can serve DoD customers. For more information, see DoD SRG Resources
	The Information Security Registered Assessors Program (IRAP) enables Australian government customers to validate that appropriate controls are in place and determine the appropriate responsibility model for addressing the requirements of the Australian government Information Security Manual (ISM) produced by the Australian Cyber Security Centre (ACSC). For more information, see IRAP Resources

Amazon Web Services (AWS) achieved the Outsourced Service Provider's Audit Report (OSPAR) attestation. AWS alignment with the Association of Banks in Singapore (ABS) Guidelines on Control Objectives and Procedures for Outsourced Service Providers (ABS Guidelines) demonstrates to customers AWS commitment to meeting the high expectations for cloud service providers set by the financial services industry in Singapore. For more information, see OSPAR Resources

You can download third-party audit reports using AWS Artifact. For more information, see Downloading Reports in AWS Artifact.

Audit AWS Secrets Manager secrets for compliance by using AWS Config

You can use AWS Config to evaluate your secrets and assess how well they comply with your internal practices, industry guidelines, and regulations. You define your internal security and compliance requirements for secrets using AWS Config rules. Then AWS Config can identify secrets that don't conform to your rules. You can also track changes to secret metadata, rotation configuration, the KMS key used for secret encryption, the Lambda rotation function, and tags associated with a secret.

You can receive notifications from Amazon SNS about your secret configurations. For example, you can receive Amazon SNS notifications for a list of secrets not configured for rotation which enables you to drive security best practices for rotating secrets.

If you have secrets in multiple AWS accounts and AWS Regions in your organization, you can aggregate that configuration and compliance data.

To add a new rule for your secrets

- Follow the instructions on Working with AWS Config managed rules, and choose one of the following rules:
  - `secretsmanager-rotation-enabled-check` — Checks whether rotation is configured for secrets stored in Secrets Manager.
  - `secretsmanager-scheduled-rotation-success-check`— Checks whether the last successful rotation is within the configured rotation frequency. The minimum frequency for the check is daily.

- `secretsmanager-secret-periodic-rotation`— Checks whether secrets were rotated within the specified number of days.
- `secretsmanager-secret-unused`— Checks whether secrets were accessed within the specified number of days.
- `secretsmanager-using-cmk` — Checks whether secrets are encrypted using the AWS managed key `aws/secretsmanager` or a customer managed key you created in AWS KMS.

After you save the rule, AWS Config evaluates your secrets every time the metadata of a secret changes. You can configure AWS Config to notify you of changes. For more information, see Notifications that AWS Config sends to an Amazon SNS topic.

Aggregate secrets from your AWS accounts and AWS Regions

You can configure AWS Config Multi-Account Multi-Region Data Aggregator to review configurations of your secrets across all accounts and regions in your organization, and then review your secret configurations and compare to secrets management best practices.

You must enable AWS Config and the AWS Config managed rules specific to secrets across all accounts and regions before you create an aggregator. For more information, see Use CloudFormation StackSets to provision resources across multiple AWS accounts and Regions.

For more information about AWS Config Aggregator, see Multi-Account Multi-Region Data Aggregation and Setting Up an Aggregator Using the Console in the AWS Config Developer Guide.

Security in AWS Secrets Manager

Security at AWS is the highest priority. As an AWS customer, you benefit from a data center and network architecture built to meet the requirements of the most security-sensitive organizations.

You and AWS share the responsibility for security. 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 AWS services in the AWS Cloud. AWS also provides you with services you can use securely. Third-party auditors regularly test and verify the effectiveness of our security as part of the AWS Compliance Programs. To learn about the compliance programs that apply to AWS Secrets Manager, see AWS Services in Scope by Compliance Program.
- **Security in the cloud** – Your AWS service determines your responsibility. You are also responsible for other factors including the sensitivity of your data, your company's requirements, and applicable laws and regulations.

For more resources, see Security Pillar - AWS Well-Architected Framework.

Topics

Mitigate the risks of using the AWS CLI to store your AWS Secrets Manager secrets

When you use the AWS Command Line Interface (AWS CLI) to invoke AWS operations, you enter those commands in a command shell. For example, you can use the Windows command prompt or Windows PowerShell, or the Bash or Z shell, among others. Many of these command shells include functionality designed to increase productivity. But this functionality can be used to compromise

your secrets. For example, in most shells, you can use the up arrow key to see the last entered command. The *command history* feature can be exploited by anyone who accesses your unsecured session. Also, other utilities that work in the background might have access to your command parameters, with the intended goal of helping you perform your tasks more efficiently. To mitigate such risks, ensure you take the following steps:

- Always lock your computer when you walk away from your console.
- Uninstall or disable console utilities you don't need or no longer use.
- Ensure the shell or the remote access program, if you are using one or the other, don't log typed commands .
- Use techniques to pass parameters not captured by the shell command history. The following example shows how you can type the secret text into a text file, and then pass the file to the AWS Secrets Manager command and immediately destroy the file. This means the typical shell history doesn't capture the secret text.

  The following example shows typical Linux commands but your shell might require slightly different commands:

```
$ touch secret.txt
        # Creates an empty text file
$ chmod go-rx secret.txt
        # Restricts access to the file to only the user
$ cat > secret.txt
        # Redirects standard input (STDIN) to the text file
ThisIsMyTopSecretPassword^D
        # Everything the user types from this point up to the CTRL-D (^D) is saved in
 the file
$ aws secretsmanager create-secret --name TestSecret --secret-string file://
secret.txt       # The Secrets Manager command takes the --secret-string parameter
 from the contents of the file
$ shred -u secret.txt
        # The file is destroyed so it can no longer be accessed.
```

After you run these commands, you should be able to use the up and down arrows to scroll through the command history and see that the secret text isn't displayed on any line.

> **Important**
>
> By default, you can't perform an equivalent technique in Windows unless you first reduce the size of the command history buffer to **1**.

To configure the Windows Command Prompt to have only 1 command history buffer of 1 command

1. Open an Administrator command prompt (**Run as administrator**).
2. Choose the icon in the upper left , and then choose **Properties**.
3. On the **Options** tab, set **Buffer Size** and **Number of Buffers** both to **1**, and then choose **OK**.
4. Whenever you have to type a command you don't want in the history, immediately follow it with one other command, such as:

   ```
   echo.
   ```

   This ensures you flush the sensitive command.

For the Windows Command Prompt shell, you can download the SysInternals SDelete tool, and then use commands similar to the following:

```
C:\> echo. 2> secret.txt
        # Creates an empty file
C:\> icacls secret.txt /remove "BUILTIN\Administrators" "NT AUTHORITY/SYSTEM" /
inheritance:r   # Restricts access to the file to only the owner
C:\> copy con secret.txt /y
        # Redirects the keyboard to text file, suppressing prompt to overwrite
THIS IS MY TOP SECRET PASSWORD^Z
      # Everything the user types from this point up to the CTRL-Z (^Z) is saved in the
 file
C:\> aws secretsmanager create-secret --name TestSecret --secret-string file://
secret.txt      # The Secrets Manager command takes the --secret-string parameter from
 the contents of the file
C:\> sdelete secret.txt
        # The file is destroyed so it can no longer be accessed.
```

Data protection in AWS Secrets Manager

The AWS shared responsibility model applies to data protection in AWS Secrets Manager. 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. This content includes the security configuration and management tasks for the AWS services that you use. For more information about data privacy, see the Data Privacy FAQ. For information about data protection in Europe, see the AWS Shared Responsibility Model and GDPR blog post on the *AWS Security Blog*.

For data protection purposes, we recommend that you protect AWS account credentials and set up individual user accounts with 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. Secrets Manager supports TLS 1.2 and 1.3 in all Regions. Secrets Manager also supports a hybrid post-quantum key exchange option for TLS (PQTLS) network encryption protocol.
- Sign your programmatic requests to Secrets Manager by using an access key ID and a secret access key associated with an IAM principal. Or you can use AWS Security Token Service (AWS STS) to generate temporary security credentials to sign requests.
- Set up API and user activity logging with AWS CloudTrail. See the section called “Log with AWS CloudTrail ”.
- If you require FIPS 140-2 validated cryptographic modules when accessing AWS through a command line interface or an API, use a FIPS endpoint. See the section called “Secrets Manager endpoints”.
- If you use the AWS CLI to access Secrets Manager, the section called “Mitigate the risks of using the AWS CLI to store your AWS Secrets Manager secrets”.

Encryption at rest

Secrets Manager uses encryption via AWS Key Management Service (AWS KMS) to protect the confidentiality of data at rest. AWS KMS provides a key storage and encryption service used by many AWS services. Every secret in Secrets Manager is encrypted with a unique data key. Each data key is protected by a KMS key. You can choose to use default encryption with the Secrets Manager

AWS managed key for the account, or you can create your own customer managed key in AWS KMS. Using a customer managed key gives you more granular authorization controls over your KMS key activities. For more information, see the section called "Secret encryption and decryption".

Encryption in transit

Secrets Manager provides secure and private endpoints for encrypting data in transit. The secure and private endpoints allows AWS to protect the integrity of API requests to Secrets Manager. AWS requires API calls be signed by the caller using X.509 certificates and/or a Secrets Manager Secret Access Key. This requirement is stated in the Signature Version 4 Signing Process (Sigv4).

If you use the AWS Command Line Interface (AWS CLI) or any of the AWS SDKs to make calls to AWS, you configure the access key to use. Then those tools automatically use the access key to sign the requests for you. See the section called "Mitigate the risks of using the AWS CLI to store your AWS Secrets Manager secrets".

Inter-network traffic privacy

AWS offers options for maintaining privacy when routing traffic through known and private network routes.

Traffic between service and on-premises clients and applications

You have two connectivity options between your private network and AWS Secrets Manager:

- An AWS Site-to-Site VPN connection. For more information, see What is AWS Site-to-Site VPN?
- An AWS Direct Connect connection. For more information, see What is AWS Direct Connect?

Traffic between AWS resources in the same Region

If you want to secure traffic between Secrets Manager and API clients in AWS, set up an AWS PrivateLink to privately access Secrets Manager API endpoints.

Encryption key management

When Secrets Manager needs to encrypt a new version of the protected secret data, Secrets Manager sends a request to AWS KMS to generate a new data key from the KMS key. Secrets Manager uses this data key for envelope encryption. Secrets Manager stores the encrypted data key with the encrypted secret. When the secret needs to be decrypted, Secrets Manager asks AWS KMS to decrypt the data key. Secrets Manager then uses the decrypted data key to decrypt the

encrypted secret. Secrets Manager never stores the data key in unencrypted form and removes the key from memory as soon as possible. For more information, see the section called “Secret encryption and decryption”.

Secret encryption and decryption in AWS Secrets Manager

Secrets Manager uses envelope encryption with AWS KMS keys and data keys to protect each secret value. Whenever the secret value in a secret changes, Secrets Manager requests a new data key from AWS KMS to protect it. The data key is encrypted under a KMS key and stored in the metadata of the secret. To decrypt the secret, Secrets Manager first decrypts the encrypted data key using the KMS key in AWS KMS.

Secrets Manager does not use the KMS key to encrypt the secret value directly. Instead, it uses the KMS key to generate and encrypt a 256-bit Advanced Encryption Standard (AES) symmetric data key, and uses the data key to encrypt the secret value. Secrets Manager uses the plaintext data key to encrypt the secret value outside of AWS KMS, and then removes it from memory. It stores the encrypted copy of the data key in the metadata of the secret.

When you create a secret, you can choose any symmetric encryption customer managed key in the AWS account and Region, or you can use the AWS managed key for Secrets Manager (`aws/secretsmanager`). If you choose the AWS managed key `aws/secretsmanager` and it doesn't already exist yet, Secrets Manager creates it and associates it with the secret. You can use the same KMS key or different KMS keys for each secret in your account. You might want to use different KMS keys to set custom permissions on the keys for a group of secrets, or if you want to audit particular operations for those keys. Secrets Manager supports only symmetric encryption KMS keys. If you use a KMS key in an external key store, cryptographic operations on the KMS key might take longer and be less reliable and durable because the request has to travel outside of AWS.

For information about changing the encryption key for a secret, see the section called “Change the encryption key for a secret”.

When you change the encryption key for a secret, it does not affect existing versions of the secret. Only the new versions you create after the key change are encrypted under the new encryption key. (The only exceptions are the `AWSCURRENT`, `AWSPENDING`, and `AWSPREVIOUS` versions, which Secrets Manager re-encrypts to help ensure you are't locked out of the secret.)

To find the KMS key associated with a secret, view the secret in the console or call ListSecrets or DescribeSecret. When the secret is associated with the AWS managed key for Secrets Manager (`aws/secretsmanager`), these operations do not return a KMS key identifier.

Topics

What is encrypted?

Secrets Manager encrypts the secret value, but it does not encrypt the following:

- Secret name and description
- Rotation settings
- ARN of the KMS key associated with the secret
- Any attached AWS tags

Encryption and decryption processes

To encrypt the secret value in a secret, Secrets Manager uses the following process.

1. Secrets Manager calls the AWS KMS GenerateDataKey operation with the ID of the KMS key for the secret and a request for a 256-bit AES symmetric key. AWS KMS returns a plaintext data key and a copy of that data key encrypted under the KMS key.
2. Secrets Manager uses the plaintext data key and the Advanced Encryption Standard (AES) algorithm to encrypt the secret value outside of AWS KMS. It removes the plaintext key from memory as soon as possible after using it.
3. Secrets Manager stores the encrypted data key in the metadata of the secret so it is available to decrypt the secret value. However, none of the Secrets Manager APIs return the encrypted secret or the encrypted data key.

To decrypt an encrypted secret value:

1. Secrets Manager calls the AWS KMS Decrypt operation and passes in the encrypted data key.
2. AWS KMS uses the KMS key for the secret to decrypt the data key. It returns the plaintext data key.
3. Secrets Manager uses the plaintext data key to decrypt the secret value. Then it removes the data key from memory as soon as possible.

Permissions for the KMS key

When Secrets Manager uses a KMS key in cryptographic operations, it acts on behalf of the user who is accessing or updating the secret value. You can grant permissions in an IAM policy or a key policy. The following Secrets Manager operations require AWS KMS permissions.

- CreateSecret
- GetSecretValue
- PutSecretValue
- UpdateSecret
- ReplicateSecretToRegions

To allow the KMS key to be used only for requests that originate in Secrets Manager, in the permissions policy, you can use the kms:ViaService condition key with the `secretsmanager.<Region>.amazonaws.com` value.

You can also use the keys or values in the encryption context as a condition for using the KMS key for cryptographic operations. For example, you can use a string condition operator in an IAM or key policy document, or use a grant constraint in a grant. KMS key grant propagation can take up to five minutes. For more information, see CreateGrant.

How Secrets Manager uses your KMS key

Secrets Manager calls the following AWS KMS operations with your KMS key.

GenerateDataKey

Secrets Manager calls the AWS KMS GenerateDataKey operation in response to the following Secrets Manager operations.

- CreateSecret – If the new secret includes a secret value, Secrets Manager requests a new data key to encrypt it.

- PutSecretValue – Secrets Manager requests a new data key to encrypt the specified secret value.
- ReplicateSecretToRegions – To encrypt the replicated secret, Secrets Manager requests a data key for the KMS key in the replica Region.
- UpdateSecret – If you change the secret value or the KMS key, Secrets Manager requests a new data key to encrypt the new secret value.

The RotateSecret operation does not call `GenerateDataKey`, because it does not change the secret value. However, if `RotateSecret` invokes a Lambda rotation function that changes the secret value, its call to the `PutSecretValue` operation triggers a `GenerateDataKey` request.

Decrypt

Secrets Manager calls the Decrypt operation in response to the following Secrets Manager operations.

- GetSecretValue and BatchGetSecretValue – Secrets Manager decrypts the secret value before returning it to the caller. To decrypt an encrypted secret value, Secrets Manager calls the AWS KMS Decrypt operation to decrypt the encrypted data key in the secret. Then, it uses the plaintext data key to decrypt the encrypted secret value. For batch commands, Secrets Manager can reuse the decrypted key, so not all calls result in a `Decrypt` request.
- PutSecretValue and UpdateSecret – Most `PutSecretValue` and `UpdateSecret` requests do not trigger a `Decrypt` operation. However, when a `PutSecretValue` or `UpdateSecret` request attempts to change the secret value in an existing version of a secret, Secrets Manager decrypts the existing secret value and compares it to the secret value in the request to confirm that they are the same. This action ensures the that Secrets Manager operations are idempotent. To decrypt an encrypted secret value, Secrets Manager calls the AWS KMS Decrypt operation to decrypt the encrypted data key in the secret. Then, it uses the plaintext data key to decrypt the encrypted secret value.
- ReplicateSecretToRegions – Secrets Manager first decrypts the secret value in the primary Region before re-encrypting the secret value with the KMS key in the replica Region.

Encrypt

Secrets Manager calls the Encrypt operation in response to the following Secrets Manager operations:

- UpdateSecret – If you change the KMS key, Secrets Manager re-encrypts the data key that protects the `AWSCURRENT`, `AWSPREVIOUS`, and `AWSPENDING` secret versions with the new key.

- ReplicateSecretToRegions – Secrets Manager re-encrypts the data key during replication using the KMS key in the replica Region.

DescribeKey

Secrets Manager calls the DescribeKey operation to determine whether to list the KMS key when you create or edit a secret in the Secrets Manager console.

Validating access to the KMS key

When you establish or change the KMS key that is associated with secret, Secrets Manager calls the `GenerateDataKey` and `Decrypt` operations with the specified KMS key. These calls confirm that the caller has permission to use the KMS key for these operation. Secrets Manager discards the results of these operations; it does not use them in any cryptographic operation.

You can identify these validation calls because the value of the `SecretVersionId` key encryption context in these requests is `RequestToValidateKeyAccess`.

> **Note**
>
> In the past, Secrets Manager validation calls did not include an encryption context. You might find calls with no encryption context in older AWS CloudTrail logs.

Key policy of the AWS managed key (`aws/secretsmanager`)

The key policy for the AWS managed key for Secrets Manager (`aws/secretsmanager`) gives users permission to use the KMS key for specified operations only when Secrets Manager makes the request on the user's behalf. The key policy does not allow any user to use the KMS key directly.

This key policy, like the policies of all AWS managed keys, is established by the service. You cannot change the key policy, but you can view it at any time. For details, see Viewing a key policy.

The policy statements in the key policy have the following effect:

- Allow users in the account to use the KMS key for cryptographic operations only when the request comes from Secrets Manager on their behalf. The `kms:ViaService` condition key enforces this restriction.
- Allows the AWS account to create IAM policies that allow users to view KMS key properties and revoke grants.

- Although Secrets Manager does not use grants to gain access to the KMS key, the policy also allows Secrets Manager to create grants for the KMS key on the user's behalf and allows the account to revoke any grant that allows Secrets Manager to use the KMS key. These are standard elements of policy document for an AWS managed key.

The following is a key policy for an example AWS managed key for Secrets Manager.

```
{
  "Id": "auto-secretsmanager-2",
  "Version": "2012-10-17",
  "Statement": [
    {
      "Sid": "Allow access through AWS Secrets Manager for all principals in the
 account that are authorized to use AWS Secrets Manager",
      "Effect": "Allow",
      "Principal": {
        "AWS": [
          "*"
        ]
      },
      "Action": [
        "kms:Encrypt",
        "kms:Decrypt",
        "kms:ReEncrypt*",
        "kms:CreateGrant",
        "kms:DescribeKey"
      ],
      "Resource": "*",
      "Condition": {
        "StringEquals": {
          "kms:CallerAccount": "111122223333",
          "kms:ViaService": "secretsmanager.us-west-2.amazonaws.com"
        }
      }
    },
    {
      "Sid": "Allow access through AWS Secrets Manager for all principals in the
 account that are authorized to use AWS Secrets Manager",
      "Effect": "Allow",
      "Principal": {
        "AWS": [
          "*"
```

```
        ]
      },
      "Action": "kms:GenerateDataKey*",
      "Resource": "*",
      "Condition": {
        "StringEquals": {
          "kms:CallerAccount": "111122223333"
        },
        "StringLike": {
          "kms:ViaService": "secretsmanager.us-west-2.amazonaws.com"
        }
      }
    },
    {
      "Sid": "Allow direct access to key metadata to the account",
      "Effect": "Allow",
      "Principal": {
        "AWS": [
          "arn:aws:iam::111122223333:root"
        ]
      },
      "Action": [
        "kms:Describe*",
        "kms:Get*",
        "kms:List*",
        "kms:RevokeGrant"
      ],
      "Resource": "*"
    }
  ]
}
```

Secrets Manager encryption context

An encryption context is a set of key–value pairs that contain arbitrary nonsecret data. When you include an encryption context in a request to encrypt data, AWS KMS cryptographically binds the encryption context to the encrypted data. To decrypt the data, you must pass in the same encryption context.

In its GenerateDataKey and Decrypt requests to AWS KMS, Secrets Manager uses an encryption context with two name–value pairs that identify the secret and its version, as shown in the

following example. The names do not vary, but combined encryption context values will be different for each secret value.

```
"encryptionContext": {
    "SecretARN": "arn:aws:secretsmanager:us-east-2:111122223333:secret:test-secret-
a1b2c3",
    "SecretVersionId": "EXAMPLE1-90ab-cdef-fedc-ba987SECRET1"
}
```

You can use the encryption context to identify these cryptographic operation in audit records and logs, such as AWS CloudTrail and Amazon CloudWatch Logs, and as a condition for authorization in policies and grants.

The Secrets Manager encryption context consists of two name-value pairs.

- **SecretARN** – The first name–value pair identifies the secret. The key is `SecretARN`. The value is the Amazon Resource Name (ARN) of the secret.

  ```
  "SecretARN": "ARN of an Secrets Manager secret"
  ```

  For example, if the ARN of the secret is `arn:aws:secretsmanager:us-east-2:111122223333:secret:test-secret-a1b2c3`, the encryption context would include the following pair.

  ```
  "SecretARN": "arn:aws:secretsmanager:us-east-2:111122223333:secret:test-secret-
  a1b2c3"
  ```

- **SecretVersionId** – The second name–value pair identifies the version of the secret. The key is `SecretVersionId`. The value is the version ID.

  ```
  "SecretVersionId": "<version-id>"
  ```

  For example, if the version ID of the secret is `EXAMPLE1-90ab-cdef-fedc-ba987SECRET1`, the encryption context would include the following pair.

  ```
  "SecretVersionId": "EXAMPLE1-90ab-cdef-fedc-ba987SECRET1"
  ```

When you establish or change the KMS key for a secret, Secrets Manager sends GenerateDataKey and Decrypt requests to AWS KMS to validate that the caller has permission to use the KMS key for these operations. It discards the responses; it does not use them on the secret value.

In these validation requests, the value of the `SecretARN` is the actual ARN of the secret, but the `SecretVersionId` value is `RequestToValidateKeyAccess`, as shown in the following example encryption context. This special value helps you to identify validation requests in logs and audit trails.

```
"encryptionContext": {
    "SecretARN": "arn:aws:secretsmanager:us-east-2:111122223333:secret:test-secret-
a1b2c3",
    "SecretVersionId": "RequestToValidateKeyAccess"
}
```

Note

In the past, Secrets Manager validation requests did not include an encryption context. You might find calls with no encryption context in older AWS CloudTrail logs.

Monitor Secrets Manager interaction with AWS KMS

You can use AWS CloudTrail and Amazon CloudWatch Logs to track the requests that Secrets Manager sends to AWS KMS on your behalf. For information about monitoring the use of secrets, see *Monitor secrets*.

GenerateDataKey

When you create or change the secret value in a secret, Secrets Manager sends a GenerateDataKey request to AWS KMS that specifies the KMS key for the secret.

The event that records the `GenerateDataKey` operation is similar to the following example event. The request is invoked by `secretsmanager.amazonaws.com`. The parameters include the Amazon Resource Name (ARN) of the KMS key for the secret, a key specifier that requires a 256-bit key, and the encryption context that identifies the secret and version.

```
{
    "eventVersion": "1.05",
    "userIdentity": {
```

```
        "type": "IAMUser",
        "principalId": "AROAIGDTESTANDEXAMPLE:user01",
        "arn": "arn:aws:sts::111122223333:assumed-role/Admin/user01",
        "accountId": "111122223333",
        "accessKeyId": "AKIAIOSFODNN7EXAMPLE",
        "sessionContext": {
            "attributes": {
                "mfaAuthenticated": "false",
                "creationDate": "2018-05-31T23:23:41Z"
            }
        },
        "invokedBy": "secretsmanager.amazonaws.com"
    },
    "eventTime": "2018-05-31T23:23:41Z",
    "eventSource": "kms.amazonaws.com",
    "eventName": "GenerateDataKey",
    "awsRegion": "us-east-2",
    "sourceIPAddress": "secretsmanager.amazonaws.com",
    "userAgent": "secretsmanager.amazonaws.com",
    "requestParameters": {
        "keyId": "arn:aws:kms:us-
east-2:111122223333:key/1234abcd-12ab-34cd-56ef-1234567890ab",
        "keySpec": "AES_256",
        "encryptionContext": {
            "SecretARN": "arn:aws:secretsmanager:us-east-2:111122223333:secret:test-
secret-a1b2c3",
            "SecretVersionId": "EXAMPLE1-90ab-cdef-fedc-ba987SECRET1"
        }
    },
    "responseElements": null,
    "requestID": "a7d4dd6f-6529-11e8-9881-67744a270888",
    "eventID": "af7476b6-62d7-42c2-bc02-5ce86c21ed36",
    "readOnly": true,
    "resources": [
        {
            "ARN": "arn:aws:kms:us-
east-2:111122223333:key/1234abcd-12ab-34cd-56ef-1234567890ab",
            "accountId": "111122223333",
            "type": "AWS::KMS::Key"
        }
    ],
    "eventType": "AwsApiCall",
    "recipientAccountId": "111122223333"
```

```
}
```

Decrypt

When you get or change the secret value of a secret, Secrets Manager sends a Decrypt request to AWS KMS to decrypt the encrypted data key. For batch commands, Secrets Manager can reuse the decrypted key, so not all calls result in a `Decrypt` request.

The event that records the `Decrypt` operation is similar to the following example event. The user is the principal in your AWS account who is accessing the table. The parameters include the encrypted table key (as a ciphertext blob) and the encryption context that identifies the table and the AWS account. AWS KMS derives the ID of the KMS key from the ciphertext.

```
{
    "eventVersion": "1.05",
    "userIdentity": {
        "type": "IAMUser",
        "principalId": "AROAIGDTESTANDEXAMPLE:user01",
        "arn": "arn:aws:sts::111122223333:assumed-role/Admin/user01",
        "accountId": "111122223333",
        "accessKeyId": "AKIAIOSFODNN7EXAMPLE",
        "sessionContext": {
            "attributes": {
                "mfaAuthenticated": "false",
                "creationDate": "2018-05-31T23:36:09Z"
            }
        },
        "invokedBy": "secretsmanager.amazonaws.com"
    },
    "eventTime": "2018-05-31T23:36:09Z",
    "eventSource": "kms.amazonaws.com",
    "eventName": "Decrypt",
    "awsRegion": "us-east-2",
    "sourceIPAddress": "secretsmanager.amazonaws.com",
    "userAgent": "secretsmanager.amazonaws.com",
    "requestParameters": {
        "encryptionContext": {
            "SecretARN": "arn:aws:secretsmanager:us-east-2:111122223333:secret:test-
secret-a1b2c3",
            "SecretVersionId": "EXAMPLE1-90ab-cdef-fedc-ba987SECRET1"
        }
    },
    "responseElements": null,
```

```
    "requestID": "658c6a08-652b-11e8-a6d4-ffee2046048a",
    "eventID": "f333ec5c-7fc1-46b1-b985-cbda13719611",
    "readOnly": true,
    "resources": [
        {
            "ARN": "arn:aws:kms:us-
east-2:111122223333:key/1234abcd-12ab-34cd-56ef-1234567890ab",
            "accountId": "111122223333",
            "type": "AWS::KMS::Key"
        }
    ],
    "eventType": "AwsApiCall",
    "recipientAccountId": "111122223333"
}
```

Encrypt

When you change the KMS key associated with a secret, Secrets Manager sends an Encrypt request to AWS KMS to re-encrypt the `AWSCURRENT`, `AWSPREVIOUS`, and `AWSPENDING` secret versions with the new key. When you replicate a secret to another Region, Secrets Manager also sends an Encrypt request to AWS KMS.

The event that records the `Encrypt` operation is similar to the following example event. The user is the principal in your AWS account who is accessing the table.

```
{
    "eventVersion": "1.08",
    "userIdentity": {
        "type": "IAMUser",
        "principalId": "AROAIGDTESTANDEXAMPLE:user01",
        "arn": "arn:aws:sts::111122223333:assumed-role/Admin/user01",
        "accountId": "111122223333",
        "accessKeyId": "AKIAIOSFODNN7EXAMPLE",
        "sessionContext": {
            "attributes": {
                "creationDate": "2023-06-09T18:11:34Z",
                "mfaAuthenticated": "false"
            }
        },
        "invokedBy": "secretsmanager.amazonaws.com"
    },
    "eventTime": "2023-06-09T18:11:34Z",
    "eventSource": "kms.amazonaws.com",
```

```
    "eventName": "Encrypt",
    "awsRegion": "us-east-2",
    "sourceIPAddress": "secretsmanager.amazonaws.com",
    "userAgent": "secretsmanager.amazonaws.com",
    "requestParameters": {
        "keyId": "arn:aws:kms:us-east-2:111122223333:key/EXAMPLE1-f1c8-4dce-8777-
aa071ddefdcc",
        "encryptionAlgorithm": "SYMMETRIC_DEFAULT",
        "encryptionContext": {
            "SecretARN": "arn:aws:secretsmanager:us-
east-2:111122223333:secret:ChangeKeyTest-5yKnKS",
            "SecretVersionId": "EXAMPLE1-5c55-4d7c-9277-1b79a5e8bc50"
        }
    },
    "responseElements": null,
    "requestID": "129bd54c-1975-4c00-9b03-f79f90e61d60",
    "eventID": "f7d9ff39-15ab-47d8-b94c-56586de4ab68",
    "readOnly": true,
    "resources": [
        {
            "accountId": "AWS Internal",
            "type": "AWS::KMS::Key",
            "ARN": "arn:aws:kms:us-west-2:111122223333:key/EXAMPLE1-f1c8-4dce-8777-
aa071ddefdcc"
        }
    ],
    "eventType": "AwsApiCall",
    "managementEvent": true,
    "recipientAccountId": "111122223333",
    "eventCategory": "Management"
}
```


Infrastructure security in AWS Secrets Manager

As a managed service, AWS Secrets Manager is protected by the AWS global network security. For information about AWS security services and how AWS protects infrastructure, see AWS Cloud Security. To design your AWS environment using the best practices for infrastructure security, see Infrastructure Protection in *Security Pillar AWS Well-Architected Framework*.

Access to Secrets Manager via the network is through AWS published APIs using TLS. Secrets Manager APIs are callable from any network location. However, Secrets Manager supports

resource-based access policies, which can include restrictions based on the source IP address. You can also use Secrets Manager resource policies to control access to secrets from specific virtual private cloud (VPC) endpoints, or specific VPCs. Effectively, this isolates network access to a given secret from only the specific VPC within the AWS network. For more information, see *VPC endpoint*.

Resiliency in AWS Secrets Manager

AWS builds the global infrastructure around AWS Regions and Availability Zones. AWS Regions provide multiple physically separated and isolated Availability Zones, which connect with low-latency, high-throughput, and highly redundant networking. With Availability Zones, you can design and operate applications and databases that automatically fail over between zones without interruption. Availability Zones allow you to be more highly available, fault tolerant, and scalable than traditional single or multiple data center infrastructures.

For more information on resiliency and disaster recovery, refer to Reliability Pillar - AWS Well-Architected Framework.

For more information about AWS Regions and Availability Zones, see AWS Global Infrastructure.

Post-quantum TLS

Secrets Manager supports a hybrid post-quantum key exchange option for the Transport Layer Security (TLS) network encryption protocol. You can use this TLS option when you connect to Secrets Manager API endpoints. We're offering this feature before post-quantum algorithms are standardized so you can begin testing the effect of these key exchange protocols on Secrets Manager calls. These optional hybrid post-quantum key exchange features are at least as secure as the TLS encryption we use today and are likely to provide additional security benefits. However, they affect latency and throughput compared to the classic key exchange protocols in use today.

To protect data encrypted today against potential future attacks, AWS is participating with the cryptographic community in the development of quantum-resistant or *post-quantum* algorithms. We've implemented hybrid post-quantum key exchange cipher suites in Secrets Manager endpoints. These hybrid cipher suites, which combine classic and post-quantum elements, ensure that your TLS connection is at least as strong as it would be with classic cipher suites. However, because the performance characteristics and bandwidth requirements of hybrid cipher suites are different from those of classic key exchange mechanisms, we recommend that you test them on your API calls.

Secrets Manager supports PQTLS in all Regions except China Regions.

To configure hybrid post-quantum TLS

1. Add the AWS Common Runtime client to your Maven dependencies. We recommend using the latest available version. For example, this statement adds version 2.20.0.

```
<dependency>
  <groupId>software.amazon.awssdk</groupId>
  <artifactId>aws-crt-client</artifactId>
  <version>2.20.0</version>
</dependency>
```

2. Add the AWS SDK for Java 2.x to your project and initialize it. Enable the hybrid post-quantum cipher suites on your HTTP client.

```
SdkAsyncHttpClient awsCrtHttpClient = AwsCrtAsyncHttpClient.builder()
            .postQuantumTlsEnabled(true)
            .build();
```

3. Create the Secrets Manager asynchronous client.

```
SecretsManagerAsyncClient SecretsManagerAsync = SecretsManagerAsyncClient.builder()
            .httpClient(awsCrtHttpClient)
            .build();
```

   Now when you call Secrets Manager API operations, your calls are transmitted to the Secrets Manager endpoint using hybrid post-quantum TLS.

For more information about using hybrid post-quantum TLS, see:

- AWS SDK for Java 2.x Developer Guide and the AWS SDK for Java 2.x released blog post.
- Introducing s2n-tls, a New Open Source TLS Implementation and Using s2n-tls.
- Post-Quantum Cryptography at the National Institute for Standards and Technology (NIST).
- Hybrid Post-Quantum Key Encapsulation Methods (PQ KEM) for Transport Layer Security 1.2 (TLS).

Post-quantum TLS for Secrets Manager is available in all AWS Regions except China.

Troubleshooting AWS Secrets Manager

Use the information here to help you diagnose and fix issues that you might encounter when you're working with Secrets Manager.

For issues related to rotation, see the section called “Troubleshoot rotation”.

Topics

"Access denied" messages when sending requests to Secrets Manager

Verify that you have permissions to call the operation and resource you requested. An administrator must grant permissions by attaching an IAM policy to your IAM user, or to a group that you're a member of. If the policy statements that grant those permissions include any conditions, such as time-of-day or IP address restrictions, you also must meet those requirements when you send the request. For information about viewing or modifying policies for an IAM user, group, or role, see Working with Policies in the *IAM User Guide*. For information about permissions required for Secrets Manager, see *Authentication and access control*.

If you're signing API requests manually, without using the AWS SDKs, verify you correctly signed the request.

"Access denied" for temporary security credentials

Verify the IAM user or role you're using to make the request has the correct permissions. Permissions for temporary security credentials derive from an IAM user or role. This means the permissions are limited to those granted to the IAM user or role. For more information about how

permissions for temporary security credentials are determined, see Controlling Permissions for Temporary Security Credentials in the *IAM User Guide*.

Verify that your requests are signed correctly and that the request is well-formed. For details, see the toolkit documentation for your chosen SDK, or Using Temporary Security Credentials to Request Access to AWS Resources in the *IAM User Guide*.

Verify that your temporary security credentials haven't expired. For more information, see Requesting Temporary Security Credentials in the *IAM User Guide*.

For information about permissions required for Secrets Manager, see *Authentication and access control*.

Changes I make aren't always immediately visible.

Secrets Manager uses a distributed computing model called eventual consistency. Any change that you make in Secrets Manager (or other AWS services) takes time to become visible from all possible endpoints. Some of the delay results from the time it takes to send the data from server to server, from replication zone to replication zone, and from region to region around the world. Secrets Manager also uses caching to improve performance, but in some cases this can add time. The change might not be visible until the previously cached data times out.

Design your global applications to account for these potential delays. Also, ensure that they work as expected, even when a change made in one location isn't instantly visible at another.

For more information about how some other AWS services are affected by eventual consistency, see:

- Managing data consistency in the *Amazon Redshift Database Developer Guide*
- Amazon S3 Data Consistency Model in the *Amazon Simple Storage Service User Guide*
- Ensuring Consistency When Using Amazon S3 and Amazon EMR for ETL Workflows in the AWS Big Data Blog
- Amazon EC2 Eventual Consistency in the *Amazon EC2 API Reference*

“Cannot generate a data key with an asymmetric KMS key” when creating a secret

Secrets Manager uses a symmetric encryption KMS key associated with a secret to generate a data key for each secret value. You can't use an asymmetric KMS key. Verify you are using a symmetric encryption KMS key instead of an asymmetric KMS key. For instructions, see Identifying asymmetric KMS keys.

An AWS CLI or AWS SDK operation can't find my secret from a partial ARN

In many cases, Secrets Manager can find your secret from part of an ARN rather than the full ARN. However, if your secret's name ends in a hyphen followed by six characters, Secrets Manager might not be able to find the secret from only part of an ARN. Instead, we recommend that you use the complete ARN or the name of the secret.

More details

Secrets Manager includes six random characters at the end of the secret name to help ensure that the secret ARN is unique. If the original secret is deleted, and then a new secret is created with the same name, the two secrets have different ARNs because of these characters. Users with access to the old secret don't automatically get access to the new secret because the ARNs are different.

Secrets Manager constructs an ARN for a secret with Region, account, secret name, and then a hyphen and six more characters, as follows:

```
arn:aws:secretsmanager:us-east-2:111122223333:secret:SecretName-abcdef
```

If your secret name ends with a hyphen and six characters, using only part of the ARN can appear to Secrets Manager as though you are specifying a full ARN. For example, you might have a secret named `MySecret-abcdef` with the ARN

`arn:aws:secretsmanager:us-east-2:111122223333:secret:MySecret-abcdef-nutBrk`

If you call the following operation, which only uses part of the secret ARN, then Secrets Manager might not find the secret.

```
$ aws secretsmanager describe-secret --secret-id arn:aws:secretsmanager:us-
east-2:111122223333:secret:MySecret-abcdef
```

This secret is managed by an AWS service, and you must use that service to update it.

If you encounter this message while trying to modify a secret, the secret can only be updated by using the managing service listed in the message. For more information, see *Secrets managed by other services*.

To determine who manages a secret, you can review the secret name. Secrets managed by other services are prefixed with the ID of that service. Or, in the AWS CLI, call describe-secret, and then review the field `OwningService`.

AWS Secrets Manager quotas

Secrets Manager read APIs have high TPS quotas, and control plane APIs that are less frequently called have lower TPS quotas. We recommend you avoid calling `PutSecretValue` or `UpdateSecret` at a sustained rate of more than once every 10 minutes. When you call `PutSecretValue` or `UpdateSecret` to update the secret value, Secrets Manager creates a new version of the secret. Secrets Manager removes unlabeled versions when there are more than 100, but it does not remove versions created less than 24 hours ago. If you update the secret value more than once every 10 minutes, you create more versions than Secrets Manager removes, and you will reach the quota for secret versions.

You may operate multiple regions in your account, and each quota is specific to each region.

When an application in one AWS account uses a secret owned by a different account, it's known as a *cross-account request*. For cross-account requests, Secrets Manager throttles the account of the identity that makes the requests, not the account that owns the secret. For example, if an identity from account A uses a secret in account B, the secret use applies only to the quotas in account A.

Secrets Manager quotas

Name	Default	Adjustable	Description
Combined rate of DeleteResourcePolicy, GetResourcePolicy, PutResourcePolicy, and ValidateResourcePolicy API requests	Each supported Region: 50 per second	No	The maximum transactions per second for DeleteResourcePolicy, GetResourcePolicy, PutResourcePolicy, and ValidateResourcePolicy API requests combined.
Combined rate of DescribeSecret and GetSecretValue API requests	Each supported Region: 10,000 per second	No	The maximum transactions per second for DescribeSecret and GetSecretValue API requests combined.

Name	Default	Adjustable	Description
Combined rate of PutSecretValue, RemoveRegionsFromReplication, ReplicateSecretToRegion, StopReplicationToReplica, UpdateSecret, and UpdateSecretVersionStage API requests	Each supported Region: 50 per second	No	The maximum transactions per second for PutSecretValue, RemoveRegionsFromReplication, ReplicateSecretToRegion, StopReplicationToReplica, UpdateSecret, and UpdateSecretVersionStage API requests combined.
Combined rate of RestoreSecret API requests	Each supported Region: 50 per second	No	The maximum transactions per second for RestoreSecret API requests.
Combined rate of RotateSecret and CancelRotateSecret API requests	Each supported Region: 50 per second	No	The maximum transactions per second for RotateSecret and CancelRotateSecret API requests combined.
Combined rate of TagResource and UntagResource API requests	Each supported Region: 50 per second	No	The maximum transactions per second for TagResource and UntagResource API requests combined.
Rate of BatchGetSecretValue API requests	Each supported Region: 100 per second	No	The maximum transactions per second for BatchGetSecretValue API requests.

Name	Default	Adjustable	Description
Rate of CreateSecret API requests	Each supported Region: 50 per second	No	The maximum transactions per second for CreateSecret API requests.
Rate of DeleteSecret API requests	Each supported Region: 50 per second	No	The maximum transactions per second for DeleteSecret API requests.
Rate of GetRandomPassword API requests	Each supported Region: 50 per second	No	The maximum transactions per second for GetRandomPassword API requests.
Rate of ListSecretVersionIds API requests	Each supported Region: 50 per second	No	The maximum transactions per second for ListSecretVersionIds API requests.
Rate of ListSecrets API requests	Each supported Region: 100 per second	No	The maximum transactions per second for ListSecrets API requests.
Resource-based policy length	Each supported Region: 20,480	No	The maximum number of characters in a resource-based permissions policy attached to a secret.

Name	Default	Adjuse	Description
Secret value size	Each supported Region: 65,536 Bytes	No	The maximum size of an encrypted secret value. If the secret value is a string, then this is the number of characters permitted in the secret value.
Secrets	Each supported Region: 500,000	No	The maximum number of secrets in each AWS Region of this AWS account.
Staging labels attached across all versions of a secret	Each supported Region: 20	No	The maximum number of staging labels attached across all versions of a secret.
Versions per secret	Each supported Region: 100	No	The maximum number of versions of a secret.

Add retries to your application

Your AWS client might see calls to Secrets Manager fail due to unexpected issues on the client side. Or calls might fail due to rate limiting from Secrets Manager. When you exceed an API request quota, Secrets Manager throttles the request. It rejects an otherwise valid request and returns a throttling error. For both kinds of failures, we recommend you retry the call after a brief waiting period. This is called a backoff and retry strategy.

If you experience the following errors, you might want to add retries to your application code:

Transient errors and exceptions

- `RequestTimeout`
- `RequestTimeoutException`

- `PriorRequestNotComplete`
- `ConnectionError`
- `HTTPClientError`

Service-side throttling and limit errors and exceptions

- `Throttling`
- `ThrottlingException`
- `ThrottledException`
- `RequestThrottledException`
- `TooManyRequestsException`
- `ProvisionedThroughputExceededException`
- `TransactionInProgressException`
- `RequestLimitExceeded`
- `BandwidthLimitExceeded`
- `LimitExceededException`
- `RequestThrottled`
- `SlowDown`

For more information, as well as example code, on retries, exponential backoff, and jitter, see the following resources:

- Exponential Backoff and Jitter
- Timeouts, retries and backoff with jitter
- Error retries and exponential backoff in AWS.