Amazon S3 Glacier

Developer Guide

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What Is Amazon S3 Glacier?

Welcome to the Amazon S3 Glacier Developer Guide. Amazon Simple Storage Service Glacier, that is Amazon S3 Glacier (Glacier), is a storage service optimized for infrequently used data, or "cold data."

Glacier is an extremely low-cost storage service that provides durable storage with security features for data archiving and backup. With Glacier, customers can store their data cost effectively for months, years, or even decades. Glacier enables customers to offload the administrative burdens of operating and scaling storage to AWS, so they don't have to worry about capacity planning, hardware provisioning, data replication, hardware failure detection and recovery, or time-consuming hardware migrations. For more service highlights and pricing information, go to the Glacier detail page.

Topics
- Are You a First-Time Glacier User? (p. 1)
- Amazon S3 Glacier Data Model (p. 2)
- Supported Operations in Glacier (p. 4)
- Accessing Amazon S3 Glacier (p. 5)

Are You a First-Time Glacier User?

If you are a first-time user of Glacier, we recommend that you begin by reading the following sections:

- **What is Glacier**—The rest of this section describes the underlying data model, the operations it supports, and the AWS SDKs that you can use to interact with the service.
- **Getting Started**—The Getting Started with Amazon S3 Glacier (p. 7) section walks you through the process of creating a vault, uploading archives, creating jobs to download archives, retrieving the job output, and deleting archives.

  **Important**
  Glacier provides a console, which you can use to create and delete vaults. However, all other interactions with Glacier require that you use the AWS Command Line Interface (AWS CLI) or write code. For example, to upload data, such as photos, videos, and other documents, you must either use the AWS CLI or write code to make requests, by using either the REST API directly or by using the AWS SDKs. For more information about using Glacier with the AWS CLI, go to AWS CLI Reference for Glacier. To install the AWS CLI, go to AWS Command Line Interface.

Beyond the getting started section, you'll probably want to learn more about Glacier operations. The following sections provide detailed information about working with Glacier using the REST API and the AWS Software Development Kits (SDKs) for Java and Microsoft .NET:

- **Using the AWS SDKs with Amazon S3 Glacier** (p. 106)
  This section provides an overview of the AWS SDKs used in various code examples in this guide. A review of this section will help when reading the following sections. It includes an overview of the high-level and the low-level APIs that these SDKs offer, when to use them, and common steps for running the code examples provided in this guide.
- **Working with Vaults in Amazon S3 Glacier** (p. 22)
  This section provides details of various vault operations such as creating a vault, retrieving vault metadata, using jobs to retrieve vault inventory, and configuring vault notifications. In addition
to using the Glacier console, you can use the AWS SDKs for various vault operations. This section describes the API and provides working samples using the AWS SDK for Java and .NET.

- **Working with Archives in Amazon S3 Glacier (p. 59)**

  This section provides details of archive operations such as uploading an archive in a single request or using a multipart upload operation to upload large archives in parts. The section also explains creating jobs to download archives asynchronously. The section provides examples using the AWS SDK for Java and .NET.

- **API Reference for Glacier (p. 150)**

  Glacier is a RESTful service. This section describes the REST operations, including the syntax, and example requests and responses for all the operations. Note that the AWS SDK libraries wrap this API, simplifying your programming tasks.

Amazon Simple Storage Service (Amazon S3) supports lifecycle configuration on an S3 bucket, which enables you to transition objects to the Amazon S3 GLACIER storage class for archival. When you transition Amazon S3 objects to the GLACIER storage class, Amazon S3 internally uses Glacier for durable storage at lower cost. Although the objects are stored in Glacier, they remain Amazon S3 objects that you manage in Amazon S3, and you cannot access them directly through Glacier.

For more information about Amazon S3 lifecycle configuration and transitioning objects to the GLACIER storage class, see Object Lifecycle Management and Transitioning Objects in the Amazon Simple Storage Service Developer Guide.

### Amazon S3 Glacier Data Model

The Amazon S3 Glacier (Glacier) data model core concepts include vaults and archives. Glacier is a REST-based web service. In terms of REST, vaults and archives are the resources. In addition, the Glacier data model includes job and notification-configuration resources. These resources complement the core resources.

**Topics**

- **Vault (p. 2)**
- **Archive (p. 3)**
- **Job (p. 3)**
- **Notification Configuration (p. 4)**

### Vault

In Glacier, a vault is a container for storing archives. When you create a vault, you specify a name and choose an AWS Region where you want to create the vault.

Each vault resource has a unique address. The general form is:

```plaintext
https://<region-specific endpoint>/<account-id>/vaults/<vaultname>
```

For example, suppose that you create a vault (examplevault) in the US West (Oregon) Region. This vault can then be addressed by the following URI:

```plaintext
https://glacier.us-west-2.amazonaws.com/111122223333/vaults/examplevault
```
In the URI,

- `glacier.us-west-2.amazonaws.com` identifies the US West (Oregon) Region.
- `111122223333` is the AWS account ID that owns the vault.
- `vaults` refers to the collection of vaults owned by the AWS account.
- `examplevault` identifies a specific vault in the vaults collection.

An AWS account can create vaults in any supported AWS Region. For list of supported AWS Regions, see [Accessing Amazon S3 Glacier](#). Within a Region, an account must use unique vault names. An AWS account can create same-named vaults in different Regions.

You can store an unlimited number of archives in a vault. Depending on your business or application needs, you can store these archives in one vault or multiple vaults.

Glacier supports various vault operations. Note that vault operations are Region specific. For example, when you create a vault, you create it in a specific Region. When you request a vault list, you request it from a specific AWS Region, and the resulting list only includes vaults created in that specific Region.

### Archive

An archive can be any data such as a photo, video, or document and is a base unit of storage in Glacier. Each archive has a unique ID and an optional description. Note that you can only specify the optional description during the upload of an archive. Glacier assigns the archive an ID, which is unique in the AWS Region in which it is stored.

Each archive has a unique address. The general form is as follows:

`https://<region-specific endpoint>/<account-id>/vaults/<vault-name>/archives/<archive-id>`

The following is an example URI of an archive stored in the `examplevault` vault in the US West (Oregon) Region:

`https://glacier.us-west-2.amazonaws.com/111122223333/vaults/examplevault/archives/NkbByEejwEggmBz2fTHgJrg0XBoDfjP4q6iu87-TjhnqS6eGoY9Zi1_AyYuubPAdTgLHy8pT5nfCFJmDl2yEZOni5L260m12vcs01MNGntHEQL8MBfGlqrEXAMPLEArchiveId`

You can store an unlimited number of archives in a vault.

In addition, the Glacier data model includes job and notification-configuration resources. These resources complement the core vault and archive resources.

### Job

Glacier jobs can perform a select query on an archive, retrieve an archive, or get an inventory of a vault. When performing a query on an archive, you initiate a job providing a SQL query and list of Glacier archive objects. Glacier Select runs the query in place and writes the output results to Amazon S3.

Retrieving an archive and vault inventory (list of archives) are asynchronous operations in Glacier in which you first initiate a job, and then download the job output after Glacier completes the job.

**Note**

Glacier offers a cold storage data archival solution. If your application needs a storage solution that requires real-time data retrieval, you might consider using Amazon S3. For more information, see [Amazon Simple Storage Service (Amazon S3)](#).
To initiate a vault inventory job, you provide a vault name. Select and archive retrieval jobs require that both the vault name and the archive ID. You can also provide an optional job description to help identify the jobs.

Select, archive retrieval, and vault inventory jobs are associated with a vault. A vault can have multiple jobs in progress at any point in time. When you send a job request (initiate a job), Glacier returns to you a job ID to track the job. Each job is uniquely identified by a URI of the form:

https://<region-specific endpoint>/account-id/vaults/vault-name/jobs/job-id

The following is an example of a job associated with an examplevault vault.

https://glacier.us-west-2.amazonaws.com/111122223333/vaults/examplevault/jobs/HkF9p607yjhFx-K3CGI6fuSm6VzW9T7esQfco8nUXYfW50jlb5gq1J555yHgt5vF542ShjoQzQV7vEXAMPLEjobID

For each job, Glacier maintains information such as job type, description, creation date, completion date, and job status. You can obtain information about a specific job or obtain a list of all your jobs associated with a vault. The list of jobs that Glacier returns includes all the in-progress and recently finished jobs.

### Notification Configuration

Because jobs take time to complete, Glacier supports a notification mechanism to notify you when a job is complete. You can configure a vault to send notification to an Amazon Simple Notification Service (Amazon SNS) topic when jobs complete. You can specify one SNS topic per vault in the notification configuration.

Glacier stores the notification configuration as a JSON document. The following is an example vault notification configuration:

```json
{
  "Events": ["ArchiveRetrievalCompleted", "InventoryRetrievalCompleted"]
}
```

Note that notification configurations are associated with vaults; you can have one for each vault. Each notification configuration resource is uniquely identified by a URI of the form:

https://<region-specific endpoint>/account-id/vaults/vault-name/notification-configuration

Glacier supports operations to set, get, and delete a notification configuration. When you delete a notification configuration, no notifications are sent when any data retrieval operation on the vault is complete.

### Supported Operations in Glacier

To work with vaults and archives (see Amazon S3 Glacier Data Model (p. 2)), Amazon S3 Glacier (Glacier) supports a set of operations. Among all the supported operations, only the following operations are asynchronous:

- Retrieving an archive
• Retrieving a vault inventory (list of archives)

These operations require you to first initiate a job and then download the job output. The following sections summarize the Glacier operations:

**Vault Operations**

Glacier provides operations to create and delete vaults. You can obtain a vault description for a specific vault or for all vaults in a region. The vault description provides information such as creation date, number of archives in the vault, total size in bytes used by all the archives in the vault, and the date Glacier generated the vault inventory. Glacier also provides operations to set, retrieve, and delete a notification configuration on the vault. For more information, see Working with Vaults in Amazon S3 Glacier (p. 22).

**Archive Operations**

Glacier provides operations for you to upload and delete archives. You cannot update an existing archive; you must delete the existing archive and upload a new archive. Note that each time you upload an archive, Glacier generates a new archive ID. For more information, see Working with Archives in Amazon S3 Glacier (p. 59).

**Jobs**

You can initiate a Glacier job to perform a select query on an archive, retrieve an archive, or get an inventory of a vault.

The following are the types of Glacier jobs:

- **select**— Perform a select query on an archive.
  - For more information, see Querying Archives with Glacier Select (p. 138).

- **archive-retrieval**— Retrieve an archive.
  - For more information, see Downloading an Archive in Amazon S3 Glacier (p. 75).

- **inventory-retrieval**— Inventory a vault.
  - For more information, see Downloading a Vault Inventory in Amazon S3 Glacier (p. 33).

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**Accessing Amazon S3 Glacier**

Amazon S3 Glacier (Glacier) is a RESTful web service that uses HTTP and HTTPS as a transport and JavaScript Object Notation (JSON) as a message serialization format. Your application code can make requests directly to the Glacier web service API. When using the REST API directly, you must write the necessary code to sign and authenticate your requests. For more information about the API, see API Reference for Glacier (p. 150).

Alternatively, you can simplify application development by using the AWS SDKs that wrap the Glacier REST API calls. You provide your credentials, and these libraries take care of authentication and request signing. For more information about using the AWS SDKs, see Using the AWS SDKs with Amazon S3 Glacier (p. 106).

Glacier also provides a console. You can use the console to create and delete vaults. However, all the archive and job operations require you to write code and make requests using either the REST API directly or the AWS SDK wrapper libraries. To access the Glacier console, go to Glacier Console.
Regions and Endpoints

You create a vault in a specific AWS Region. You always send your Glacier requests to a region-specific endpoint. For a list of the AWS Regions supported by Glacier, go to Regions and Endpoints in the AWS General Reference.
Getting Started with Amazon S3 Glacier

In Amazon S3 Glacier (Glacier), a vault is a container for storing archives, and an archive is any object, such as a photo, video, or document that you store in a vault. An archive is the base unit of storage in Glacier. This getting started exercise provides instructions for you to explore basic Glacier operations on the vaults and archives resources described in the Amazon S3 Glacier Data Model (p. 2) section.

In the getting started exercise, you will create a vault, upload and download an archive, and finally delete the archive and the vault. You can do all these operations programmatically. However, the getting started exercise uses the Glacier management console to create and delete a vault. For uploading and downloading an archive, this getting started section uses the AWS Software Development Kits (SDKs) for Java and .NET high-level API. The high-level API provides a simplified programming experience when working with Glacier. For more information about these APIs, see Using the AWS SDKs with Amazon S3 Glacier (p. 106).

Important
Glacier provides a management console. You can use the console to create and delete vaults as shown in this getting started exercise. However, all other interactions with Glacier require that you use the AWS Command Line Interface (CLI) or write code. For example, to upload data, such as photos, videos, and other documents, you must either use the AWS CLI or write code to make requests, using either the REST API directly or by using the AWS SDKs. For more information about using Glacier with the AWS CLI, go to AWS CLI Reference for Glacier. To install the AWS CLI, go to AWS Command Line Interface.

This getting started exercise provides code examples in Java and C# for you to upload and download an archive. The last section of the getting started provides steps where you can learn more about the developer experience with Glacier.

Topics
- Step 1: Before You Begin with Amazon S3 Glacier (p. 7)
- Step 2: Create a Vault in Amazon S3 Glacier (p. 11)
- Step 3: Upload an Archive to a Vault in Amazon S3 Glacier (p. 12)
- Step 4: Download an Archive from a Vault in Amazon S3 Glacier (p. 15)
- Step 5: Delete an Archive from a Vault in Amazon S3 Glacier (p. 18)
- Step 6: Delete a Vault in Amazon S3 Glacier (p. 20)
- Where Do I Go From Here? (p. 21)

Step 1: Before You Begin with Amazon S3 Glacier

Before you can start with this exercise, you must sign up for an AWS account (if you don't already have one), and then download one of the AWS Software Development Kits (SDKs). The following sections provide instructions.

Topics
- Set Up an AWS Account and an Administrator User (p. 8)
- Download the Appropriate AWS SDK (p. 10)
Amazon S3 Glacier Developer Guide
Set Up an AWS Account

Important
Amazon S3 Glacier (Glacier) provides a management console, which you can use to create and delete vaults. However, all other interactions with Glacier require that you use the AWS Command Line Interface (CLI) or write code. For example, to upload data, such as photos, videos, and other documents, you must either use the AWS CLI or write code to make requests, using either the REST API directly or by using the AWS SDKs. For more information about using Glacier with the AWS CLI, go to AWS CLI Reference for Glacier. To install the AWS CLI, go to AWS Command Line Interface.

Set Up an AWS Account and an Administrator User

If you have not already done so, you need to sign up for an AWS account and create an administrator user in the account.

To complete the setup, follow the instructions in the following topics:

Set Up an AWS Account and Create an Administrator User

Sign up for AWS

When you sign up for Amazon Web Services (AWS), your AWS account is automatically signed up for all services in AWS, including Glacier. You are charged only for the services that you use. For more information about Glacier usage rates, see the Amazon S3 Glacier product page.

If you already have an AWS account and you have created an IAM user for the account, skip to the next task. If you don’t have an AWS account, use the following procedure to create one.

To create an AWS account

2. Follow the online instructions.
   Part of the sign-up procedure involves receiving a phone call and entering a verification code on the phone keypad.

   Note your AWS account ID, because you’ll need it for the next step.

Create an IAM User

Services in AWS, such as Glacier, require that you provide credentials when you access them, so that the service can determine whether you have permissions to access the resources owned by that service. The console requires your password. You can create access keys for your AWS account to access the AWS CLI or API. However, we don’t recommend that you access AWS using the credentials for your AWS account. Instead, we recommend that you use AWS Identity and Access Management (IAM). Create an IAM user, add the user to an IAM group with administrative permissions, and then grant administrative permissions to the IAM user that you created. You can then access AWS using a special URL and that IAM user’s credentials.

If you signed up for AWS, but you haven’t created an IAM user for yourself, you can create one using the IAM console.

The Getting Started examples in this guide assume you have a user with administrator privileges.

To create an administrator user for yourself and add the user to an administrators group (console)

1. Use your AWS account email address and password to sign in as the AWS account root user to the IAM console at https://console.aws.amazon.com/iam/.
Note
We strongly recommend that you adhere to the best practice of using the Administrator IAM user below and securely lock away the root user credentials. Sign in as the root user only to perform a few account and service management tasks.

2. In the navigation pane, choose Users and then choose Add user.
3. For User name, enter Administrator.
4. Select the check box next to AWS Management Console access. Then select Custom password, and then enter your new password in the text box.
5. (Optional) By default, AWS requires the new user to create a new password when first signing in. You can clear the check box next to User must create a new password at next sign-in to allow the new user to reset their password after they sign in.
6. Choose Next: Permissions.
7. Under Set permissions, choose Add user to group.
8. Choose Create group.
9. In the Create group dialog box, for Group name enter Administrators.
10. Choose Filter policies, and then select AWS managed -job function to filter the table contents.
11. In the policy list, select the check box for AdministratorAccess. Then choose Create group.

Note
You must activate IAM user and role access to Billing before you can use the AdministratorAccess permissions to access the AWS Billing and Cost Management console. To do this, follow the instructions in step 1 of the tutorial about delegating access to the billing console.
12. Back in the list of groups, select the check box for your new group. Choose Refresh if necessary to see the group in the list.
13. Choose Next: Tags.
14. (Optional) Add metadata to the user by attaching tags as key-value pairs. For more information about using tags in IAM, see Tagging IAM Entities in the IAM User Guide.
15. Choose Next: Review to see the list of group memberships to be added to the new user. When you are ready to proceed, choose Create user.

You can use this same process to create more groups and users and to give your users access to your AWS account resources. To learn about using policies that restrict user permissions to specific AWS resources, see Access Management and Example Policies.

To sign in as the new IAM user
1. Sign out of the AWS Management Console.
2. Use the following URL format to log in to the console:

   https://aws_account_number.signin.aws.amazon.com/console/

   The aws_account_number is your AWS account ID without hyphen. For example, if your AWS account ID is 1234-5678-9012, your AWS account number is 123456789012. For information about how to find your account number, see Your AWS Account ID and Its Alias in the IAM User Guide.
3. Enter the IAM user name and password that you just created. When you're signed in, the navigation bar displays your_user_name @ your_aws_account_id.

If you don't want the URL for your sign-in page to contain your AWS account ID, you can create an account alias.
To create or remove an account alias

1. Sign in to the AWS Management Console and open the IAM console at https://console.aws.amazon.com/iam/.
2. On the navigation pane, choose Dashboard.
3. Find the IAM users sign-in link.
4. To create the alias, click Customize, enter the name you want to use for your alias, and then choose Yes, Create.
5. To remove the alias, choose Customize, and then choose Yes, Delete. The sign-in URL reverts to using your AWS account ID.

To sign in after you create an account alias, use the following URL:

https://your_account_alias.signin.aws.amazon.com/console/

To verify the sign-in link for IAM users for your account, open the IAM console and check under IAM users sign-in link: on the dashboard.

For more information about IAM, see the following:

- AWS Identity and Access Management (IAM)
- Getting Started
- IAM User Guide

For information about using IAM with Glacier, see Identity and Access Management in Amazon S3 Glacier (p. 114).

Download the Appropriate AWS SDK

To try the getting started exercise, you must decide which programming language you want to use and download the appropriate AWS SDK for your development platform.

The getting started exercise provides examples in Java and C#.

Downloading the AWS SDK for Java

To test the Java examples in this developer guide, you need the AWS SDK for Java. You have the following download options:

- If you are using Eclipse, you can download and install the AWS Toolkit for Eclipse using the update site http://aws.amazon.com/eclipse/. For more information, go to AWS Toolkit for Eclipse.
- If you are using any other IDE to create your application, download the AWS SDK for Java.

Downloading the AWS SDK for .NET

To test the C# examples in this developer guide, you need the AWS SDK for .NET. You have the following download options:

- If you are using Visual Studio, you can install both the AWS SDK for .NET and the AWS Toolkit for Visual Studio. The toolkit provides AWS Explorer for Visual Studio and project templates that you can use for development. To download the AWS SDK for .NET go to http://aws.amazon.com/sdkfornet.
Step 2: Create a Vault in Amazon S3 Glacier

A vault is a container for storing archives. Your first step is to create a vault in one of the supported AWS regions. In this getting started exercise, you create a vault in the US West (Oregon) region. For a list of the AWS regions supported by Amazon S3 Glacier (Glacier), go to Regions and Endpoints in the AWS General Reference.

You can create vaults programmatically or by using the Glacier console. This section uses the console to create a vault. In a later step, you will upload an archive to the vault.

To create a vault

1. Sign into the AWS Management Console and open the Glacier console at https://console.aws.amazon.com/glacier/.
2. Select a region from the region selector.
   - In this getting started exercise, we use the US West (Oregon) region.
3. If you are using Glacier for the first time, click Get started. (Otherwise, you would click Create Vault.)
4. Enter examplevault as the vault name in the Vault Name field and then click Next Step.

There are guidelines for naming a vault. For more information, see Creating a Vault in Amazon S3 Glacier (p. 23).
Step 3: Upload an Archive to a Vault in Amazon S3 Glacier

In this step, you upload a sample archive to the vault you created in the preceding step (see Step 2: Create a Vault in Amazon S3 Glacier (p. 11)). Depending on the development platform you are using, click one of the links at the end of this section.

**Important**

Any archive operation, such as upload, download, or deletion, requires that you use the AWS Command Line Interface (CLI) or write code. There is no console support for archive operations.
For example, to upload data, such as photos, videos, and other documents, you must either use the AWS CLI or write code to make requests, using either the REST API directly or by using the AWS SDKs. To install the AWS CLI, see AWS Command Line Interface. For more information about using Amazon S3 Glacier (Glacier) with the AWS CLI, see AWS CLI Reference for Glacier. For examples of using the AWS CLI to upload archives to Glacier, see Using Glacier with the AWS Command Line Interface.

An archive is any object, such as a photo, video, or document that you store in a vault. It is a base unit of storage in Glacier. You can upload an archive in a single request. For large archives, Glacier provides a multipart upload API that enables you to upload an archive in parts. In this getting started section, you upload a sample archive in a single request. For this exercise, you specify a file that is smaller in size. For larger files, multipart upload is suitable. For more information, see Uploading Large Archives in Parts (Multipart Upload) (p. 67).

Topics

• Upload an Archive to a Vault in Amazon S3 Glacier Using the AWS SDK for Java (p. 13)
• Upload an Archive to a Vault in Amazon S3 Glacier Using the AWS SDK for .NET (p. 14)

Upload an Archive to a Vault in Amazon S3 Glacier Using the AWS SDK for Java

The following Java code example uses the high-level API of the AWS SDK for Java to upload a sample archive to the vault. In the code example, note the following:

• The example creates an instance of the AmazonGlacierClient class.
• The example uses the upload method of the ArchiveTransferManager class from the high-level API of the AWS SDK for Java.
• The example uses the US West (Oregon) region (us-west-2) to match the location where you created the vault previously in Step 2: Create a Vault in Amazon S3 Glacier (p. 11).

For step-by-step instructions on how to run this example, see Running Java Examples for Amazon S3 Glacier Using Eclipse (p. 109). You need to update the code as shown with the name of the archive file you want to upload.

Note

Amazon S3 Glacier (Glacier) keeps an inventory of all the archives in your vaults. When you upload the archive in the following example, it will not appear in a vault in the management console until the vault inventory has been updated. This update usually happens once a day.

Example — Uploading an Archive Using the AWS SDK for Java

```java
import java.io.File;
import java.io.IOException;
import java.util.Date;
import com.amazonaws.auth.profile.ProfileCredentialsProvider;
import com.amazonaws.services.glacier.AmazonGlacierClient;
import com.amazonaws.services.glacier.transfer.ArchiveTransferManager;
import com.amazonaws.services.glacier.transfer.UploadResult;

public class AmazonGlacierUploadArchive_GettingStarted {
    public static String vaultName = "examplevault2";
    public static String archiveToUpload = "*** provide name of file to upload ***";
}
```
public static AmazonGlacierClient client;
public static void main(String[] args) throws IOException {
    ProfileCredentialsProvider credentials = new ProfileCredentialsProvider();
    client = new AmazonGlacierClient(credentials);
    client.setEndpoint("https://glacier.us-west-2.amazonaws.com");
    try {
        ArchiveTransferManager atm = new ArchiveTransferManager(client, credentials);
        UploadResult result = atm.upload(vaultName, "my archive " + (new Date()), new File(archiveToUpload));
        System.out.println("Archive ID: " + result.getArchiveId());
    } catch (Exception e) {
        System.err.println(e);
    }
}

Upload an Archive to a Vault in Amazon S3 Glacier Using the AWS SDK for .NET

The following C# code example uses the high-level API of the AWS SDK for .NET to upload a sample archive to the vault. In the code example, note the following:

- The example creates an instance of the ArchiveTransferManager class for the specified Amazon S3 Glacier (Glacier) region endpoint.
- The code example uses the US West (Oregon) region (us-west-2) to match the location where you created the vault previously in Step 2: Create a Vault in Amazon S3 Glacier (p. 11).
- The example uses the Upload method of the ArchiveTransferManager class to upload your archive. For small archives, this method uploads the archive directly to Glacier. For larger archives, this method uses Glacier's multipart upload API to split the upload into multiple parts for better error recovery, if any errors are encountered while streaming the data to Glacier.

For step-by-step instructions on how to run the following example, see Running Code Examples (p. 111). You need to update the code as shown with the name of your vault and the name of the archive file to upload.

**Note**
Glacier keeps an inventory of all the archives in your vaults. When you upload the archive in the following example, it will not appear in a vault in the management console until the vault inventory has been updated. This update usually happens once a day.

Example — Uploading an Archive Using the High-Level API of the AWS SDK for .NET

using System;
using Amazon.Glacier;
using Amazon.Glacier.Transfer;
using Amazon.Runtime;

namespace glacier.amazon.com.docsamples
{
    class ArchiveUploadHighLevel_GettingStarted
    {
        static string vaultName = "examplevault";
Step 4: Download an Archive from a Vault in Amazon S3 Glacier

In this step, you download the sample archive you uploaded previously in Step 3: Upload an Archive to a Vault in Amazon S3 Glacier (p. 12).

Important
Any archive operation, such as upload, download, or deletion, requires that you use the AWS Command Line Interface (AWS CLI) or write code. There is no console support for archive operations. For example, to upload data, such as photos, videos, and other documents, you must either use the AWS CLI or write code to make requests, using either the REST API directly or the AWS SDKs. For more information about using Amazon S3 Glacier (Glacier) with the AWS CLI, see AWS CLI Reference for Glacier. To install the AWS CLI, see AWS Command Line Interface.

In general, retrieving your data from Glacier is a two-step process:

1. Initiate a retrieval job.
2. After the job completes, download the bytes of data.

To retrieve an archive from Glacier, you first initiate a job. After the job completes, you download the data. For more information about archive retrievals, see Retrieving Glacier Archives (p. 75).

The access time of your request depends on the retrieval option you choose: Expedited, Standard, or Bulk retrievals. For all but the largest archives (250 MB+), data accessed using Expedited retrievals are typically made available within 1–5 minutes. Archives retrieved using Standard retrievals typically complete between 3–5 hours. Bulk retrievals typically complete within 5–12 hours. For more information about the retrieval options, see the Glacier FAQ. For information about data retrieval charges, see the Glacier detail page.

The code examples shown in the following topics initiate the job, wait for it to complete, and then download the archive's data.
Download an Archive from a Vault in Amazon S3 Glacier Using the AWS SDK for Java

The following Java code example uses the high-level API of the AWS SDK for Java to download the archive you uploaded in the previous step. In the code example, note the following:

- The example creates an instance of the AmazonGlacierClient class.
- The code uses the US West (Oregon) region (us-west-2) to match the location where you created the vault in Step 2: Create a Vault in Amazon S3 Glacier (p. 11).
- The example uses the download method of the ArchiveTransferManager class from the high-level API of the AWS SDK for Java. The example creates an Amazon SNS topic, and an Amazon Simple Queue Service queue that is subscribed to that topic. If you created an IAM administrative user as instructed in Step 1: Before You Begin with Amazon S3 Glacier (p. 7) your user has the necessary IAM permissions for the creation and use of the Amazon SNS topic and Amazon SQS queue.

For step-by-step instructions on how to run this example, see Running Java Examples for Amazon S3 Glacier Using Eclipse (p. 109). You need to update the code as shown with the archive ID of the file you uploaded in Step 3: Upload an Archive to a Vault in Amazon S3 Glacier (p. 12).

Example — Downloading an Archive Using the AWS SDK for Java

```java
import java.io.File;
import java.io.IOException;
import com.amazonaws.auth.profile.ProfileCredentialsProvider;
import com.amazonaws.services.glacier.AmazonGlacierClient;
import com.amazonaws.services.glacier.transfer.ArchiveTransferManager;
import com.amazonaws.services.sns.AmazonSNSClient;
import com.amazonaws.services.sqs.AmazonSQSClient;
import com.amazonaws.services.sns.AmazonSNSClient;
import com.amazonaws.services.sqs.AmazonSQSClient;

public class AmazonGlacierDownloadArchive_GettingStarted {
    public static String vaultName = "examplevault";
    public static String archiveId = "*** provide archive ID ***";
    public static String downloadFilePath = "*** provide location to download archive ***";

    public static AmazonGlacierClient glacierClient;
    public static AmazonSQSClient sqsClient;
    public static AmazonSNSClient snsClient;

    public static void main(String[] args) throws IOException {
        ProfileCredentialsProvider credentials = new ProfileCredentialsProvider();

        glacierClient = new AmazonGlacierClient(credentials);
        sqsClient = new AmazonSQSClient(credentials);
        snsClient = new AmazonSNSClient(credentials);

        glacierClient.setEndpoint("glacier.us-west-2.amazonaws.com");
        sqsClient.setEndpoint("sqs.us-west-2.amazonaws.com");
        snsClient.setEndpoint("sns.us-west-2.amazonaws.com");
    }
}
```
Download an Archive from a Vault in Amazon S3 Glacier Using the AWS SDK for .NET

The following C# code example uses the high-level API of the AWS SDK for .NET to download the archive you uploaded previously in Upload an Archive to a Vault in Amazon S3 Glacier Using the AWS SDK for .NET (p. 14). In the code example, note the following:

- The example creates an instance of the `ArchiveTransferManager` class for the specified Amazon S3 Glacier (Glacier) region endpoint.
- The code example uses the US West (Oregon) region (`us-west-2`) to match the location where you created the vault previously in Step 2: Create a Vault in Amazon S3 Glacier (p. 11).
- The example uses the `Download` method of the `ArchiveTransferManager` class to download your archive. The example creates an Amazon SNS topic, and an Amazon Simple Queue Service queue that is subscribed to that topic. If you created an IAM administrative user as instructed in Step 1: Before You Begin with Amazon S3 Glacier (p. 7) your user has the necessary IAM permissions for the creation and use of the Amazon SNS topic and Amazon SQS queue.
- The example then initiates the archive retrieval job and polls the queue for the archive to be available. When the archive is available, download begins. For information about retrieval times, see Archive Retrieval Options (p. 76)

For step-by-step instructions on how to run this example, see Running Code Examples (p. 111). You need to update the code as shown with the archive ID of the file you uploaded in Step 3: Upload an Archive to a Vault in Amazon S3 Glacier (p. 12).

Example — Download an Archive Using the High-Level API of the AWS SDK for .NET

```csharp
glacier.amazon.com/docsamples
namespace glacier.amazon.com.docsamples
{
class ArchiveDownloadHighLevel_GettingStarted
{
    static string vaultName = "examplevault";
    static string archiveId = "*** Provide archive ID ***";
    static string downloadFilePath = "*** Provide the file name and path to where to store the download ***";

    public static void Main(string[] args)
    {
        try
        {
            // Code...
        }
    }
}
```
Step 5: Delete an Archive from a Vault in Amazon S3 Glacier

In this step, you delete the sample archive you uploaded in Step 3: Upload an Archive to a Vault in Amazon S3 Glacier (p. 12).

Important
You cannot delete an archive using the Amazon S3 Glacier (Glacier) console. Any archive operation, such as upload, download, or deletion, requires that you use the AWS CLI or write code. For example, to upload data, such as photos, videos, and other documents, you must either use the AWS CLI or write code to make requests, using either the REST API directly or by using the AWS SDKs. For more information about using Glacier with the AWS CLI, go to AWS CLI Reference for Glacier. To install the AWS CLI, go to AWS Command Line Interface.

Depending on which SDK you are using, delete the sample archive by following one of these steps:

- Delete an Archive from a Vault in Amazon S3 Glacier Using the AWS SDK for Java (p. 19)
- Delete an Archive from a Vault in Amazon S3 Glacier Using the AWS SDK for .NET (p. 20)

Related Sections

- Step 3: Upload an Archive to a Vault in Amazon S3 Glacier (p. 12)
- Deleting an Archive in Amazon S3 Glacier (p. 101)
Delete an Archive from a Vault in Amazon S3 Glacier Using the AWS SDK for Java

The following code example uses the AWS SDK for Java to delete the archive. In the code, note the following:

- The `DeleteArchiveRequest` object describes the delete request, including the vault name where the archive is located and the archive ID.
- The `deleteArchive` method sends the request to Amazon S3 Glacier (Glacier) to delete the archive.
- The example uses the US West (Oregon) region (`us-west-2`) to match the location where you created the vault in Step 2: Create a Vault in Amazon S3 Glacier (p. 11).

For step-by-step instructions on how to run this example, see Running Java Examples for Amazon S3 Glacier Using Eclipse (p. 109). You need to update the code as shown with the archive ID of the file you uploaded in Step 3: Upload an Archive to a Vault in Amazon S3 Glacier (p. 12).

Example — Deleting an Archive Using the AWS SDK for Java

```java
import java.io.IOException;
import com.amazonaws.auth.profile.ProfileCredentialsProvider;
import com.amazonaws.services.glacier.AmazonGlacierClient;
import com.amazonaws.services.glacier.model.DeleteArchiveRequest;

public class AmazonGlacierDeleteArchive_GettingStarted {
    public static String vaultName = "examplevault";
    public static String archiveId = "*** provide archive ID***";
    public static AmazonGlacierClient client;

    public static void main(String[] args) throws IOException {
        ProfileCredentialsProvider credentials = new ProfileCredentialsProvider();
        client = new AmazonGlacierClient(credentials);
        client.setEndpoint("https://glacier.us-west-2.amazonaws.com/");

        try {
            // Delete the archive.
            client.deleteArchive(new DeleteArchiveRequest()
                    .withVaultName(vaultName)
                    .withArchiveId(archiveId));
            System.out.println("Deleted archive successfully.");
        } catch (Exception e) {
            System.err.println("Archive not deleted.");
            System.err.println(e);
        }
    }
}
```
Delete an Archive from a Vault in Amazon S3 Glacier Using the AWS SDK for .NET

The following C# code example uses the high-level API of the AWS SDK for .NET to delete the archive you uploaded in the previous step. In the code example, note the following:

- The example creates an instance of the `ArchiveTransferManager` class for the specified Amazon S3 Glacier (Glacier) region endpoint.
- The code example uses the US West (Oregon) region (`us-west-2`) to match the location where you created the vault previously in Step 2: Create a Vault in Amazon S3 Glacier (p. 11).
- The example uses the `Delete` method of the `ArchiveTransferManager` class provided as part of the high-level API of the AWS SDK for .NET.

For step-by-step instructions on how to run this example, see Running Code Examples (p. 111). You need to update the code as shown with the archive ID of the file you uploaded in Step 3: Upload an Archive to a Vault in Amazon S3 Glacier (p. 12).

Example — Deleting an Archive Using the High-Level API of the AWS SDK for .NET

```csharp
using System;
using Amazon.Glacier;
using Amazon.Glacier.Transfer;
using Amazon.Runtime;

namespace glacier.amazon.com.docsamples
{
    class ArchiveDeleteHighLevel_GettingStarted
    {
        static string vaultName = "examplevault";
        static string archiveId = "*** Provide archive ID ***";

        public static void Main(string[] args)
        {
            try
            {
                var manager = new ArchiveTransferManager(Amazon.RegionEndpoint.USWest2);
                manager.DeleteArchive(vaultName, archiveId);
            }
            catch (AmazonGlacierException e) { Console.WriteLine(e.Message); }
            catch (AmazonServiceException e) { Console.WriteLine(e.Message); }
            catch (Exception e) { Console.WriteLine(e.Message); }
            Console.WriteLine("To continue, press Enter");
            Console.ReadKey();
        }
    }
}
```

Step 6: Delete a Vault in Amazon S3 Glacier

A vault is a container for storing archives. You can delete an Amazon S3 Glacier (Glacier) vault only if there are no archives in the vault as of the last inventory that Glacier computed and there have been no writes to the vault since the last inventory.
Note
Glacier prepares an inventory for each vault periodically, every 24 hours. Because the inventory might not reflect the latest information, Glacier ensures the vault is indeed empty by checking if there were any write operations since the last vault inventory.

You can delete a vault programmatically or by using the Glacier console. This section uses the console to delete a vault. For information about deleting a vault programmatically, see Deleting a Vault in Amazon S3 Glacier (p. 53).

To delete a vault
2. From the region selector, select the AWS region where the vault exists that you want to delete.
   In this getting started exercise, we use the US West (Oregon) region.
3. Select the vault that you want to delete.
   In this getting started exercise, we've been using a vault named examplevault.
4. Click Delete Vault.

Where Do I Go From Here?

Now that you have tried the getting started exercise, you can explore the following sections to learn more about Amazon S3 Glacier (Glacier).

- Working with Vaults in Amazon S3 Glacier (p. 22)
- Working with Archives in Amazon S3 Glacier (p. 59)
Working with Vaults in Amazon S3 Glacier

A vault is a container for storing archives. When you create a vault, you specify a vault name and a region in which you want to create the vault. For a list of supported regions, see Accessing Amazon S3 Glacier (p. 5).

You can store an unlimited number of archives in a vault.

**Important**
Amazon S3 Glacier (Glacier) provides a management console. You can use the console to create and delete vaults. However, all other interactions with Glacier require that you use the AWS Command Line Interface (CLI) or write code. For example, to upload data, such as photos, videos, and other documents, you must either use the AWS CLI or write code to make requests, using either the REST API directly or by using the AWS SDKs. For more information about using Glacier with the AWS CLI, go to AWS CLI Reference for Glacier. To install the AWS CLI, go to AWS Command Line Interface.

**Topics**
- Vault Operations in Glacier (p. 22)
- Creating a Vault in Amazon S3 Glacier (p. 23)
- Retrieving Vault Metadata in Amazon S3 Glacier (p. 29)
- Downloading a Vault Inventory in Amazon S3 Glacier (p. 33)
- Configuring Vault Notifications in Amazon S3 Glacier (p. 45)
- Deleting a Vault in Amazon S3 Glacier (p. 53)
- Tagging Your Amazon S3 Glacier Vaults (p. 55)
- Amazon S3 Glacier Vault Lock (p. 56)

Vault Operations in Glacier

Glacier supports various vault operations. Note that vault operations are region specific. For example, when you create a vault, you create it in a specific region. When you list vaults, Glacier returns the vault list from the region you specified in the request.

**Creating and Deleting Vaults**

An AWS account can create up to 1,000 vaults per region. For a list of the AWS regions supported by Glacier, see Regions and Endpoints in the AWS General Reference.

You can delete a vault only if there are no archives in the vault as of the last inventory that Glacier computed and there have been no writes to the vault since the last inventory.

**Note**
Glacier prepares an inventory for each vault periodically, every 24 hours. Because the inventory might not reflect the latest information, Glacier ensures the vault is indeed empty by checking if there were any write operations since the last vault inventory.

For more information, see Creating a Vault in Amazon S3 Glacier (p. 23) and Deleting a Vault in Amazon S3 Glacier (p. 53).
Retrieving Vault Metadata

You can retrieve vault information such as the vault creation date, number of archives in the vault, and the total size of all the archives in the vault. Glacier provides API calls for you to retrieve this information for a specific vault or all the vaults in a specific region in your account. For more information, see Retrieving Vault Metadata in Amazon S3 Glacier (p. 29).

Downloading a Vault Inventory

A vault inventory refers to the list of archives in a vault. For each archive in the list, the inventory provides archive information such as archive ID, creation date, and size. Glacier updates the vault inventory approximately once a day, starting on the day the first archive is uploaded to the vault. A vault inventory must exist for you to be able to download it.

Downloading a vault inventory is an asynchronous operation. You must first initiate a job to download the inventory. After receiving the job request, Glacier prepares your inventory for download. After the job completes, you can download the inventory data.

Given the asynchronous nature of the job, you can use Amazon Simple Notification Service (Amazon SNS) notifications to notify you when the job completes. You can specify an Amazon SNS topic for each individual job request or configure your vault to send a notification when specific vault events occur.

Glacier prepares an inventory for each vault periodically, every 24 hours. If there have been no archive additions or deletions to the vault since the last inventory, the inventory date is not updated. When you initiate a job for a vault inventory, Glacier returns the last inventory it generated, which is a point-in-time snapshot and not real-time data. You might not find it useful to retrieve vault inventory for each archive upload. However, suppose you maintain a database on the client-side associating metadata about the archives you upload to Glacier. Then, you might find the vault inventory useful to reconcile information in your database with the actual vault inventory.

For more information about retrieving a vault inventory, see Downloading a Vault Inventory in Amazon S3 Glacier (p. 33).

Configuring Vault Notifications

Retrieving anything from Glacier, such as an archive from a vault or a vault inventory, is a two-step process in which you first initiate a job. After the job completes, you can download the output. You can use Glacier notifications support to know when your job is complete. Glacier sends notification messages to an Amazon Simple Notification Service (Amazon SNS) topic that you provide.

You can configure notifications on a vault and identify vault events and the Amazon SNS topic to be notified when the event occurs. Anytime the vault event occurs, Glacier sends a notification to the specified Amazon SNS topic. For more information, see Configuring Vault Notifications in Amazon S3 Glacier (p. 45).

Creating a Vault in Amazon S3 Glacier

Creating a vault adds a vault to the set of vaults in your account. An AWS account can create up to 1,000 vaults per region. For a list of the AWS regions supported by Amazon S3 Glacier (Glacier), see Regions and Endpoints in the AWS General Reference. For information on creating more vaults, go to the Glacier product detail page.

When you create a vault, you must provide a vault name. The following are the vault naming requirements:

- Names can be between 1 and 255 characters long.
• Allowed characters are a–z, A–Z, 0–9, '_' (underscore), '-' (hyphen), and '.' (period).

Vault names must be unique within an account and the region in which the vault is being created. That is, an account can create vaults with the same name in different regions but not in the same region.

Topics
• Creating a Vault in Amazon S3 Glacier Using the AWS SDK for Java (p. 24)
• Creating a Vault in Amazon S3 Glacier Using the AWS SDK for .NET (p. 26)
• Creating a Vault in Amazon S3 Glacier Using the REST API (p. 29)
• Creating a Vault Using the Amazon S3 Glacier Console (p. 29)

Creating a Vault in Amazon S3 Glacier Using the AWS SDK for Java

The low-level API provides methods for all the vault operations, including creating and deleting vaults, getting a vault description, and getting a list of vaults created in a specific region. The following are the steps to create a vault using the AWS SDK for Java.

1. Create an instance of the AmazonGlacierClient class (the client).
   You need to specify an AWS region in which you want to create a vault. All operations you perform using this client apply to that region.

2. Provide request information by creating an instance of the CreateVaultRequest class.
   Amazon S3 Glacier (Glacier) requires you to provide a vault name and your account ID. If you don't provide an account ID, then the account ID associated with the credentials you provide to sign the request is used. For more information, see Using the AWS SDK for Java with Amazon S3 Glacier (p. 107).

3. Execute the createVault method by providing the request object as a parameter.
   The response Glacier returns is available in the CreateVaultResult object.

The following Java code snippet illustrates the preceding steps. The snippet creates a vault in the us-west-2 region. The Location it prints is the relative URI of the vault that includes your account ID, the region, and the vault name.

```java
AmazonGlacierClient client = new AmazonGlacierClient(credentials);
client.setEndpoint("https://glacier.us-west-2.amazonaws.com");
CreateVaultRequest request = new CreateVaultRequest()
    .withVaultName("**** provide vault name ****");
CreateVaultResult result = client.createVault(request);
System.out.println("Created vault successfully: " + result.getLocation());
```

Note
For information about the underlying REST API, see Create Vault (PUT vault) (p. 174).

Example: Creating a Vault Using the AWS SDK for Java

The following Java code example creates a vault in the us-west-2 region (for more information on regions, see Accessing Amazon S3 Glacier (p. 5)). In addition, the code example retrieves the vault information, lists all vaults in the same region, and then deletes the vault created.
For step-by-step instructions on how to run the following example, see Running Java Examples for Amazon S3 Glacier Using Eclipse (p. 109).

Example

```java
import java.io.IOException;
import java.util.List;

import com.amazonaws.auth.profile.ProfileCredentialsProvider;
import com.amazonaws.services.glacier.AmazonGlacierClient;
import com.amazonaws.services.glacier.model.CreateVaultRequest;
import com.amazonaws.services.glacier.model.CreateVaultResult;
import com.amazonaws.services.glacier.model.DeleteVaultRequest;
import com.amazonaws.services.glacier.model.DescribeVaultOutput;
import com.amazonaws.services.glacier.model.DescribeVaultRequest;
import com.amazonaws.services.glacier.model.DescribeVaultResult;
import com.amazonaws.services.glacier.model.ListVaultsRequest;
import com.amazonaws.services.glacier.model.ListVaultsResult;

public class AmazonGlacierVaultOperations {

  public static AmazonGlacierClient client;

  public static void main(String[] args) throws IOException {
    ProfileCredentialsProvider credentials = new ProfileCredentialsProvider();
    client = new AmazonGlacierClient(credentials);
    client.setEndpoint("https://glacier.us-east-1.amazonaws.com/");

    String vaultName = "examplevaultfordelete";

    try {
      createVault(client, vaultName);
      describeVault(client, vaultName);
      listVaults(client);
      deleteVault(client, vaultName);
    } catch (Exception e) {
      System.err.println("Vault operation failed." + e.getMessage());
    }
  }

  private static void createVault(AmazonGlacierClient client, String vaultName) {
    CreateVaultRequest createVaultRequest = new CreateVaultRequest()
        .withVaultName(vaultName);
    CreateVaultResult createVaultResult = client.createVault(createVaultRequest);
    System.out.println("Created vault successfully: " + createVaultResult.getLocation());
  }

  private static void describeVault(AmazonGlacierClient client, String vaultName) {
    DescribeVaultRequest describeVaultRequest = new DescribeVaultRequest()
        .withVaultName(vaultName);
    DescribeVaultResult describeVaultResult = client.describeVault(describeVaultRequest);
    System.out.println("Describing the vault: " + vaultName);
    System.out.print("CreationDate: " + describeVaultResult.getCreationDate() +
        "\nLastInventoryDate: " + describeVaultResult.getLastInventoryDate() +
        "\nNumberOfArchives: " + describeVaultResult.getNumberOfArchives() +
        "\nSizeInBytes: " + describeVaultResult.getSizeInBytes() +
        "\n" + describeVaultResult.getNumInBytes());
  }

  private static void listVaults(AmazonGlacierClient client) {
    ListVaultsRequest listVaultsRequest = new ListVaultsRequest();
    ListVaultsResult listVaultsResult = client.listVaults(listVaultsRequest);
    System.out.println("Found " + listVaultsResult.getVaultCount() + " vaults.");
  }

  private static void deleteVault(AmazonGlacierClient client, String vaultName) {
    DeleteVaultRequest deleteVaultRequest = new DeleteVaultRequest()
        .withVaultName(vaultName);
    DescribeVaultResult describeVaultResult = client.describeVault(deleteVaultRequest);
    System.out.println("Deleting vault: " + vaultName);
    System.out.print("CreationDate: " + describeVaultResult.getCreationDate() +
        "\nLastInventoryDate: " + describeVaultResult.getLastInventoryDate() +
        "\nNumberOfArchives: " + describeVaultResult.getNumberOfArchives() +
        "\nSizeInBytes: " + describeVaultResult.getSizeInBytes());
  }
}
```
Creating a Vault Using .NET

Both the high-level and low-level APIs (p. 106) provided by the AWS SDK for .NET provide a method to create a vault.

Topics

- Creating a Vault Using the High-Level API of the AWS SDK for .NET (p. 26)
- Creating a Vault Using the Low-Level API of the AWS SDK for .NET (p. 27)

Creating a Vault Using the High-Level API of the AWS SDK for .NET

The ArchiveTransferManager class of the high-level API provides the CreateVault method you can use to create a vault in an AWS region.

Example: Vault Operations Using the High-Level API of the AWS SDK for .NET

The following C# code example creates and delete a vault in the US West (Oregon) Region. For a list of AWS regions in which you can create vaults, see Accessing Amazon S3 Glacier (p. 5).

For step-by-step instructions on how to run the following example, see Running Code Examples (p. 111). You need to update the code as shown with a vault name.

Example

```csharp
using System;
```
using Amazon.Glacier;
using Amazon.Glacier.Transfer;
using Amazon.Runtime;

namespace glacier.amazon.com.docsamples
{
    class VaultCreateDescribeListVaultsDeleteHighLevel
    {
        static string vaultName = "*** Provide vault name ***";

        public static void Main(string[] args)
        {
            try
            {
                var manager = new ArchiveTransferManager(Amazon.RegionEndpoint.USWest2);
                manager.CreateVault(vaultName);
                Console.WriteLine("Vault created. To delete the vault, press Enter");
                Console.ReadKey();
                manager.DeleteVault(vaultName);
                Console.WriteLine("Vault deleted. To continue, press Enter");
                Console.ReadKey();
            }
            catch (AmazonGlacierException e) { Console.WriteLine(e.Message); }
            catch (AmazonServiceException e) { Console.WriteLine(e.Message); }
            catch (Exception e) { Console.WriteLine(e.Message); }
            Console.WriteLine("To continue, press Enter");
            Console.ReadKey();
        }
    }
}

Creating a Vault Using the Low-Level API of the AWS SDK for .NET

The low-level API provides methods for all the vault operations, including create and delete vaults, get a vault description, and get a list of vaults created in a specific region. The following are the steps to create a vault using the AWS SDK for .NET.

1. Create an instance of the AmazonGlacierClient class (the client).

   You need to specify an AWS region in which you want to create a vault. All operations you perform using this client apply to that region.

2. Provide request information by creating an instance of the CreateVaultRequest class.

   Amazon S3 Glacier (Glacier) requires you to provide a vault name and your account ID. If you don't provide an account ID, then account ID associated with the credentials you provide to sign the request is assumed. For more information, see Using the AWS SDK for .NET with Amazon S3 Glacier (p. 110).

3. Execute the CreateVault method by providing the request object as a parameter.

   The response Glacier returns is available in the CreateVaultResponse object.

Example: Vault Operations Using the Low-Level API of the AWS SDK for .NET

The following C# example illustrates the preceding steps. The example creates a vault in the US West (Oregon) Region. In addition, the code example retrieves the vault information, lists all vaults in the same region, and then deletes the vault created. The Location printed is the relative URI of the vault that includes your account ID, the region, and the vault name.

Note
For information about the underlying REST API, see Create Vault (PUT vault) (p. 174).
For step-by-step instructions on how to run the following example, see Running Code Examples (p. 111). You need to update the code as shown with a vault name.

Example

```csharp
using System;
using Amazon.Glacier;
using Amazon.Glacier.Model;
using Amazon.Runtime;

namespace glacier.amazon.com.doc samples
{
    class VaultCreateDescribeListVaultsDelete
    {
        static string vaultName = "*** Provide vault name ***";
        static AmazonGlacierClient client;

        public static void Main(string[] args)
        {
            try
            {
                using (client = new AmazonGlacierClient(Amazon.RegionEndpoint.USWest2))
                {
                    Console.WriteLine("Creating a vault.");
                    CreateAVault();
                    DescribeVault();
                    GetVaultsList();
                    Console.WriteLine("\nVault created. Now press Enter to delete the vault...");
                    Console.ReadKey();
                    DeleteVault();
                }
            }
            catch (AmazonGlacierException e) { Console.WriteLine(e.Message); }
            catch (AmazonServiceException e) { Console.WriteLine(e.Message); }
            catch (Exception e) { Console.WriteLine(e.Message); }
            Console.WriteLine("To continue, press Enter");
            Console.ReadKey();
        }

        static void CreateAVault()
        {
            CreateVaultRequest request = new CreateVaultRequest()
            {
                VaultName = vaultName
            };
            CreateVaultResponse response = client.CreateVault(request);
            Console.WriteLine("Vault created: {0}\n", response.Location);
        }

        static void DescribeVault()
        {
            DescribeVaultRequest describeVaultRequest = new DescribeVaultRequest()
            {
                VaultName = vaultName
            };
            DescribeVaultResponse describeVaultResponse = client.DescribeVault(describeVaultRequest);
            Console.WriteLine("\nVault description...");
            Console.WriteLine("\nVaultName: " + describeVaultResponse.VaultName +
            "\nVaultARN: " + describeVaultResponse.VaultARN +
            "\nVaultCreationDate: " + describeVaultResponse.CreationDate +
            "\nNumberOfArchives: " + describeVaultResponse.NumberOfArchives +
            "\nSizeInBytes: " + describeVaultResponse.SizeInBytes +
        }
    }
}
```
Creating a Vault Using REST API

To create a vault using the REST API, see Create Vault (PUT vault) (p. 174).

Creating a Vault Using the Amazon S3 Glacier Console

To create a vault using the Amazon S3 Glacier (Glacier) console, see Step 2: Create a Vault in Amazon S3 Glacier (p. 11) in the Getting Started tutorial.

Retrieving Vault Metadata in Amazon S3 Glacier

You can retrieve vault information such as the vault creation date, number of archives in the vault, and the total size of all the archives in the vault. Amazon S3 Glacier (Glacier) provides API calls for you to retrieve this information for a specific vault or all the vaults in a specific region in your account.

If you retrieve a vault list, Glacier returns the list sorted by the ASCII values of the vault names. The list contains up to 1,000 vaults. You should always check the response for a marker at which to continue the list; if there are no more items the marker field is null. You can optionally limit the number of...
vaults returned in the response. If there are more vaults than are returned in the response, the result is paginated. You need to send additional requests to fetch the next set of vaults.

Topics
- Retrieving Vault Metadata in Amazon S3 Glacier Using the AWS SDK for Java (p. 30)
- Retrieving Vault Metadata in Amazon S3 Glacier Using the AWS SDK for .NET (p. 31)
- Retrieving Vault Metadata Using the REST API (p. 33)

Retrieving Vault Metadata in Amazon S3 Glacier Using the AWS SDK for Java

Topics
- Retrieve Vault Metadata for a Vault (p. 30)
- Retrieve Vault Metadata for All Vaults in a Region (p. 31)
- Example: Retrieving Vault Metadata Using the AWS SDK for Java (p. 31)

Retrieve Vault Metadata for a Vault

You can retrieve metadata for a specific vault or all the vaults in a specific region. The following are the steps to retrieve vault metadata for a specific vault using the low-level API of the AWS SDK for Java.

1. Create an instance of the AmazonGlacierClient class (the client).
   
   You need to specify an AWS region where the vault resides. All operations you perform using this client apply to that region.

2. Provide request information by creating an instance of the DescribeVaultRequest class.
   
   Amazon S3 Glacier (Glacier) requires you to provide a vault name and your account ID. If you don't provide an account ID, then the account ID associated with the credentials you provide to sign the request is assumed. For more information, see Using the AWS SDK for Java with Amazon S3 Glacier (p. 107).

3. Execute the describeVault method by providing the request object as a parameter.
   
   The vault metadata information that Glacier returns is available in the DescribeVaultResult object.

The following Java code snippet illustrates the preceding steps.

```java
DescribeVaultRequest request = new DescribeVaultRequest()
   .withVaultName("*** provide vault name***");
DescribeVaultResult result = client.describeVault(request);
System.out.print(
   "\nCreationDate: " + result.getCreationDate() +
   "\nLastInventoryDate: " + result.getLastInventoryDate() +
   "\nNumberOfArchives: " + result.getNumberOfArchives() +
   "\nSizeInBytes: " + result.getSizeInBytes() +
   "\nVaultARN: " + result.getVaultARN() +
   "\nVaultName: " + result.getVaultName());
```

Note
For information about the underlying REST API, see Describe Vault (GET vault) (p. 184).
Retrieve Vault Metadata for All Vaults in a Region

You can also use the `listVaults` method to retrieve metadata for all the vaults in a specific region.

The following Java code snippet retrieves list of vaults in the `us-west-2` region. The request limits the number of vaults returned in the response to 5. The code snippet then makes a series of `listVaults` calls to retrieve the entire vault list from the region.

```java
AmazonGlacierClient client;
client.setEndpoint("https://glacier.us-west-2.amazonaws.com/");
String marker = null;
do {
    ListVaultsRequest request = new ListVaultsRequest()
        .withLimit("5")
        .withMarker(marker);
    ListVaultsResult listVaultsResult = client.listVaults(request);
    List<DescribeVaultOutput> vaultList = listVaultsResult.getVaultList();
    marker = listVaultsResult.getMarker();
    for (DescribeVaultOutput vault : vaultList) {
        System.out.println(
            "CreationDate: " + vault.getCreationDate() +
            "LastInventoryDate: " + vault.getLastInventoryDate() +
            "NumberOfArchives: " + vault.getNumberOfArchives() +
            "SizeInBytes: " + vault.getSizeInBytes() +
            "VaultARN: " + vault.getVaultARN() +
            "VaultName: " + vault.getVaultName());
    }
} while (marker != null);
```

In the preceding code segment, if you don't specify the `Limit` value in the request, Glacier returns up to 10 vaults, as set by the Glacier API. If there are more vaults to list, the response `marker` field contains the vault Amazon Resource Name (ARN) at which to continue the list with a new request; otherwise, the `marker` field is null.

Note that the information returned for each vault in the list is the same as the information you get by calling the `describeVault` method for a specific vault.

Note
The `listVaults` method calls the underlying REST API (see List Vaults (GET vaults) (p. 199)).

Example: Retrieving Vault Metadata Using the AWS SDK for Java

For a working code example, see Example: Creating a Vault Using the AWS SDK for Java (p. 24). The Java code example creates a vault and retrieves the vault metadata.

Retrieving Vault Metadata in Amazon S3 Glacier Using the AWS SDK for .NET

Topics
- Retrieve Vault Metadata for a Vault (p. 32)
- Retrieve Vault Metadata for All Vaults in a Region (p. 32)
- Example: Retrieving Vault Metadata Using the Low-Level API of the AWS SDK for .NET (p. 33)
Retrieve Vault Metadata for a Vault

You can retrieve metadata for a specific vault or all the vaults in a specific region. The following are the steps to retrieve vault metadata for a specific vault using the low-level API of the AWS SDK for .NET.

1. Create an instance of the `AmazonGlacierClient` class (the client).

   You need to specify an AWS region where the vault resides. All operations you perform using this client apply to that region.

2. Provide request information by creating an instance of the `DescribeVaultRequest` class.

   Amazon S3 Glacier (Glacier) requires you to provide a vault name and your account ID. If you don't provide an account ID, then the account ID associated with the credentials you provide to sign the request is assumed. For more information, see Using the AWS SDK for .NET with Amazon S3 Glacier (p. 110).

3. Execute the `DescribeVault` method by providing the request object as a parameter.

   The vault metadata information that Glacier returns is available in the `DescribeVaultResult` object.

The following C# code snippet illustrates the preceding steps. The snippet retrieves metadata information of an existing vault in the US West (Oregon) Region.

```csharp
AmazonGlacierClient client;
client = new AmazonGlacierClient(Amazon.RegionEndpoint.USWest2);
DescribeVaultRequest describeVaultRequest = new DescribeVaultRequest()
{
    VaultName = "*** Provide vault name ***"
};
DescribeVaultResponse describeVaultResponse = client.DescribeVault(describeVaultRequest);
Console.WriteLine("Vault description...");
Console.WriteLine("VaultName: " + describeVaultResponse.VaultName +
    "VaultARN: " + describeVaultResponse.VaultARN +
    "VaultCreationDate: " + describeVaultResponse.CreationDate +
    "NumberOfArchives: " + describeVaultResponse.NumberOfArchives +
    "SizeInBytes: " + describeVaultResponse.SizeInBytes +
    "LastInventoryDate: " + describeVaultResponse.LastInventoryDate +
};
```

**Note**

For information about the underlying REST API, see Describe Vault (GET vault) (p. 184).

Retrieve Vault Metadata for All Vaults in a Region

You can also use the `ListVaults` method to retrieve metadata for all the vaults in a specific region.

The following C# code snippet retrieves list of vaults in the US West (Oregon) Region. The request limits the number of vaults returned in the response to 5. The code snippet then makes a series of `ListVaults` calls to retrieve the entire vault list from the region.

```csharp
AmazonGlacierClient client;
client = new AmazonGlacierClient(Amazon.RegionEndpoint.USWest2);
string lastMarker = null;
Console.WriteLine("List of vaults in your account in the specific region ...");
do {
```
ListVaultsRequest request = new ListVaultsRequest()
{
    Limit = 5,
    Marker = lastMarker
};
ListVaultsResponse response = client.ListVaults(request);
foreach (DescribeVaultOutput output in response.VaultList)
{
    Console.WriteLine("Vault Name: {0} \tCreation Date: {1} \t #of archives: {2}",
                        output.VaultName, output.CreationDate, output.NumberOfArchives);
} lastMarker = response.Marker;
} while (lastMarker != null);

In the preceding code segment, if you don't specify the Limit value in the request, Glacier returns up to 10 vaults, as set by the Glacier API.

Note that the information returned for each vault in the list is the same as the information you get by calling the DescribeVault method for a specific vault.

Note
The ListVaults method calls the underlying REST API (see List Vaults (GET vaults) (p. 199)).

Example: Retrieving Vault Metadata Using the Low-Level API of the AWS SDK for .NET

For a working code example, see Example: Vault Operations Using the Low-Level API of the AWS SDK for .NET (p. 27). The C# code example creates a vault and retrieves the vault metadata.

Retrieving Vault Metadata Using the REST API

To list vaults using the REST API, see List Vaults (GET vaults) (p. 199). To describe one vault, see Describe Vault (GET vault) (p. 184).

Downloading a Vault Inventory in Amazon S3 Glacier

After you upload your first archive to your vault, Amazon S3 Glacier (Glacier) automatically creates a vault inventory and then updates it approximately once a day. After Glacier creates the first inventory, it typically takes half a day and up to a day before that inventory is available for retrieval. You can retrieve a vault inventory from Glacier with the following two-step process:

1. Initiate an inventory retrieval job by using the Initiate Job (POST jobs) (p. 251) operation.

    Important
    A data retrieval policy can cause your initiate retrieval job request to fail with a PolicyEnforcedException exception. For more information about data retrieval policies, see Amazon S3 Glacier Data Retrieval Policies (p. 141). For more information about the PolicyEnforcedException exception, see Error Responses (p. 166).

2. After the job completes, download the bytes using the Get Job Output (GET output) (p. 245) operation.

For example, retrieving an archive or a vault inventory requires you to first initiate a retrieval job. The job request is executed asynchronously. When you initiate a retrieval job, Glacier creates a job and returns a
job ID in the response. When Glacier completes the job, you can get the job output, the archive bytes, or the vault inventory data.

The job must complete before you can get its output. To determine the status of the job, you have the following options:

- **Wait for job completion notification**—You can specify an Amazon Simple Notification Service (Amazon SNS) topic to which Glacier can post a notification after the job is completed. You can specify Amazon SNS topic using the following methods:
  
  - Specify an Amazon SNS topic per job basis.

    When you initiate a job, you can optionally specify an Amazon SNS topic.
  
  - Set notification configuration on the vault.

    You can set notification configuration for specific events on the vault (see Configuring Vault Notifications in Amazon S3 Glacier (p. 45)). Glacier sends a message to the specified SNS topic any time the specific event occur.

    If you have notification configuration set on the vault and you also specify an Amazon SNS topic when you initiate a job, Glacier sends job completion message to both the topics.

    You can configure the SNS topic to notify you via email or store the message in an Amazon Simple Queue Service (Amazon SQS) that your application can poll. When a message appears in the queue, you can check if the job is completed successfully and then download the job output.

- **Request job information explicitly**—Glacier also provides a describe job operation (Describe Job (GET JobID) (p. 238)) that enables you to poll for job information. You can periodically send this request to obtain job information. However, using Amazon SNS notifications is the recommended option.

  **Note**

  The information you get via SNS notification is the same as what you get by calling Describe Job.

**Topics**

- About the Inventory (p. 34)
- Downloading a Vault Inventory in Amazon S3 Glacier Using the AWS SDK for Java (p. 35)
- Downloading a Vault Inventory in Amazon S3 Glacier Using the AWS SDK for .NET (p. 40)
- Downloading a Vault Inventory Using the REST API (p. 44)

**About the Inventory**

Glacier updates a vault inventory approximately once a day, starting on the day you first upload an archive to the vault. If there have been no archive additions or deletions to the vault since the last inventory, the inventory date is not updated. When you initiate a job for a vault inventory, Glacier returns the last inventory it generated, which is a point-in-time snapshot and not real-time data. Note that after Glacier creates the first inventory for the vault, it typically takes half a day and up to a day before that inventory is available for retrieval.

You might not find it useful to retrieve a vault inventory for each archive upload. However, suppose you maintain a database on the client-side associating metadata about the archives you upload to Glacier. Then, you might find the vault inventory useful to reconcile information, as needed, in your database with the actual vault inventory. You can limit the number of inventory items retrieved by filtering on the archive creation date or by setting a limit. For more information about limiting inventory retrieval, see Range Inventory Retrieval (p. 254).
The inventory can be returned in two formats, comma-separated values (CSV) or JSON. You can optionally specify the format when you initiate the inventory job. The default format is JSON. For more information about the data fields returned in an inventory job output, see Response Body (p. 248) of the Get Job Output API.

**Downloading a Vault Inventory in Amazon S3 Glacier Using the AWS SDK for Java**

The following are the steps to retrieve a vault inventory using the low-level API of the AWS SDK for Java. The high-level API does not support retrieving a vault inventory.

1. Create an instance of the AmazonGlacierClient class (the client).
   
   You need to specify an AWS region where the vault resides. All operations you perform using this client apply to that region.

2. Initiate an inventory retrieval job by executing the initiateJob method.
   
   Execute initiateJob by providing job information in an InitiateJobRequest object.
   
   **Note**
   
   Note that if an inventory has not been completed for the vault an error is returned. Amazon S3 Glacier (Glacier) prepares an inventory for each vault periodically, every 24 hours.

   Glacier returns a job ID in response. The response is available in an instance of the InitiateJobResult class.

   ```java
   InitiateJobRequest initJobRequest = new InitiateJobRequest()
   .withVaultName("*** provide vault name ***")
   .withJobParameters(
     new JobParameters()
     .withType("inventory-retrieval")
     .withSNSTopic("*** provide SNS topic ARN ****")
   );
   InitiateJobResult initJobResult = client.initiateJob(initJobRequest);
   String jobId = initJobResult.getJobId();
   ```

3. Wait for the job to complete.
   
   You must wait until the job output is ready for you to download. If you have either set a notification configuration on the vault, or specified an Amazon Simple Notification Service (Amazon SNS) topic when you initiated the job, Glacier sends a message to the topic after it completes the job.

   You can also poll Glacier by calling the describeJob method to determine job completion status. However, using an Amazon SNS topic for notification is the recommended approach. The code example given in the following section uses Amazon SNS for Glacier to publish a message.

4. Download the job output (vault inventory data) by executing the getJobOutput method.
   
   You provide your account ID, job ID, and vault name by creating an instance of the GetJobOutputRequest class. If you don’t provide an account ID, then the account ID associated with the credentials you provide to sign the request is used. For more information, see Using the AWS SDK for Java with Amazon S3 Glacier (p. 107).

   The output that Glacier returns is available in the GetJobOutputResult object.

   ```java
   GetJobOutputRequest jobOutputRequest = new GetJobOutputRequest()
   .withVaultName("*** provide vault name ****")
   ```
Note
For information about the job related underlying REST API, see Job Operations (p. 237).

Example: Retrieving a Vault Inventory Using the AWS SDK for Java

The following Java code example retrieves the vault inventory for the specified vault.

The example performs the following tasks:

• Creates an Amazon Simple Notification Service (Amazon SNS) topic.
  Glacier sends notification to this topic after it completes the job.

• Creates an Amazon Simple Queue Service (Amazon SQS) queue.
  The example attaches a policy to the queue to enable the Amazon SNS topic to post messages to the queue.

• Initiates a job to download the specified archive.
  In the job request, the Amazon SNS topic that was created is specified so that Glacier can publish a notification to the topic after it completes the job.

• Checks the Amazon SQS queue for a message that contains the job ID.
  If there is a message, parse the JSON and check if the job completed successfully. If it did, download the archive.

• Cleans up by deleting the Amazon SNS topic and the Amazon SQS queue that it created.

```java
import java.io.BufferedReader;
import java.io.BufferedWriter;
import java.io.FileWriter;
import java.io.IOException;
import java.io.InputStreamReader;
import java.util.HashMap;
import java.util.List;
import java.util.Map;
import com.fasterxml.jackson.core.JsonFactory;
import com.fasterxml.jackson.core.JsonParseException;
import com.fasterxml.jackson.core.JsonParser;
import com.fasterxml.jackson.databind.JsonNode;
import com.fasterxml.jackson.databind.ObjectMapper;
import com.amazonaws.AmazonClientException;
import com.amazonaws.auth.policy.Policy;
import com.amazonaws.auth.policy.Principal;
import com.amazonaws.auth.policy.Resource;
import com.amazonaws.auth.policy.Statement;
import com.amazonaws.auth.policy.Statement.Effect;
import com.amazonaws.auth.policy.actions.SQSActions;
import com.amazonaws.auth.profile.ProfileCredentialsProvider;
import com.amazonaws.services.glacier.AmazonGlacierClient;
import com.amazonaws.services.glacier.model.GetJobOutputRequest;
import com.amazonaws.services.glacier.model.GetJobOutputResult;
import com.amazonaws.services.glacier.model.InitiateJobRequest;
```
public class AmazonGlacierDownloadInventoryWithSQSPolling {

    public static String vaultName = "*** provide vault name ***";
    public static String snsTopicName = "*** provide topic name ***";
    public static String sqsQueueName = "*** provide queue name ***";
    public static String sqsQueueARN;
    public static String sqsQueueURL;
    public static String snsTopicARN;
    public static String snsSubscriptionARN;
    public static String fileName = "*** provide file name ***";
    public static String region = "*** region ***";
    public static long sleepTime = 600;
    public static AmazonGlacierClient client;
    public static AmazonSQSClient sqsClient;
    public static AmazonSNSClient snsClient;
    public static String jobId;
    public static String message;
    public static String queueUrl;
    
    public static void main(String[] args) throws IOException {
        ProfileCredentialsProvider credentials = new ProfileCredentialsProvider();

        client = new AmazonGlacierClient(credentials);
        client.setEndpoint("https://glacier." + region + ".amazonaws.com");
        sqsClient = new AmazonSQSClient(credentials);
        sqsClient.setEndpoint("https://sqs." + region + ".amazonaws.com");
        snsClient = new AmazonSNSClient(credentials);
        snsClient.setEndpoint("https://sns." + region + ".amazonaws.com");

        try {
            setupSQS();
            setupSNS();

            String jobId = initiateJobRequest();
            System.out.println("Jobid = "+jobId);

            Boolean success = waitForJobToComplete(jobId, sqsQueueURL);
            if (!success) {
                throw new Exception("Job did not complete successfully.");
            }

            downloadJobOutput(jobId);
            cleanUp();
        } catch (Exception e) {
            System.err.println("Inventory retrieval failed.");
            System.err.println(e);
        }
    }
}

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37
private static void setupSQS() {
    CreateQueueRequest request = new CreateQueueRequest()
        .withQueueName(sqsQueueName);
    CreateQueueResult result = sqsClient.createQueue(request);
    sqsQueueURL = result.getQueueUrl();

    GetQueueAttributesRequest qRequest = new GetQueueAttributesRequest()
        .withQueueUrl(sqsQueueURL)
        .withAttributeNames("QueueArn");
    GetQueueAttributesResult qResult = sqsClient.getQueueAttributes(qRequest);
    sqsQueueARN = qResult.getAttributes().get("QueueArn");

    Policy sqsPolicy =
        new Policy().withStatements(
            new Statement(Effect.Allow)
                .withPrincipals(Principal.AllUsers)
                .withActions(SQSActions.SendMessage)
                .withResources(new Resource(sqsQueueARN)));

    Map<String, String> queueAttributes = new HashMap<String, String>();
    queueAttributes.put("Policy", sqsPolicy.toJson());
    sqsClient.setQueueAttributes(new SetQueueAttributesRequest(sqsQueueURL,
        queueAttributes));
}

private static void setupSNS() {
    CreateTopicRequest request = new CreateTopicRequest()
        .withName(snsTopicName);
    CreateTopicResult result = snsClient.createTopic(request);
    snsTopicARN = result.getTopicArn();

    SubscribeRequest request2 = new SubscribeRequest()
        .withTopicArn(snsTopicARN)
        .withEndpoint(sqsQueueARN)
        .withProtocol("sqs");
    SubscribeResult result2 = snsClient.subscribe(request2);

    snsSubscriptionARN = result2.getSubscriptionArn();
}

private static String initiateJobRequest() {
    JobParameters jobParameters = new JobParameters()
        .withType("inventory-retrieval")
        .withSNSTopic(snsTopicARN);
    InitiateJobRequest request = new InitiateJobRequest()
        .withVaultName(vaultName)
        .withJobParameters(jobParameters);
    InitiateJobResult response = client.initiateJob(request);
    return response.getJobId();
}

private static Boolean waitForJobToComplete(String jobId, String sqsQueueUrl) throws
    InterruptedException, JsonParseException, IOException {
    Boolean messageFound = false;
    Boolean jobSuccessful = false;
    ObjectMapper mapper = new ObjectMapper();
    JsonFactory factory = mapper.getFactory();

    while (!messageFound) {
        List<Message> msgs = sqsClient.receiveMessage(
            API Version 2012-06-01
            38
new
ReceiveMessageRequest(sqsQueueUrl).withMaxNumberOfMessages(10)).getMessages();

if (msgs.size() > 0) {
    for (Message m : msgs) {
        JsonParser jpMessage = factory.createJsonParser(m.getBody());
        JsonNode jobMessageNode = mapper.readTree(jpMessage);
        String jobMessage = jobMessageNode.get("Message").textValue();

        JsonParser jpDesc = factory.createJsonParser(jobMessage);
        JsonNode jobDescNode = mapper.readTree(jpDesc);
        String retrievedJobId = jobDescNode.get("JobId").textValue();
        String statusCode = jobDescNode.get("StatusCode").textValue();
        if (retrievedJobId.equals(jobId)) {
            messageFound = true;
            if (statusCode.equals("Succeeded")) {
                jobSuccessful = true;
            }
        }
    }
}
else {
    Thread.sleep(sleepTime * 1000);
}
return (messageFound && jobSuccessful);
}

private static void downloadJobOutput(String jobId) throws IOException {
    GetJobOutputRequest getJobOutputRequest = new GetJobOutputRequest()
            .withVaultName(vaultName)
            .withJobId(jobId);
    GetJobOutputResult getJobOutputResult = client.getJobOutput(getJobOutputRequest);

    FileWriter fstream = new FileWriter(fileName);
    BufferedWriter out = new BufferedWriter(fstream);
    BufferedReader in = new BufferedReader(new InputStreamReader(getJobOutputResult.getBody()));
    String inputLine;
    try {
        while ((inputLine = in.readLine()) != null) {
            out.write(inputLine);
        }
    } catch (IOException e) {
        throw new AmazonClientException("Unable to save archive", e);
    }
    finally{
        try {in.close();} catch (Exception e) {
        try {out.close();} catch (Exception e) {
    System.out.println("Retrieved inventory to " + fileName);
}

private static void cleanUp() {
    snsClient.unsubscribe(new UnsubscribeRequest(snsSubscriptionARN));
    snsClient.deleteTopic(new DeleteTopicRequest(snsTopicARN));
    sqsClient.deleteQueue(new DeleteQueueRequest(sqsQueueURL));
}
Download a Vault Inventory in Amazon S3 Glacier Using the AWS SDK for .NET

The following are the steps to retrieve a vault inventory using the low-level API of the AWS SDK for .NET. The high-level API does not support retrieving a vault inventory.

1. Create an instance of the `AmazonGlacierClient` class (the client).

You need to specify an AWS region where the vault resides. All operations you perform using this client apply to that region.

2. Initiate an inventory retrieval job by executing the `InitiateJob` method.

You provide job information in an `InitiateJobRequest` object. Amazon S3 Glacier (Glacier) returns a job ID in response. The response is available in an instance of the `InitiateJobResponse` class.

```csharp
AmazonGlacierClient client;
client = new AmazonGlacierClient(Amazon.RegionEndpoint.USWest2);

InitiateJobRequest initJobRequest = new InitiateJobRequest()
{
    VaultName = vaultName,
    JobParameters = new JobParameters()
    {
        Type = "inventory-retrieval",
        SNSTopic = "*** Provide Amazon SNS topic arn ***",
    }
};
InitiateJobResponse initJobResponse = client.InitiateJob(initJobRequest);
string jobId = initJobResponse.JobId;
```

3. Wait for the job to complete.

You must wait until the job output is ready for you to download. If you have either set a notification configuration on the vault identifying an Amazon Simple Notification Service (Amazon SNS) topic, or specified an Amazon SNS topic when you initiated a job, Glacier sends a message to that topic after it completes the job. The code example given in the following section uses Amazon SNS for Glacier to publish a message.

You can also poll Glacier by calling the `DescribeJob` method to determine job completion status. Although using Amazon SNS topic for notification is the recommended approach.

4. Download the job output (vault inventory data) by executing the `GetJobOutput` method.

You provide your account ID, vault name, and the job ID information by creating an instance of the `GetJobOutputRequest` class. If you don’t provide an account ID, then the account ID associated with the credentials you provide to sign the request is assumed. For more information, see Using the AWS SDK for .NET with Amazon S3 Glacier (p. 110).

The output that Glacier returns is available in the `GetJobOutputResponse` object.

```csharp
GetJobOutputRequest getJobOutputRequest = new GetJobOutputRequest()
{
    JobId = jobId,
    VaultName = vaultName
};

GetJobOutputResponse getJobOutputResponse = client.GetJobOutput(getJobOutputRequest);
using (Stream webStream = getJobOutputResponse.Body)
{
    using (Stream fileToSave = File.OpenWrite(fileName))
    {
```
{  
  CopyStream(webStream, fileToSave);
}

Note
For information about the job related underlying REST API, see Job Operations (p. 237).

Example: Retrieving a Vault Inventory Using the Low-Level API of the AWS SDK for .NET

The following C# code example retrieves the vault inventory for the specified vault.

The example performs the following tasks:

- Set up an Amazon SNS topic.
  
  Glacier sends notification to this topic after it completes the job.
- Set up an Amazon SQS queue.
  
  The example attaches a policy to the queue to enable the Amazon SNS topic to post messages.
- Initiate a job to download the specified archive.
  
  In the job request, the example specifies the Amazon SNS topic so that Glacier can send a message after it completes the job.
- Periodically check the Amazon SQS queue for a message.
  
  If there is a message, parse the JSON and check if the job completed successfully. If it did, download the archive. The code example uses the JSON.NET library (see JSON.NET) to parse the JSON.
- Clean up by deleting the Amazon SNS topic and the Amazon SQS queue it created.

Example

```csharp
using System;
using System.Collections.Generic;
using System.IO;
using System.Threading;
using Amazon.Glacier;
using Amazon.Glacier.Model;
using Amazon.Glacier.Transfer;
using Amazon.Runtime;
using Amazon.SimpleNotificationService;
using Amazon.SimpleNotificationService.Model;
using Amazon.SQS;
using Amazon.SQS.Model;
using Newtonsoft.Json;
namespace glacier.amazon.com.docssamples
{
  class VaultInventoryJobLowLevelUsingSNSSQS
  {
    static string topicArn;
    static string queueUrl;
    static string queueArn;
    static string vaultName = "*** Provide vault name ***";
    static string fileName = "*** Provide file name and path where to store inventory ***";
```
static AmazonSimpleNotificationServiceClient snsClient;
static AmazonSQSClient sqsClient;
const string SQS_POLICY =
"{" +
"  \"Version\" : \"2012-10-17\"," +
"  \"Statement\" : [{" +
"    {" +
"      \"Sid\" : \"sns-rule\"," +
"      \"Effect\" : \"Allow\"," +
"      \"Principal\" : {\"AWS\" : \"arn:aws:iam::123456789012:root\" }," +
"      \"Action\" : \"sqs:SendMessage\"," +
"      \"Resource\" : \"{QuernArn}\"," +
"      \"Condition\" : {" +
"        \"ArnLike\" : {" +
"          \"aws:SourceArn\" : \"{TopicArn}\" +
"        }" +
"      }" +
"    }" +
"  }"] +
"}"
;

public static void Main(string[] args)
{
    AmazonGlacierClient client;
    try
    {
        using (client = new AmazonGlacierClient(Amazon.RegionEndpoint.USWest2))
        {
            Console.WriteLine("Setup SNS topic and SQS queue.");
            SetupTopicAndQueue();
            Console.WriteLine("To continue, press Enter"); Console.ReadKey();
            Console.WriteLine("Retrieve Inventory List");
            GetVaultInventory(client);
            Console.WriteLine("Operations successful.");
            Console.WriteLine("To continue, press Enter"); Console.ReadKey();
        }
        catch (AmazonGlacierException e) { Console.WriteLine(e.Message); }
        catch (AmazonServiceException e) { Console.WriteLine(e.Message); }
        catch (Exception e) { Console.WriteLine(e.Message); } finally
        {
            // Delete SNS topic and SQS queue.
            snsClient.DeleteTopic(new DeleteTopicRequest() { TopicArn = topicArn });
            sqsClient.DeleteQueue(new DeleteQueueRequest() { QueueUrl = queueUrl });
        }
    }

    static void SetupTopicAndQueue()
    {
        long ticks = DateTime.Now.Ticks;

        // Setup SNS topic.
        snsClient = new AmazonSimpleNotificationServiceClient(Amazon.RegionEndpoint.USWest2);
        sqsClient = new AmazonSQSClient(Amazon.RegionEndpoint.USWest2);

        topicArn = snsClient.CreateTopic(new CreateTopicRequest { Name = "GlacierDownload-" +
            ticks }).TopicArn;
        Console.Write("topicArn: "); Console.WriteLine(topicArn);

        CreateQueueRequest createQueueRequest = new CreateQueueRequest();
        createQueueRequest.QueueName = "GlacierDownload-" + ticks;
        CreateQueueResponse createQueueResponse = sqsClient.CreateQueue(createQueueRequest);
        queueUrl = createQueueResponse.QueueUrl;
        Console.Write("QueueURL: "); Console.WriteLine(queueUrl);
    }
}
GetQueueAttributesRequest getQueueAttributesRequest = new
GetQueueAttributesRequest()
  { AttributeNames = new List<string> { "QueueArn" },
    QueueUrl = queueUrl
  };

GetQueueAttributesResponse response = sqsClient.GetQueueAttributes(getQueueAttributesRequest);
queueArn = response.QueueARN;
Console.WriteLine(queueArn);

// Setup the Amazon SNS topic to publish to the SQS queue.
snsClient.Subscribe(new SubscribeRequest()
  { Protocol = "sqs",
    Endpoint = queueArn,
    TopicArn = topicArn
  });

// Add the policy to the queue so SNS can send messages to the queue.
var policy = SQS_POLICY.Replace("{TopicArn}", topicArn).Replace("{QuernArn}", queueArn);

sqsClient.SetQueueAttributes(new SetQueueAttributesRequest()
  { QueueUrl = queueUrl,
    Attributes = new Dictionary<string, string>
      { QueueAttributeName.Policy, policy }
  });

GetVaultInventory(AmazonGlacierClient client)
{
  // Initiate job.
  InitiateJobRequest initJobRequest = new InitiateJobRequest()
    { VaultName = vaultName,
      JobParameters = new JobParameters()
        { Type = "inventory-retrieval",
          Description = "This job is to download a vault inventory.",
          SNSTopic = topicArn,
        }
    };

  InitiateJobResponse initJobResponse = client.InitiateJob(initJobRequest);
  string jobId = initJobResponse.JobId;

  // Check queue for a message and if job completed successfully, download inventory.
  ProcessQueue(jobId, client);
}

private static void ProcessQueue(string jobId, AmazonGlacierClient client)
{
  ReceiveMessageRequest receiveMessageRequest = new ReceiveMessageRequest()
    { QueueUrl = queueUrl, MaxNumberOfMessages = 1 }; // Network error - missing value

  bool jobDone = false;
  while (!jobDone)
  {
    Console.WriteLine("Poll SQS queue");
    ReceiveMessageResponse receiveMessageResponse = sqsClient.ReceiveMessage(receiveMessageRequest);
    if (receiveMessageResponse.Messages.Count == 0)
    {
      jobDone = true;
    }

Thread.Sleep(10000 * 60);
continue;
}
Console.WriteLine("Got message");
Message message = receiveMessageResponse.Messages[0];
Dictionary<string, string> outerLayer = JsonConvert.DeserializeObject<Dictionary<string, string>>(message.Body);
Dictionary<string, object> fields = JsonConvert.DeserializeObject<Dictionary<string, object>>(outerLayer["Message"]) as string;

if (String.Equals(statusCode, GlacierUtils.JOB_STATUS_SUCCEEDED, StringComparison.InvariantCultureIgnoreCase))
{
    Console.WriteLine("Downloading job output");
    DownloadOutput(jobId, client); // Save job output to the specified file location.
}
else if (String.Equals(statusCode, GlacierUtils.JOB_STATUS_FAILED, StringComparison.InvariantCultureIgnoreCase))
    Console.WriteLine("Job failed... cannot download the inventory.");

jobDone = true;
sqsClient.DeleteMessage(new DeleteMessageRequest() { QueueUrl = queueUrl,
ReceiptHandle = message.ReceiptHandle });

private static void DownloadOutput(string jobId, AmazonGlacierClient client)
{
    GetJobOutputRequest getJobOutputRequest = new GetJobOutputRequest()
    {
        JobId = jobId,
        VaultName = vaultName
    };

    GetJobOutputResponse getJobOutputResponse = client.GetJobOutput(getJobOutputRequest);
    using (Stream webStream = getJobOutputResponse.Body)
    {
        using (Stream fileToSave = File.OpenWrite(fileName))
        {
            CopyStream(webStream, fileToSave);
        }
    }

    public static void CopyStream(Stream input, Stream output)
    {
        byte[] buffer = new byte[65536];
        int length;
        while ((length = input.Read(buffer, 0, buffer.Length)) > 0)
        {
            output.Write(buffer, 0, length);
        }
    }


Downloading a Vault Inventory Using the REST API

To download a vault inventory using the REST API

Downloading a vault inventory is a two-step process.
Configuring Vault Notifications in Amazon S3 Glacier

Retrieving anything from Amazon S3 Glacier (Glacier), such as an archive from a vault or a vault inventory, is a two-step process.

1. Initiate a retrieval job.
2. After the job completes, download the job output.

You can set a notification configuration on a vault so that when a job completes a message is sent to an Amazon Simple Notification Service (Amazon SNS) topic.

**Topics**
- Configuring Vault Notifications in Glacier: General Concepts (p. 45)
- Configuring Vault Notifications in Amazon S3 Glacier Using the AWS SDK for Java (p. 46)
- Configuring Vault Notifications in Amazon S3 Glacier Using the AWS SDK for .NET (p. 48)
- Configuring Vault Notifications in Glacier Using the REST API (p. 50)
- Configuring Vault Notifications Using the Amazon S3 Glacier Console (p. 50)

### Configuring Vault Notifications in Glacier: General Concepts

A Glacier retrieval job request is executed asynchronously. You must wait until Glacier completes the job before you can get its output. You can periodically poll Glacier to determine the job status, but that is not an optimal approach. Glacier also supports notifications. When a job completes, it can post a message to an Amazon Simple Notification Service (Amazon SNS) topic. This requires you to set notification configuration on the vault. In the configuration, you identify one or more events and an Amazon SNS topic to which you want Glacier to send a message when the event occurs.

Glacier defines events specifically related to job completion (ArchiveRetrievalCompleted, InventoryRetrievalCompleted) that you can add to the vault's notification configuration. When a specific job completes, Glacier publishes a notification message to the SNS topic.

The notification configuration is a JSON document as shown in the following example.

```json
{
  "Events": ["ArchiveRetrievalCompleted", "InventoryRetrievalCompleted"]
}
```

Note that you can configure only one Amazon SNS topic for a vault.

**Note**

Adding a notification configuration to a vault causes Glacier to send a notification each time the event specified in the notification configuration occurs. You can also optionally specify an Amazon SNS topic in each job initiation request. If you add both the notification configuration
on the vault and also specify an Amazon SNS topic in your initiate job request, Glacier sends both notifications.

The job completion message Glacier sends include information such as the type of job (InventoryRetrieval, ArchiveRetrieval), job completion status, SNS topic name, job status code, and the vault ARN. The following is an example notification Glacier sent to an SNS topic after an InventoryRetrieval job completed.

```
{
    "Action": "InventoryRetrieval",
    "ArchiveId": null,
    "ArchiveSizeInBytes": null,
    "Completed": true,
    "CompletionDate": "2012-06-12T22:20:40.790Z",
    "CreationDate": "2012-06-12T22:20:36.814Z",
    "InventorySizeInBytes": 11693,
    "JobDescription": "my retrieval job",
    "JobId": "HkF9p6o7yjhFx-K3CGL6fuSm6VzW9T7e9QGfo0nUXVYW0j1b5gq1JZ55yHg55vF542SzhjoQzQVv7vEXAMPLEjobID",
    "SHA256TreeHash": null,
    "StatusCode": "Succeeded",
    "StatusMessage": "Succeeded",
}
```

If the Completed field is true, you must also check the StatusCode to check if the job completed successfully or failed.

Note that the Amazon SNS topic must allow the vault to publish a notification. By default, only the SNS topic owner can publish a message to the topic. However, if the SNS topic and the vault are owned by different AWS accounts, then you must configure the SNS topic to accept publications from the vault. You can configure the SNS topic policy in the Amazon SNS console.

For more information about Amazon SNS, see Getting Started with Amazon SNS.

## Configuring Vault Notifications in Amazon S3 Glacier Using the AWS SDK for Java

The following are the steps to configure notifications on a vault using the low-level API of the AWS SDK for Java.

1. Create an instance of the `AmazonGlacierClient` class (the client).

   You need to specify an AWS region where the vault resides. All operations you perform using this client apply to that region.

2. Provide notification configuration information by creating an instance of the `SetVaultNotificationsRequest` class.

   You need to provide the vault name, notification configuration information, and account ID. If specifying a notification configuration, you provide the Amazon Resource Name (ARN) of an existing Amazon SNS topic and one or more events for which you want to be notified. For a list of supported events, see Set Vault Notification Configuration (PUT notification-configuration) (p. 208).

3. Execute the `setVaultNotifications` method by providing the request object as a parameter.

The following Java code snippet illustrates the preceding steps. The snippet sets a notification configuration on a vault. The configuration requests Amazon S3 Glacier (Glacier) to send a notification
to the specified Amazon SNS topic when either the ArchiveRetrievalCompleted event or the
InventoryRetrievalCompleted event occurs.

```java
SetVaultNotificationsRequest request = new SetVaultNotificationsRequest()
    .withAccountId("-")
    .withVaultName("*** provide vault name ***")
    .withVaultNotificationConfig(
        new VaultNotificationConfig()
            .withSNSTopic("*** provide SNS topic ARN ***")
            .withEvents("ArchiveRetrievalCompleted", "InventoryRetrievalCompleted")
    );
client.setVaultNotifications(request);
```

**Note**
For information about the underlying REST API, see Vault Operations (p. 170).

**Example: Setting the Notification Configuration on a Vault Using the AWS SDK for Java**

The following Java code example sets a vault's notifications configuration, deletes the configuration, and
then restores the configuration. For step-by-step instructions on how to run the following example, see
Using the AWS SDK for Java with Amazon S3 Glacier (p. 107).

**Example**

```java
import java.io.IOException;
import com.amazonaws.auth.profile.ProfileCredentialsProvider;
import com.amazonaws.services.glacier.AmazonGlacierClient;
import com.amazonaws.services.glacier.model.DeleteVaultNotificationsRequest;
import com.amazonaws.services.glacier.model.GetVaultNotificationsRequest;
import com.amazonaws.services.glacier.model.GetVaultNotificationsResult;
import com.amazonaws.services.glacier.model.SetVaultNotificationsRequest;
import com.amazonaws.services.glacier.model.VaultNotificationConfig;

class AmazonGlacierVaultNotifications {
    public static AmazonGlacierClient client;
    public static String vaultName = "*** provide vault name ****";
    public static String snsTopicARN = "*** provide sns topic ARN ***";

    public static void main(String[] args) throws IOException {
        ProfileCredentialsProvider credentials = new ProfileCredentialsProvider();
        client = new AmazonGlacierClient(credentials);
        client.setEndpoint("https://glacier.us-east-1.amazonaws.com/");
        try {
            System.out.println("Adding notification configuration to the vault.");
            setVaultNotifications();
            getVaultNotifications();
            deleteVaultNotifications();
        } catch (Exception e) {
            System.err.println("Vault operations failed." + e.getMessage());
        }
    }

    private static void setVaultNotifications() {
```
Configuring Vault Notifications in Amazon S3 Glacier Using the AWS SDK for .NET

The following are the steps to configure notifications on a vault using the low-level API of the AWS SDK for .NET.

1. Create an instance of the AmazonGlacierClient class (the client).

   You need to specify an AWS region where the vault resides. All operations you perform using this client apply to that region.

2. Provide notification configuration information by creating an instance of the SetVaultNotificationsRequest class.

   You need to provide the vault name, notification configuration information, and account ID. If you don't provide an account ID, then the account ID associated with the credentials you provide to sign the request is assumed. For more information, see Using the AWS SDK for .NET with Amazon S3 Glacier (p. 110).

   In specifying a notification configuration, you provide the Amazon Resource Name (ARN) of an existing Amazon SNS topic and one or more events for which you want to be notified. For a list of supported events, see Set Vault Notification Configuration (PUT notification-configuration) (p. 208).

3. Execute the SetVaultNotifications method by providing the request object as a parameter.

4. After setting notification configuration on a vault, you can retrieve configuration information by calling the GetVaultNotifications method, and remove it by calling the DeleteVaultNotifications method provided by the client.
Example: Setting the Notification Configuration on a Vault Using the AWS SDK for .NET

The following C# code example illustrates the preceding steps. The example sets the notification configuration on the vault ("examplevault") in the US West (Oregon) Region, retrieves the configuration, and then deletes it. The configuration requests Amazon S3 Glacier (Glacier) to send a notification to the specified Amazon SNS topic when either the ArchiveRetrievalCompleted event or the InventoryRetrievalCompleted event occurs.

**Note**
For information about the underlying REST API, see Vault Operations (p. 170).

For step-by-step instructions to run the following example, see Running Code Examples (p. 111). You need to update the code as shown and provide an existing vault name and an Amazon SNS topic.

Example

```csharp
using System;
using System.Collections.Generic;
using Amazon.Glacier;
using Amazon.Glacier.Model;
using Amazon.Runtime;
namespace glacier.amazon.com.docsamples
{
    class VaultNotificationSetGetDelete
    {
        static string vaultName = "examplevault";
        static string snsTopicARN = "*** Provide Amazon SNS topic ARN ***";
        static IAmazonGlacier client;

        public static void Main(string[] args)
        {
            try
            {
                using (client = new AmazonGlacierClient(Amazon.RegionEndpoint.USWest2))
                {
                    Console.WriteLine("Adding notification configuration to the vault.");
                    SetVaultNotificationConfig();
                    GetVaultNotificationConfig();
                    Console.WriteLine("To delete vault notification configuration, press Enter");
                    Console.ReadKey();
                    DeleteVaultNotificationConfig();
                }
            }
            catch (AmazonGlacierException e) { Console.WriteLine(e.Message); }
            catch (AmazonServiceException e) { Console.WriteLine(e.Message); }
            catch (Exception e) { Console.WriteLine(e.Message); }
            Console.WriteLine("To continue, press Enter");
            Console.ReadKey();
        }

        static void SetVaultNotificationConfig()
        {
            SetVaultNotificationsRequest request = new SetVaultNotificationsRequest()
            {
                VaultName = vaultName,
                VaultNotificationConfig = new VaultNotificationConfig()
                {
                    Events = new List<string>() { "ArchiveRetrievalCompleted", "InventoryRetrievalCompleted" },
                }
            }
```
Configuring Vault Notifications in Glacier Using the REST API

To configure vault notifications using the REST API, see Set Vault Notification Configuration (PUT notification-configuration) (p. 208). Additionally, you can also get vault notifications (Get Vault Notifications (GET notification-configuration) (p. 192)) and delete vault notifications (Delete Vault Notifications (DELETE notification-configuration) (p. 182)).

Configuring Vault Notifications Using the Amazon S3 Glacier Console

This section describes how to configure vault notifications using the Amazon S3 Glacier (Glacier) console. When you configure notifications, you specify job completion events that trigger notification to an Amazon Simple Notification Service (Amazon SNS) topic. In addition to configuring notifications for the vault, you can also specify a topic to publish notification to when you initiate a job. If your vault is configured to notify for a specific event and you specify notification in the job initiation request, then two notifications are sent.

To configure a vault notification

2. Select a vault in the vault list.
3. Select the **Notifications** tab.

4. Select the *enabled* in the **Notifications** field.

5. On the **Notifications** tab, do one of the following:

<table>
<thead>
<tr>
<th>To...</th>
<th>Do this...</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specify an existing Amazon SNS topic</td>
<td>Enter the Amazon SNS topic in the <strong>Amazon SNS Topic ARN</strong> text box.</td>
</tr>
<tr>
<td></td>
<td>The topic is an Amazon Resource Name (ARN) that has the form shown below.</td>
</tr>
<tr>
<td></td>
<td><em>arn:aws:sns:region:accountId:topicname</em></td>
</tr>
<tr>
<td></td>
<td>You can find the an Amazon SNS topic ARN from the Amazon Simple Notification Service (Amazon SNS) console.</td>
</tr>
</tbody>
</table>
To... | Do this...
---|---
Create a new Amazon SNS topic | a. Click **create a new SNS topic**. A **Create Notifications SNS Topic** dialog box appears.
b. In the **Topic Name** field, specify the name of the new topic.
If you will subscribe to the topic using SMS subscriptions, put a name in the **Display Name** field.
c. Click **Create Topic**.
The **Amazon SNS Topic ARN** text box is populated with the ARN of the new topic.

6. Select the events that trigger notification.
For example, to trigger notification when only archive retrieval jobs are complete, check only Get Archive Job Complete.

7. Click **Save**.

**Important**
By default, a new topic does not have any subscriptions associated with it. To receive notifications published to this topic, you must subscribe to the topic. Follow the steps in **Subscribe to a Topic** in the Amazon Simple Notification Service Getting Started Guide to subscribe to a new topic.
Deleting a Vault in Amazon S3 Glacier

Amazon S3 Glacier (Glacier) deletes a vault only if there are no archives in the vault as of the last inventory it computed and there have been no writes to the vault since the last inventory. For information about deleting archives, see Deleting an Archive in Amazon S3 Glacier (p. 101). For information about downloading a vault inventory, Downloading a Vault Inventory in Amazon S3 Glacier (p. 33).

Note
Glacier prepares an inventory for each vault periodically, every 24 hours. Because the inventory might not reflect the latest information, Glacier ensures the vault is indeed empty by checking if there were any write operations since the last vault inventory.

Topics
- Deleting a Vault in Amazon S3 Glacier Using the AWS SDK for Java (p. 53)
- Deleting a Vault in Amazon S3 Glacier Using the AWS SDK for .NET (p. 54)
- Deleting a Vault in Glacier Using the REST API (p. 55)
- Deleting a Vault Using the Amazon S3 Glacier Console (p. 55)

Deleting a Vault in Amazon S3 Glacier Using the AWS SDK for Java

The following are the steps to delete a vault using the low-level API of the AWS SDK for Java.

1. Create an instance of the AmazonGlacierClient class (the client).
   - You need to specify an AWS region from where you want to delete a vault. All operations you perform using this client apply to that region.

2. Provide request information by creating an instance of the DeleteVaultRequest class.
   - You need to provide the vault name and account ID. If you don't provide an account ID, then account ID associated with the credentials you provide to sign the request is assumed. For more information, see Using the AWS SDK for Java with Amazon S3 Glacier (p. 107).

3. Execute the deleteVault method by providing the request object as a parameter.
   - Amazon S3 Glacier (Glacier) deletes the vault only if it is empty. For more information, see Delete Vault (DELETE vault) (p. 178).

The following Java code snippet illustrates the preceding steps.

```java
try {
    DeleteVaultRequest request = new DeleteVaultRequest()
        .withVaultName("*** provide vault name ***");
    client.deleteVault(request);
    System.out.println("Deleted vault: " + vaultName);
} catch (Exception e) {
    System.err.println(e.getMessage());
}
```

Note
For information about the underlying REST API, see Delete Vault (DELETE vault) (p. 178).
Example: Deleting a Vault Using the AWS SDK for Java

For a working code example, see Example: Creating a Vault Using the AWS SDK for Java (p. 24). The Java code example shows basic vault operations including create and delete vault.

Deleting a Vault in Amazon S3 Glacier Using the AWS SDK for .NET

Both the high-level and low-level APIs (p. 106) provided by the AWS SDK for .NET provide a method to delete a vault.

Topics
- Deleting a Vault Using the High-Level API of the AWS SDK for .NET (p. 54)
- Deleting a Vault Using the Low-Level API of the AWS SDK for .NET (p. 54)

Deleting a Vault Using the High-Level API of the AWS SDK for .NET

The ArchiveTransferManager class of the high-level API provides the DeleteVault method you can use to delete a vault.

Example: Deleting a Vault Using the High-Level API of the AWS SDK for .NET

For a working code example, see Example: Vault Operations Using the High-Level API of the AWS SDK for .NET (p. 26). The C# code example shows basic vault operations including create and delete vault.

Deleting a Vault Using the Low-Level API of the AWS SDK for .NET

The following are the steps to delete a vault using the AWS SDK for .NET.

1. Create an instance of the AmazonGlacierClient class (the client).
   You need to specify an AWS region from where you want to delete a vault. All operations you perform using this client apply to that region.

2. Provide request information by creating an instance of the DeleteVaultRequest class.
   You need to provide the vault name and account ID. If you don't provide an account ID, then account ID associated with the credentials you provide to sign the request is assumed. For more information, see Using the AWS SDK for .NET with Amazon S3 Glacier (p. 110).

3. Execute the DeleteVault method by providing the request object as a parameter.
   Amazon S3 Glacier (Glacier) deletes the vault only if it is empty. For more information, see Delete Vault (DELETE vault) (p. 178).

The following C# code snippet illustrates the preceding steps. The snippet retrieves metadata information of a vault that exists in the default AWS region.

```csharp
AmazonGlacierClient client;
client = new AmazonGlacierClient(Amazon.RegionEndpoint.USEast1);
DeleteVaultRequest request = new DeleteVaultRequest();
```
Deleting a Vault Using REST

```java
{
    VaultName = "*** provide vault name ***"
}
DeleteVaultResponse response = client.DeleteVault(request);
```

**Note**
For information about the underlying REST API, see Delete Vault (DELETE vault) (p. 178).

**Example: Deleting a Vault Using the Low-Level API of the AWS SDK for .NET**
For a working code example, see Example: Vault Operations Using the Low-Level API of the AWS SDK for .NET (p. 27). The C# code example shows basic vault operations including create and delete vault.

**Deleting a Vault in Glacier Using the REST API**
To delete a vault using the REST API, see Delete Vault (DELETE vault) (p. 178).

**Deleting a Vault Using the Amazon S3 Glacier Console**
Amazon S3 Glacier (Glacier) deletes a vault only if there are no archives in the vault as of the last inventory it computed and there have been no writes to the vault since the last inventory. For information about deleting archives, see Deleting an Archive in Amazon S3 Glacier (p. 101). For information about downloading a vault inventory, Downloading a Vault Inventory in Amazon S3 Glacier (p. 33).

The following are the steps to delete a vault using the Glacier console.

2. From the region selector, select the AWS region where the vault exists.
3. Select the vault.
4. Click Delete Vault.

**Tagging Your Amazon S3 Glacier Vaults**
You can assign your own metadata to Amazon S3 Glacier (Glacier) vaults in the form of tags. A tag is a key-value pair that you define for a vault. For basic information about tagging, including restrictions on tags, see Tagging Amazon S3 Glacier Resources (p. 145).

The following topics describe how you can add, list, and remove tags for vaults.

**Topics**
- Tagging Vaults Using the Amazon S3 Glacier Console (p. 55)
- Tagging Vaults Using the Amazon S3 Glacier API (p. 56)
- Related Sections (p. 56)

**Tagging Vaults Using the Amazon S3 Glacier Console**
You can add, list, and remove tags using the Glacier console as described in the following procedures.
To view the tags for a vault

2. From the region selector, choose a region.
3. On the Amazon S3 Glacier Vaults page, choose a vault.
4. Choose the Tags tab. The tags for that vault will appear.

To add a tag to a vault

1. Open the Glacier console, and then choose a region from the region selector.
2. On the Amazon S3 Glacier Vaults page, choose a vault.
3. Choose the Tags tab.
4. Specify the tag key in the Key field, optionally specify a tag value in the Value field, and then choose Save.
   
   If the Save button is not enabled, either the tag key or the tag value that you specified does not meet the tag restrictions. For more about tag restrictions, see Tag Restrictions (p. 145).

To remove a tag from a vault

1. Open the Glacier console, and then choose a region from the region selector.
2. On the Amazon S3 Glacier Vaults page, choose a vault.
3. Choose the Tags tab, and then choose the x at the end of the row that describes the tag you want to delete.
4. Choose Delete.

Tagging Vaults Using the Amazon S3 Glacier API

You can add, list, and remove tags using the Glacier API. For examples, see the following documentation:

Add Tags To Vault (POST tags add) (p. 172)

Adds or updates tags for the specified vault.

List Tags For Vault (GET tags) (p. 197)

Lists the tags for the specified vault.

Remove Tags From Vault (POST tags remove) (p. 203)

Removes tags from the specified vault.

Related Sections

• Tagging Amazon S3 Glacier Resources (p. 145)

Amazon S3 Glacier Vault Lock

The following topics describe how to lock a vault in Amazon S3 Glacier and how to use Vault Lock policies.
Vault Locking Overview

Glacier Vault Lock allows you to easily deploy and enforce compliance controls for individual Glacier
vaults with a vault lock policy. You can specify controls such as “write once read many” (WORM) in a vault
lock policy and lock the policy from future edits. Once locked, the policy can no longer be changed.

Glacier enforces the controls set in the vault lock policy to help achieve your compliance objectives, for
example, for data retention. You can deploy a variety of compliance controls in a vault lock policy using
the AWS Identity and Access Management (IAM) policy language. For more information about vault lock
policies, see Amazon S3 Glacier Access Control with Vault Lock Policies (p. 126).

A vault lock policy is different than a vault access policy. Both policies govern access controls to
your vault. However, a vault lock policy can be locked to prevent future changes, providing strong
enforcement for your compliance controls. You can use the vault lock policy to deploy regulatory and
compliance controls, which typically require tight controls on data access. In contrast, you use a vault
access policy to implement access controls that are not compliance related, temporary, and subject to
frequent modification. Vault lock and vault access policies can be used together. For example, you can
implement time-based data retention rules in the vault lock policy (deny deletes), and grant read access
to designated third parties or your business partners (allow reads).

Locking a vault takes two steps:

1. Initiate the lock by attaching a vault lock policy to your vault, which sets the lock to an in-progress
state and returns a lock ID. While in the in-progress state, you have 24 hours to validate your vault
lock policy before the lock ID expires.

2. Use the lock ID to complete the lock process. If the vault lock policy doesn't work as expected, you can
abort the lock and restart from the beginning. For information on how to use the Glacier API to lock a
vault, see Locking a Vault by Using the Amazon S3 Glacier API (p. 57).

Locking a Vault by Using the Amazon S3 Glacier API

To lock your vault with the Glacier API, you first call Initiate Vault Lock (POST lock-policy) (p. 194)
with a vault lock policy that specifies the controls you want to deploy. Initiate Vault Lock (POST lock-
policy) (p. 194) attaches the policy to your vault, transitions the vault lock to the in-progress state, and
returns a unique lock ID. After the vault lock enters the in-progress state, you have 24 hours to complete
the lock by calling Complete Vault Lock (POST lockId) (p. 176) with the lock ID returned from Initiate
Vault Lock (POST lock-policy) (p. 194). After the vault is locked it cannot be unlocked.

If you don't complete the vault lock process within 24 hours after entering the in-progress state, your
vault automatically exits the in-progress state, and the vault lock policy is removed. You can call Initiate
Vault Lock (POST lock-policy) (p. 194) again to install a new vault lock policy and transition into the in-
progress state.

The in-progress state provides the opportunity to test your vault lock policy before you lock it. Your vault
lock policy takes full effect during the in-progress state just as if the vault has been locked, except that
you can remove the policy by calling Abort Vault Lock (DELETE lock-policy) (p. 170). To fine-tune your
policy, you can repeat the Abort Vault Lock (DELETE lock-policy) (p. 170)/Initiate Vault Lock (POST
lock-policy) (p. 194) combination as many times as necessary to validate your vault lock policy changes.

After you validate the vault lock policy, you can call Complete Vault Lock (POST lockId) (p. 176) with
the most recent lock ID to complete the vault locking process. Your vault transitions to a locked state.
where the vault lock policy is unchangeable and can no longer be removed by calling Abort Vault Lock
(DELETE lock-policy) (p. 170).

Related Sections

- Amazon S3 Glacier Access Control with Vault Lock Policies (p. 126)
- Abort Vault Lock (DELETE lock-policy) (p. 170)
- Complete Vault Lock (POST lockId) (p. 176)
- Get Vault Lock (GET lock-policy) (p. 189)
- Initiate Vault Lock (POST lock-policy) (p. 194)
Working with Archives in Amazon S3 Glacier

An archive is any object, such as a photo, video, or document, that you store in a vault. It is a base unit of storage in Amazon S3 Glacier (Glacier). Each archive has a unique ID and an optional description. When you upload an archive, Glacier returns a response that includes an archive ID. This archive ID is unique in the region in which the archive is stored. The following is an example archive ID.

TJgHcrOSfAkV6hdPqOATyfp_0ZaxLl5pIBoc02iz0gDPMz2ig-nhw_d_Pafstsd1f6HScrjHnP-3p6LCJClYytFT_CBhT9CwNxbRaMSmetS3I-Gqwxi3Y8QtgbJbhEQPso0mJ3KEexample

Archive IDs are 138 bytes long. When you upload an archive, you can provide an optional description. You can retrieve an archive using its ID but not its description.

Important
Glacier provides a management console. You can use the console to create and delete vaults. However, all other interactions with Glacier require that you use the AWS Command Line Interface (CLI) or write code. For example, to upload data, such as photos, videos, and other documents, you must either use the AWS CLI or write code to make requests, using either the REST API directly or by using the AWS SDKs. For more information about using Glacier with the AWS CLI, go to AWS CLI Reference for Glacier. To install the AWS CLI, go to AWS Command Line Interface.

Topics
- Archive Operations in Amazon S3 Glacier (p. 59)
- Maintaining Client-Side Archive Metadata (p. 60)
- Uploading an Archive in Amazon S3 Glacier (p. 60)
- Downloading an Archive in Amazon S3 Glacier (p. 75)
- Deleting an Archive in Amazon S3 Glacier (p. 101)
- Querying an Archives in Amazon S3 Glacier (p. 105)

Archive Operations in Amazon S3 Glacier

Glacier supports the following basic archive operations: upload, download, and delete. Downloading an archive is an asynchronous operation.

Uploading an Archive in Amazon S3 Glacier

You can upload an archive in a single operation or upload it in parts. The API call you use to upload an archive in parts is referred as Multipart Upload. For more information, see Uploading an Archive in Amazon S3 Glacier (p. 60).

Important
Glacier provides a management console. You can use the console to create and delete vaults. However, all other interactions with Glacier require that you use the AWS Command Line Interface (CLI) or write code. For example, to upload data, such as photos, videos, and other documents, you must either use the AWS CLI or write code to make requests, using either the REST API directly or by using the AWS SDKs. For more information about using Glacier with the AWS CLI, go to AWS CLI Reference for Glacier. To install the AWS CLI, go to AWS Command Line Interface.
Downloading an Archive in Amazon S3 Glacier

Downloading an archive is an asynchronous operation. You must first initiate a job to download a specific archive. After receiving the job request, Glacier prepares your archive for download. After the job completes, you can download your archive data. Because of the asynchronous nature of the job, you can request Glacier to send a notification to an Amazon Simple Notification Service (Amazon SNS) topic when the job completes. You can specify an SNS topic for each individual job request or configure your vault to send a notification when specific events occur. For more information about downloading an archive, see Downloading an Archive in Amazon S3 Glacier (p. 75).

Deleting an Archive in Amazon S3 Glacier

Glacier provides an API call that you can use to delete one archive at a time. For more information, see Deleting an Archive in Amazon S3 Glacier (p. 101).

Updating an Archive in Glacier

After you upload an archive, you cannot update its content or its description. The only way you can update the archive content or its description is by deleting the archive and uploading another archive. Note that each time you upload an archive, Glacier returns to you a unique archive ID.

Maintaining Client-Side Archive Metadata

Except for the optional archive description, Glacier does not support any additional metadata for the archives. When you upload an archive Glacier assigns an ID, an opaque sequence of characters, from which you cannot infer any meaning about the archive. You might maintain metadata about the archives on the client-side. The metadata can include archive name and some other meaningful information about the archive.

Note

If you are an Amazon Simple Storage Service (Amazon S3) customer, you know that when you upload an object to a bucket, you can assign the object an object key such as MyDocument.txt or SomePhoto.jpg. In Glacier, you cannot assign a key name to the archives you upload.

If you maintain client-side archive metadata, note that Glacier maintains a vault inventory that includes archive IDs and any descriptions you provided during the archive upload. You might occasionally download the vault inventory to reconcile any issues in your client-side database you maintain for the archive metadata. However, Glacier takes vault inventory approximately daily. When you request a vault inventory, Glacier returns the last inventory it prepared, a point in time snapshot.

Uploading an Archive in Amazon S3 Glacier

Amazon S3 Glacier (Glacier) provides a management console, which you can use to create and delete vaults. However, you cannot upload archives to Glacier by using the management console. To upload data, such as photos, videos, and other documents, you must either use the AWS CLI or write code to make requests, by using either the REST API directly or by using the AWS SDKs.

For information about using Glacier with the AWS CLI, go to AWS CLI Reference for Glacier. To install the AWS CLI, go to AWS Command Line Interface. The following Uploading topics describe how to upload archives to Glacier by using the AWS SDK for Java, the AWS SDK for .NET, and the REST API.
Options for Uploading an Archive to Amazon S3 Glacier

Depending on the size of the data you are uploading, Glacier offers the following options:

- **Upload archives in a single operation** – In a single operation, you can upload archives from 1 byte to up to 4 GB in size. However, we encourage Glacier customers to use multipart upload to upload archives greater than 100 MB. For more information, see Uploading an Archive in a Single Operation (p. 61).

- **Upload archives in parts** – Using the multipart upload API, you can upload large archives, up to about 40,000 GB (10,000 * 4 GB).

The multipart upload API call is designed to improve the upload experience for larger archives. You can upload archives in parts. These parts can be uploaded independently, in any order, and in parallel. If a part upload fails, you only need to upload that part again and not the entire archive. You can use multipart upload for archives from 1 byte to about 40,000 GB in size. For more information, see Uploading Large Archives in Parts (Multipart Upload) (p. 67).

**Important**
The Glacier vault inventory is only updated once a day. When you upload an archive, you will not immediately see the new archive added to your vault (in the console or in your downloaded vault inventory list) until the vault inventory has been updated.

Using the AWS Snowball Service

AWS Snowball accelerates moving large amounts of data into and out of AWS using Amazon-owned devices, bypassing the internet. For more information, see AWS Snowball detail page.

To upload existing data to Amazon S3 Glacier (Glacier), you might consider using one of the AWS Snowball device types to import data into Amazon Simple Storage Service (Amazon S3), and then move it to the Amazon S3 GLACIER storage class for archival using lifecycle rules. When you transition Amazon S3 objects to the GLACIER storage class, Amazon S3 internally uses Glacier for durable storage at lower cost. Although the objects are stored in Glacier, they remain Amazon S3 objects that you manage in Amazon S3, and you cannot access them directly through Glacier.

For more information about Amazon S3 lifecycle configuration and transitioning objects to the GLACIER storage class, see Object Lifecycle Management and Transitioning Objects in the Amazon Simple Storage Service Developer Guide.

Uploading an Archive in a Single Operation

As described in Uploading an Archive in Amazon S3 Glacier (p. 60), you can upload smaller archives in a single operation. However, we encourage Amazon S3 Glacier (Glacier) customers to use Multipart Upload to upload archives greater than 100 MB.

**Topics**
- Uploading an Archive in a Single Operation Using the AWS SDK for Java (p. 62)
- Uploading an Archive in a Single Operation Using the AWS SDK for .NET in Amazon S3 Glacier (p. 64)
Uploading an Archive in a Single Operation Using the AWS SDK for Java

Both the high-level and low-level APIs provided by the AWS SDK for Java provide a method to upload an archive.

Topics
- Uploading an Archive Using the High-Level API of the AWS SDK for Java (p. 62)
- Uploading an Archive in a Single Operation Using the Low-Level API of the AWS SDK for Java (p. 63)

Uploading an Archive Using the High-Level API of the AWS SDK for Java

The ArchiveTransferManager class of the high-level API provides the upload method, which you can use to upload an archive to a vault.

**Note**
You can use the upload method to upload small or large archives. Depending on the archive size you are uploading, this method determines whether to upload it in a single operation or use the multipart upload API to upload the archive in parts.

Example: Uploading an Archive Using the High-Level API of the AWS SDK for Java

The following Java code example uploads an archive to a vault (examplevault) in the US West (Oregon) region (us-west-2). For a list of supported regions and endpoints, see Accessing Amazon S3 Glacier (p. 5).

For step-by-step instructions on how to run this example, see Running Java Examples for Amazon S3 Glacier Using Eclipse (p. 109). You need to update the code as shown with the name of the vault you want to upload to and the name of the file you want to upload.

Example

```java
import java.io.File;
import java.io.IOException;
import java.util.Date;
import com.amazonaws.auth.profile.ProfileCredentialsProvider;
import com.amazonaws.services.glacier.AmazonGlacierClient;
import com.amazonaws.services.glacier.transfer.ArchiveTransferManager;
import com.amazonaws.services.glacier.transfer.UploadResult;

public class ArchiveUploadHighLevel {
    public static String vaultName = "*** provide vault name ***";
    public static String archiveToUpload = "*** provide name of file to upload ***";
    public static AmazonGlacierClient client;

    public static void main(String[] args) throws IOException {
        ProfileCredentialsProvider credentials = new ProfileCredentialsProvider();
        client = new AmazonGlacierClient(credentials);
```
Uploading an Archive in a Single Operation Using the Low-Level API of the AWS SDK for Java

The low-level API provides methods for all the archive operations. The following are the steps to upload an archive using the AWS SDK for Java.

1. Create an instance of the AmazonGlacierClient class (the client).

   You need to specify an AWS region where you want to upload the archive. All operations you perform using this client apply to that region.

2. Provide request information by creating an instance of the UploadArchiveRequest class.

   In addition to the data you want to upload, you need to provide a checksum (SHA-256 tree hash) of the payload, the vault name, the content length of the data, and your account ID.

   If you don’t provide an account ID, then the account ID associated with the credentials you provide to sign the request is assumed. For more information, see Using the AWS SDK for Java with Amazon S3 Glacier (p. 107).

3. Execute the uploadArchive method by providing the request object as a parameter.

   In response, Amazon S3 Glacier (Glacier) returns an archive ID of the newly uploaded archive.

The following Java code snippet illustrates the preceding steps.

```java
AmazonGlacierClient client;
UploadArchiveRequest request = new UploadArchiveRequest()
    .withVaultName("*** provide vault name ***")
    .withChecksum(checksum)
    .withBody(new ByteArrayInputStream(body))
    .withContentLength((long)body.length);
UploadArchiveResult uploadArchiveResult = client.uploadArchive(request);
System.out.println("Location (includes ArchiveID): " + uploadArchiveResult.getLocation());
```

Example: Uploading an Archive in a Single Operation Using the Low-Level API of the AWS SDK for Java

The following Java code example uses the AWS SDK for Java to upload an archive to a vault (examplevault). For step-by-step instructions on how to run this example, see Running Java Examples for Amazon S3 Glacier Using Eclipse (p. 109). You need to update the code as shown with the name of the vault you want to upload to and the name of the file you want to upload.
Amazon S3 Glacier Developer Guide
Uploading an Archive in a Single Operation

import java.io.ByteArrayInputStream;
import java.io.File;
import java.io.FileInputStream;
import java.io.IOException;
import java.io.InputStream;
import com.amazonaws.auth.profile.ProfileCredentialsProvider;
import com.amazonaws.services.glacier.AmazonGlacierClient;
import com.amazonaws.services.glacier.TreeHashGenerator;
import com.amazonaws.services.glacier.model.UploadArchiveRequest;
import com.amazonaws.services.glacier.model.UploadArchiveResult;
public class ArchiveUploadLowLevel {

    public static String vaultName = "*** provide vault name ***";
    public static String archiveFilePath = "*** provide file upload ***";
    public static AmazonGlacierClient client;

    public static void main(String[] args) throws IOException {
        ProfileCredentialsProvider credentials = new ProfileCredentialsProvider();
        client = new AmazonGlacierClient(credentials);
        client.setEndpoint("https://glacier.us-east-1.amazonaws.com/");

        try {
            // First open file and read.
            File file = new File(archiveFilePath);
            InputStream is = new FileInputStream(file);
            byte[] body = new byte[(int) file.length()];
            is.read(body);

            // Send request.
            UploadArchiveRequest request = new UploadArchiveRequest()
                .withVaultName(vaultName)
                .withChecksum(TreeHashGenerator.calculateTreeHash(new File(archiveFilePath)))
                .withBody(new ByteArrayInputStream(body))
                .withContentLength((long)body.length);

            UploadArchiveResult uploadArchiveResult = client.uploadArchive(request);

            System.out.println("ArchiveID: " + uploadArchiveResult.getArchiveId());
        } catch (Exception e) {
            System.err.println("Archive not uploaded.");
            System.err.println(e);
        }
    }
}

Uploading an Archive in a Single Operation Using the AWS SDK for .NET in Amazon S3 Glacier

Both the high-level and low-level APIs (p. 106) provided by the AWS SDK for .NET provide a method to upload an archive in a single operation.

Topics
- Uploading an Archive Using the High-Level API of the AWS SDK for .NET (p. 65)
- Uploading an Archive in a Single Operation Using the Low-Level API of the AWS SDK for .NET (p. 65)

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Uploading an Archive Using the High-Level API of the AWS SDK for .NET

The ArchiveTransferManager class of the high-level API provides the Upload method that you can use to upload an archive to a vault.

**Note**
You can use the Upload method to upload small or large files. Depending on the file size you are uploading, this method determines whether to upload it in a single operation or use the multipart upload API to upload the file in parts.

**Example: Uploading an Archive Using the High-Level API of the AWS SDK for .NET**

The following C# code example uploads an archive to a vault (examplevault) in the US West (Oregon) Region.

For step-by-step instructions on how to run this example, see Running Code Examples (p. 111). You need to update the code as shown with the name of the file you want to upload.

**Example**

```csharp
using System;
using Amazon.Glacier;
using Amazon.Glacier.Transfer;
using Amazon.Runtime;
namespace glacier.amazon.com.docsamples
{
    class ArchiveUploadHighLevel
    {
        static string vaultName = "examplevault";
        static string archiveToUpload = "*** Provide file name (with full path) to upload ***";
        public static void Main(string[] args)
        {
            try
            {
                var manager = new ArchiveTransferManager(Amazon.RegionEndpoint.USWest2);
                // Upload an archive.
                string archiveId = manager.Upload(vaultName, "upload archive test", archiveToUpload).ArchiveId;
                Console.WriteLine("Archive ID: (Copy and save this ID for use in other examples.) : {0}", archiveId);
                Console.WriteLine("To continue, press Enter");
                Console.ReadKey();
            }
            catch (AmazonGlacierException e) { Console.WriteLine(e.Message); }
            catch (AmazonServiceException e) { Console.WriteLine(e.Message); }
            catch (Exception e) { Console.WriteLine(e.Message); }
            Console.WriteLine("To continue, press Enter");
            Console.ReadKey();
        }
    }
}
```

Uploading an Archive in a Single Operation Using the Low-Level API of the AWS SDK for .NET

The low-level API provides methods for all the archive operations. The following are the steps to upload an archive using the AWS SDK for .NET.

1. Create an instance of the AmazonGlacierClient class (the client).
You need to specify an AWS region where you want to upload the archive. All operations you perform using this client apply to that region.

2. Provide request information by creating an instance of the `UploadArchiveRequest` class.

   In addition to the data you want to upload, you need to provide a checksum (SHA-256 tree hash) of the payload, the vault name, and your account ID.

   If you don’t provide an account ID, then the account ID associated with the credentials you provide to sign the request is assumed. For more information, see Using the AWS SDK for .NET with Amazon S3 Glacier (p. 110).

3. Execute the `UploadArchive` method by providing the request object as a parameter.

In response, Glacier returns an archive ID of the newly uploaded archive.

Example: Uploading an Archive in a Single Operation Using the Low-Level API of the AWS SDK for .NET

The following C# code example illustrates the preceding steps. The example uses the AWS SDK for .NET to upload an archive to a vault (examplevault).

**Note**

For information about the underlying REST API to upload an archive in a single request, see Upload Archive (POST archive) (p. 212).

For step-by-step instructions on how to run this example, see Running Code Examples (p. 111). You need to update the code as shown with the name of the file you want to upload.

Example

```csharp
using System;
using System.IO;
using Amazon.Glacier;
using Amazon.Glacier.Model;
using Amazon.Runtime;

namespace glacier.amazon.com.docsamples
{
    class ArchiveUploadSingleOpLowLevel
    {
        static string vaultName = "examplevault";
        static string archiveToUpload = "*** Provide file name (with full path) to upload ***";

        public static void Main(string[] args)
        {
            AmazonGlacierClient client;
            try
            {
                using (client = new AmazonGlacierClient(Amazon.RegionEndpoint.USWest2))
                {
                    Console.WriteLine("Uploading an archive.");
                    string archiveId = UploadAnArchive(client);
                    Console.WriteLine("Archive ID: {0}", archiveId);
                }
            }
            catch (AmazonGlacierException e) { Console.WriteLine(e.Message); }
            catch (AmazonServiceException e) { Console.WriteLine(e.Message); }
            catch (Exception e) { Console.WriteLine(e.Message); }
            Console.WriteLine("To continue, press Enter");
            Console.ReadKey();
        }
    }
}
```

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static string UploadAnArchive(AmazonGlacierClient client)
{
    using (FileStream fileStream = new FileStream(archiveToUpload, FileMode.Open, FileAccess.Read))
    {
        string treeHash = TreeHashGenerator.CalculateTreeHash(fileStream);
        UploadArchiveRequest request = new UploadArchiveRequest()
        {
            VaultName = vaultName,
            Body = fileStream,
            Checksum = treeHash
        };
        UploadArchiveResponse response = client.UploadArchive(request);
        string archiveID = response.ArchiveId;
        return archiveID;
    }
}

Uploading an Archive in a Single Operation Using the REST API

You can use the Upload Archive API call to upload an archive in a single operation. For more information, see Upload Archive (POST archive) (p. 212).

Uploading Large Archives in Parts (Multipart Upload)

Topics
- Multipart Upload Process (p. 67)
- Quick Facts (p. 68)
- Uploading Large Archives in Parts Using the AWS SDK for Java (p. 69)
- Uploading Large Archives Using the AWS SDK for .NET (p. 72)
- Uploading Large Archives in Parts Using the REST API (p. 75)

Multipart Upload Process

As described in Uploading an Archive in Amazon S3 Glacier (p. 60), we encourage Amazon S3 Glacier (Glacier) customers to use Multipart Upload to upload archives greater than 100 MB.

1. Initiate Multipart Upload

When you send a request to initiate a multipart upload, Glacier returns a multipart upload ID, which is a unique identifier for your multipart upload. Any subsequent multipart upload operations require this ID. The ID is valid for at least 24 hours.

In your request to initiate a multipart upload, you must specify the part size in number of bytes. Each part you upload, except the last part, must be of this size.

Note
You don’t need to know the overall archive size when using the Multipart Upload. This allows for use cases where the archive size is not known when you start uploading the archive. You only need to decide part size at the time you initiate a multipart upload.

In the initiate multipart upload request, you can also provide an optional archive description.

2. Upload Parts
For each part upload request, you must include the multipart upload ID you obtained in step 1. In the request, you must also specify the content range, in bytes, identifying the position of the part in the final archive. Glacier later uses the content range information to assemble the archive in proper sequence. Because you provide the content range for each part that you upload, it determines the part's position in the final assembly of the archive, and therefore you can upload parts in any order. You can also upload parts in parallel. If you upload a new part using the same content range as a previously uploaded part, the previously uploaded part is overwritten.

3. **Complete (or Abort) Multipart Upload**

   After uploading all the archive parts, you use the complete operation. Again, you must specify the upload ID in your request. Glacier creates an archive by concatenating parts in ascending order based on the content range you provided. Glacier response to a Complete Multipart Upload request includes an archive ID for the newly created archive. If you provided an optional archive description in the Initiate Multipart Upload request, Glacier associates it with the assembled archive. After you successfully complete a multipart upload, you cannot refer to the multipart upload ID. That means you cannot access parts associated with the multipart upload ID.

   If you abort a multipart upload, you cannot upload any more parts using that multipart upload ID. All storage consumed by any parts associated with the aborted multipart upload is freed. If any part uploads were in-progress, they can still succeed or fail even after you abort.

**Additional Multipart Upload Operations**

Amazon S3 Glacier (Glacier) provides the following additional multipart upload API calls.

- **List Parts**—Using this operation, you can list the parts of a specific multipart upload. It returns information about the parts that you have uploaded for a multipart upload. For each list parts request, Glacier returns information for up to 1,000 parts. If there are more parts to list for the multipart upload, the result is paginated and a marker is returned in the response at which to continue the list. You need to send additional requests to retrieve subsequent parts. Note that the returned list of parts doesn't include parts that haven't completed uploading.

- **List Multipart Uploads**—Using this operation, you can obtain a list of multipart uploads in progress. An in-progress multipart upload is an upload that you have initiated, but have not yet completed or aborted. For each list multipart uploads request, Glacier returns up to 1,000 multipart uploads. If there are more multipart uploads to list, then the result is paginated and a marker is returned in the response at which to continue the list. You need to send additional requests to retrieve the remaining multipart uploads.

**Quick Facts**

The following table provides multipart upload core specifications.

<table>
<thead>
<tr>
<th>Item</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum archive size</td>
<td>10,000 x 4 GB</td>
</tr>
<tr>
<td>Maximum number of parts per upload</td>
<td>10,000</td>
</tr>
<tr>
<td>Part size</td>
<td>1 MB to 4 GB, last part can be &lt; 1 MB. You specify the size value in bytes.</td>
</tr>
<tr>
<td></td>
<td>The part size must be a megabyte (1024 KB) multiplied by a power of 2. For example, 1048576 (1 MB), 2097152 (2 MB), 4194304 (4 MB), 8388608 (8 MB).</td>
</tr>
</tbody>
</table>
### Uploading Large Archives in Parts Using the AWS SDK for Java

Both the high-level and low-level APIs (p. 106) provided by the AWS SDK for Java provide a method to upload a large archive (see Uploading an Archive in Amazon S3 Glacier (p. 60)).

- The high-level API provides a method that you can use to upload archives of any size. Depending on the file you are uploading, the method either uploads an archive in a single operation or uses the multipart upload support in Amazon S3 Glacier (Glacier) to upload the archive in parts.
- The low-level API maps close to the underlying REST implementation. Accordingly, it provides a method to upload smaller archives in one operation and a group of methods that support multipart upload for larger archives. This section explains uploading large archives in parts using the low-level API.

For more information about the high-level and low-level APIs, see Using the AWS SDK for Java with Amazon S3 Glacier (p. 107).

**Topics**
- Uploading Large Archives in Parts Using the High-Level API of the AWS SDK for Java  (p. 69)
- Uploading Large Archives in Parts Using the Low-Level API of the AWS SDK for Java (p. 69)

### Uploading Large Archives in Parts Using the High-Level API of the AWS SDK for Java

You use the same methods of the high-level API to upload small or large archives. Based on the archive size, the high-level API methods decide whether to upload the archive in a single operation or use the multipart upload API provided by Glacier. For more information, see Uploading an Archive Using the High-Level API of the AWS SDK for Java (p. 62).

### Upload Large Archives in Parts Using the Low-Level API of the AWS SDK for Java

For granular control of the upload you can use the low-level API where you can configure the request and process the response. The following are the steps to upload large archives in parts using the AWS SDK for Java.

1. Create an instance of the `AmazonGlacierClient` class (the client).
   
   You need to specify an AWS region where you want to save the archive. All operations you perform using this client apply to that region.

2. Initiate multipart upload by calling the `initiateMultipartUpload` method.
   
   You need to provide vault name in which you want to upload the archive, part size you want to use to upload archive parts, and an optional description. You provide this information by creating an instance of the `InitiateMultipartUploadRequest` class. In response, Glacier returns an upload ID.

3. Upload parts by calling the `uploadMultipartPart` method.
For each part you upload, you need to provide the vault name, the byte range in the final assembled
archive that will be uploaded in this part, the checksum of the part data, and the upload ID.
4. Complete multipart upload by calling the completeMultipartUpload method.

You need to provide the upload ID, the checksum of the entire archive, the archive size (combined size
of all parts you uploaded), and the vault name. Glacier constructs the archive from the uploaded parts
and returns an archive ID.

Example: Uploading a Large Archive in Parts Using the AWS SDK for Java

The following Java code example uses the AWS SDK for Java to upload an archive to a vault
(examplevault). For step-by-step instructions on how to run this example, see Running Java Examples
for Amazon S3 Glacier Using Eclipse (p. 109). You need to update the code as shown with the name of
the file you want to upload.

Note
This example is valid for part sizes from 1 MB to 1 GB. However, Glacier supports part sizes up to
4 GB.

Example

```java
import java.io.ByteArrayInputStream;
import java.io.File;
import java.io.FileInputStream;
import java.io.IOException;
import java.security.NoSuchAlgorithmException;
import java.util.Arrays;
import java.util.Date;
import java.util.LinkedList;
import java.util.List;
import com.amazonaws.AmazonClientException;
import com.amazonaws.AmazonServiceException;
import com.amazonaws.auth.profile.ProfileCredentialsProvider;
import com.amazonaws.services.glacier.AmazonGlacierClient;
import com.amazonaws.services.glacier.TreeHashGenerator;
import com.amazonaws.services.glacier.model.CompleteMultipartUploadRequest;
import com.amazonaws.services.glacier.model.CompleteMultipartUploadResult;
import com.amazonaws.services.glacier.model.InitiateMultipartUploadRequest;
import com.amazonaws.services.glacier.model.InitiateMultipartUploadResult;
import com.amazonaws.services.glacier.model.UploadMultipartPartRequest;
import com.amazonaws.services.glacier.model.UploadMultipartPartResult;
import com.amazonaws.util.BinaryUtils;

public class ArchiveMPU {

  public static String vaultName = "examplevault";
  // This example works for part sizes up to 1 GB.
  public static String partSize = "1048576";  // 1 MB.
  public static String archiveFilePath = "*** provide archive file path ***";
  public static AmazonGlacierClient client;

  public static void main(String[] args) throws IOException {
    ProfileCredentialsProvider credentials = new ProfileCredentialsProvider();
    client = new AmazonGlacierClient(credentials);
    client.setEndpoint("https://glacier.us-west-2.amazonaws.com/");

    try {
      System.out.println("Uploading an archive.");
      String uploadid = initiateMultipartUpload();
```
String checksum = uploadParts(uploadId);
String archiveId = CompleteMultiPartUpload(uploadId, checksum);
System.out.println("Completed an archive. ArchiveId: " + archiveId);

} catch (Exception e) {
    System.err.println(e);
}

private static String initiateMultipartUpload() {
    // Initiate
    InitiateMultipartUploadRequest request = new InitiateMultipartUploadRequest()
        .withVaultName(vaultName)
        .withArchiveDescription("my archive " + (new Date()))
        .withPartSize(partSize);

    InitiateMultipartUploadResult result = client.initiateMultipartUpload(request);

    System.out.println("ArchiveID: " + result.getUploadId());
    return result.getUploadId();
}

private static String uploadParts(String uploadId) throws AmazonServiceException,
NoSuchAlgorithmException, AmazonClientException, IOException {
    int filePosition = 0;
    long currentPosition = 0;
    byte[] buffer = new byte[Integer.valueOf(partSize)];
    List<byte[]> binaryChecksums = new LinkedList<byte[]>();

    File file = new File(archiveFilePath);
    FileInputStream fileToUpload = new FileInputStream(file);
    String contentRange;
    int read = 0;
    while (currentPosition < file.length()) {
        read = fileToUpload.read(buffer, filePosition, buffer.length);
        if (read == -1) { break; }
        byte[] bytesRead = Arrays.copyOf(buffer, read);

        contentRange = String.format("bytes %s-%s/*", currentPosition, currentPosition + read - 1);
        String checksum = TreeHashGenerator.calculateTreeHash(new ByteArrayInputStream(bytesRead));
        byte[] binaryChecksum = BinaryUtils.fromHex(checksum);
        binaryChecksums.add(binaryChecksum);
        System.out.println(contentRange);

        //Upload part.
        UploadMultipartPartRequest partRequest = new UploadMultipartPartRequest()
            .withVaultName(vaultName)
            .withBody(new ByteArrayInputStream(bytesRead))
            .withChecksum(checksum)
            .withRange(contentRange)
            .withUploadId(uploadId);

        UploadMultipartPartResult partResult = client.uploadMultipartPart(partRequest);
        System.out.println("Part uploaded, checksum: " + partResult.getChecksum());
        currentPosition = currentPosition + read;
    }
    fileToUpload.close();
    String checksum = TreeHashGenerator.calculateTreeHash(binaryChecksums);
    return checksum;
}
private static String CompleteMultiPartUpload(String uploadId, String checksum) throws NoSuchAlgorithmException, IOException {
    File file = new File(archiveFilePath);
    CompleteMultipartUploadRequest compRequest = new CompleteMultipartUploadRequest()
        .withVaultName(vaultName)
        .withUploadId(uploadId)
        .withChecksum(checksum)
        .withArchiveSize(String.valueOf(file.length()));
    CompleteMultipartUploadResult compResult = client.completeMultipartUpload(compRequest);
    return compResult.getLocation();
}

Uploading Large Archives Using the AWS SDK for .NET

Both the high-level and low-level APIs (p. 106) provided by the AWS SDK for .NET provide a method to upload large archives in parts (see Uploading an Archive in Amazon S3 Glacier (p. 60)).

- The high-level API provides a method that you can use to upload archives of any size. Depending on the file you are uploading, the method either uploads archive in a single operation or uses the multipart upload support in Amazon S3 Glacier (Glacier) to upload the archive in parts.
- The low-level API maps close to the underlying REST implementation. Accordingly, it provides a method to upload smaller archives in one operation and a group of methods that support multipart upload for larger archives. This section explains uploading large archives in parts using the low-level API.

For more information about the high-level and low-level APIs, see Using the AWS SDK for .NET with Amazon S3 Glacier (p. 110).

Topics
- Uploading Large Archives in Parts Using the High-Level API of the AWS SDK for .NET (p. 72)
- Uploading Large Archives in Parts Using the Low-Level API of the AWS SDK for .NET (p. 72)

Uploading Large Archives in Parts Using the High-Level API of the AWS SDK for .NET

You use the same methods of the high-level API to upload small or large archives. Based on the archive size, the high-level API methods decide whether to upload the archive in a single operation or use the multipart upload API provided by Glacier. For more information, see Uploading an Archive Using the High-Level API of the AWS SDK for .NET (p. 65).

Uploading Large Archives in Parts Using the Low-Level API of the AWS SDK for .NET

For granular control of the upload, you can use the low-level API, where you can configure the request and process the response. The following are the steps to upload large archives in parts using the AWS SDK for .NET.

1. Create an instance of the AmazonGlacierClient class (the client).
   You need to specify an AWS region where you want to save the archive. All operations you perform using this client apply to that region.
2. Initiate multipart upload by calling the `InitiateMultipartUpload` method.

You need to provide the vault name to which you want to upload the archive, the part size you want to use to upload archive parts, and an optional description. You provide this information by creating an instance of the `InitiateMultipartUploadRequest` class. In response, Glacier returns an upload ID.

3. Upload parts by calling the `UploadMultipartPart` method.

For each part you upload, you need to provide the vault name, the byte range in the final assembled archive that will be uploaded in this part, the checksum of the part data, and the upload ID.

4. Complete the multipart upload by calling the `CompleteMultipartUpload` method.

You need to provide the upload ID, the checksum of the entire archive, the archive size (combined size of all parts you uploaded), and the vault name. Glacier constructs the archive from the uploaded parts and returns an archive ID.

Example: Uploading a Large Archive in Parts Using the AWS SDK for .NET

The following C# code example uses the AWS SDK for .NET to upload an archive to a vault (examplevault). For step-by-step instructions on how to run this example, see Running Code Examples (p. 111). You need to update the code as shown with the name of a file you want to upload.

Example

```csharp
using System;
using System.Collections.Generic;
using System.IO;
using Amazon.Glacier;
using Amazon.Glacier.Model;
using Amazon.Runtime;

namespace glacier.amazon.com.docsamples
{
    class ArchiveUploadMPU
    {
        static string vaultName = "examplevault";
        static string archiveToUpload = "*** Provide file name (with full path) to upload ***";
        static long partSize = 4194304; // 4 MB.

        public static void Main(string[] args)
        {
            AmazonGlacierClient client;
            List<string> partChecksumList = new List<string>();
            try
            {
                using (client = new AmazonGlacierClient(Amazon.RegionEndpoint.USWest2))
                {
                    Console.WriteLine("Uploading an archive.");
                    string uploadId = InitiateMultipartUpload(client);
                    partChecksumList = UploadParts(uploadId, client);
                    string archiveId = CompleteMPU(uploadId, client, partChecksumList);
                    Console.WriteLine("Archive ID: {0}", archiveId);
                }
                Console.WriteLine("Operations successful. To continue, press Enter");
                Console.ReadKey();
            }
            catch (AmazonGlacierException e) { Console.WriteLine(e.Message); }
            catch (AmazonServiceException e) { Console.WriteLine(e.Message); }
            catch (Exception e) { Console.WriteLine(e.Message); }
            Console.WriteLine("To continue, press Enter");
            Console.ReadKey();
        }
    }
}
```
static string InitiateMultipartUpload(AmazonGlacierClient client)
{
    InitiateMultipartUploadRequest initiateMPUrequest = new
    InitiateMultipartUploadRequest()
    {
        VaultName = vaultName,
        PartSize = partSize,
        ArchiveDescription = "Test doc uploaded using MPU."
    };

    InitiateMultipartUploadResponse initiateMPUresponse =
    client.InitiateMultipartUpload(initiateMPUrequest);
    return initiateMPUresponse.UploadId;
}

static List<string> UploadParts(string uploadID, AmazonGlacierClient client)
{
    List<string> partChecksumList = new List<string>();
    long currentPosition = 0;
    var buffer = new byte[Convert.ToInt32(partSize)];

    long fileLength = new FileInfo(archiveToUpload).Length;
    using (FileStream fileToUpload = new FileStream(archiveToUpload, FileMode.Open,
        FileAccess.Read))
    {
        while (fileToUpload.Position < fileLength)
        {
            Stream uploadPartStream = GlacierUtils.CreatePartStream(fileToUpload, partSize);
            string checksum = TreeHashGenerator.CalculateTreeHash(uploadPartStream);
            partChecksumList.Add(checksum);
            // Upload part.
            UploadMultipartPartRequest uploadMPUrequest = new UploadMultipartPartRequest()
            {
                VaultName = vaultName,
                Body = uploadPartStream,
                Checksum = checksum,
                UploadId = uploadID
            };
            uploadMPUrequest.SetRange(currentPosition, currentPosition +
                uploadPartStream.Length - 1);
            client.UploadMultipartPart(uploadMPUrequest);
            currentPosition = currentPosition + uploadPartStream.Length;
        }
    }
    return partChecksumList;
}

static string CompleteMPU(string uploadID, AmazonGlacierClient client, List<string>
    partChecksumList)
{
    long fileLength = new FileInfo(archiveToUpload).Length;
    CompleteMultipartUploadRequest completeMPUrequest = new
    CompleteMultipartUploadRequest()
    {
        UploadId = uploadID,
        ArchiveSize = fileLength.ToString(),
        Checksum = TreeHashGenerator.CalculateTreeHash(partChecksumList),
        VaultName = vaultName
    };
}
Uploading Large Archives in Parts Using the REST API

As described in Uploading Large Archives in Parts (Multipart Upload) (p. 67), multipart upload refers to a set of operations that enable you to upload an archive in parts and perform related operations. For more information about these operations, see the following API reference topics:

- Initiate Multipart Upload (POST multipart-uploads) (p. 221)
- Upload Part (PUT uploadID) (p. 234)
- Complete Multipart Upload (POST uploadID) (p. 218)
- Abort Multipart Upload (DELETE uploadID) (p. 216)
- List Parts (GET uploadID) (p. 224)
- List Multipart Uploads (GET multipart-uploads) (p. 229)

Downloading an Archive in Amazon S3 Glacier

Amazon S3 Glacier (Glacier) provides a management console, which you can use to create and delete vaults. However, you cannot download archives from Glacier by using the management console. To download data, such as photos, videos, and other documents, you must either use the AWS CLI or write code to make requests, by using either the REST API directly or by using the AWS SDKs.

For information about using Glacier with the AWS CLI, see AWS CLI Reference for Glacier. To install the AWS CLI, see AWS Command Line Interface. The following Downloading an Archive topics describe how to download archives to Glacier by using the AWS SDK for Java, the AWS SDK for .NET, and the REST API.

Retrieving Glacier Archives

Retrieving an archive from Amazon S3 Glacier (Glacier) is an asynchronous operation in which you first initiate a job, and then download the output after the job completes. To initiate an archive retrieval job you use the Initiate Job (POST jobs) (p. 251) REST API or the equivalent in the AWS CLI, or AWS SDKS.

Topics

- Archive Retrieval Options (p. 76)
- Ranged Archive Retrievals (p. 78)

Retrieving an archive from Glacier is a two-step process.

To retrieve an archive

1. Initiate an archive retrieval job.
   a. Get the ID of the archive that you want to retrieve. You can get the archive ID from an inventory of the vault. For more information, see Downloading a Vault Inventory in Amazon S3 Glacier (p. 33).
   b. Initiate a job requesting Glacier to prepare an entire archive or a portion of the archive for subsequent download by using the Initiate Job (POST jobs) (p. 251) operation.
When you initiate a job, Glacier returns a job ID in the response and executes the job asynchronously. (You cannot download the job output until after the job completes as described in Step 2.)

**Important**
For Standard retrievals only, a data retrieval policy can cause your initiate retrieval job request to fail with a `PolicyEnforcedException` exception. For more information about data retrieval policies, see Amazon S3 Glacier Data Retrieval Policies (p. 141). For more information about the `PolicyEnforcedException` exception, see Error Responses (p. 166).

When required, you can restore large segments of the data stored in the GLACIER and DEEP_ARCHIVE Amazon S3 storage classes. For example, you might want to restore data for a secondary copy. However, if you need to restore a large amount of data, keep in mind that the GLACIER and DEEP_ARCHIVE storage classes are designed for 35 random restore requests per pebibyte (PiB) stored per day.

For more information about restoring data from these storage classes, see Amazon S3 Storage Classes for Archiving Objects in the Amazon Simple Storage Service Developer Guide.

2. After the job completes, download the bytes using the Get Job Output (GET output) (p. 245) operation.

You can download all bytes or specify a byte range to download only a portion of the job output. For larger output, downloading the output in chunks helps in the event of a download failure, such as a network failure. If you get job output in a single request and there is a network failure, you have to restart downloading the output from the beginning. However, if you download the output in chunks, in the event of any failure, you need only restart the download of the smaller portion and not the entire output.

Glacier must complete a job before you can get its output. After completion, a job will not expire for at least 24 hours after completion, which means you can download the output within the 24-hour period after the job is completed. To determine if your job is complete, check its status by using one of the following options:

- **Wait for a job completion notification** — You can specify an Amazon Simple Notification Service (Amazon SNS) topic to which Glacier can post a notification after the job is completed. Glacier sends notification only after it completes the job.

You can specify an Amazon SNS topic for a job when you initiate the job. In addition to specifying an Amazon SNS topic in your job request, if your vault has notifications configuration set for archive retrieval events, then Glacier also publishes a notification to that SNS topic. For more information, see Configuring Vault Notifications in Amazon S3 Glacier (p. 45).

- **Request job information explicitly** — You can also use the Glacier describe job operation (Describe Job (GET JobID) (p. 238)) to periodically poll for job information. However, we recommend using Amazon SNS notifications.

**Note**
The information you get by using SNS notification is the same as what you get by calling Describe Job.

**Archive Retrieval Options**

You can specify one of the following when initiating a job to retrieve an archive based on your access time and cost requirements. For information about retrieval pricing, see the Glacier Pricing.
- **Expedited** — Expedited retrievals allow you to quickly access your data when occasional urgent requests for a subset of archives are required. For all but the largest archives (250 MB+), data accessed using Expedited retrievals are typically made available within 1–5 minutes. Provisioned Capacity ensures that retrieval capacity for Expedited retrievals is available when you need it. For more information, see Provisioned Capacity (p. 77).

- **Standard** — Standard retrievals allow you to access any of your archives within several hours. Standard retrievals typically complete within 3–5 hours. This is the default option for retrieval requests that do not specify the retrieval option.

- **Bulk** — Bulk retrievals are Glacier’s lowest-cost retrieval option, which you can use to retrieve large amounts, even petabytes, of data inexpensively in a day. Bulk retrievals typically complete within 5–12 hours.

To make an Expedited, Standard, or Bulk retrieval, set the `Tier` parameter in the Initiate Job (POST jobs) (p. 251) REST API request to the option you want, or the equivalent in the AWS CLI or AWS SDKs. If you have purchased provisioned capacity, then all expedited retrievals are automatically served through your provisioned capacity.

**Provisioned Capacity**

Provisioned capacity ensures that your retrieval capacity for expedited retrievals is available when you need it. Each unit of capacity provides that at least three expedited retrievals can be performed every five minutes and provides up to 150 MB/s of retrieval throughput.

You should purchase provisioned retrieval capacity if your workload requires highly reliable and predictable access to a subset of your data in minutes. Without provisioned capacity Expedited retrievals are accepted, except for rare situations of unusually high demand. However, if you require access to Expedited retrievals under all circumstances, you must purchase provisioned retrieval capacity.

**Purchasing Provisioned Capacity**

You can purchase provisioned capacity units by using the Glacier console, the Purchase Provisioned Capacity (POST provisioned-capacity) (p. 285) REST API, the AWS SDKs, or the AWS CLI. For provisioned capacity pricing information, see Glacier Pricing.

A provisioned capacity unit lasts for one month starting at the date and time of purchase, which is the start date. The unit expires on the expiration date, which is exactly one month after the start date to the nearest second.

If the start date is on the 31st day of a month, the expiration date is the last day of the next month. For example, if the start date is August 31, the expiration date is September 30. If the start date is January 31, the expiration date is February 28.

To use the Glacier console to purchase provisioned capacity, choose Settings and then choose Provisioned capacity.
If you don’t have any provisioned capacity, but you want to buy it, choose **Add 1 capacity unit**, and then choose **Buy**.

After your purchase has succeeded, you can choose **Buy** again to purchase additional capacity units. When you are finished, choose **Close**.

**Ranged Archive Retrievals**

When you retrieve an archive from Glacier, you can optionally specify a range, or portion, of the archive to retrieve. The default is to retrieve the whole archive. Specifying a range of bytes can be helpful when you want to do the following:

- **Manage your data downloads** – Glacier allows retrieved data to be downloaded for 24 hours after the retrieval request completes. Therefore, you might want to retrieve only portions of the archive so that you can manage the schedule of downloads within the given download window.
- **Retrieve a targeted part of a large archive** – For example, suppose you have previously aggregated many files and uploaded them as a single archive, and now you want to retrieve a few of the files. In this case, you can specify a range of the archive that contains the files you are interested in by using one retrieval request. Or, you can initiate multiple retrieval requests, each with a range for one or more files.

When initiating a retrieval job using range retrievals, you must provide a range that is megabyte aligned. In other words, the byte range can start at zero (the beginning of your archive), or at any 1 MB interval thereafter (1 MB, 2 MB, 3 MB, and so on).

The end of the range can either be the end of your archive or any 1 MB interval greater than the beginning of your range. Furthermore, if you want to get checksum values when you download the data (after the retrieval job completes), the range you request in the job initiation must also be tree-hash.
aligned. Checksums are a way you can ensure that your data was not corrupted during transmission. For more information about megabyte alignment and tree-hash alignment, see Receiving Checksums When Downloading Data (p. 165).

Downloading an Archive in Amazon S3 Glacier Using the AWS SDK for Java

Both the high-level and low-level APIs (p. 106) provided by the AWS SDK for Java provide a method to download an archive.

Topics
- Downloading an Archive Using the High-Level API of the AWS SDK for Java (p. 79)
- Downloading an Archive Using the Low-Level API of the AWS SDK for Java (p. 80)

Downloading an Archive Using the High-Level API of the AWS SDK for Java

The `ArchiveTransferManager` class of the high-level API provides the `download` method you can use to download an archive.

**Important**
The `ArchiveTransferManager` class creates an Amazon Simple Notification Service (Amazon SNS) topic, and an Amazon Simple Queue Service (Amazon SQS) queue that is subscribed to that topic. It then initiates the archive retrieval job and polls the queue for the archive to be available. When the archive is available, download begins. For information about retrieval times, see Archive Retrieval Options (p. 76).

Example: Downloading an Archive Using the High-Level API of the AWS SDK for Java

The following Java code example downloads an archive from a vault (`examplevault`) in the US West (Oregon) region (`us-west-2`).

For step-by-step instructions to run this sample, see Running Java Examples for Amazon S3 Glacier Using Eclipse (p. 109). You need to update the code as shown with an existing archive ID and the local file path where you want to save the downloaded archive.

Example

```java
import java.io.File;
import java.io.IOException;
import com.amazonaws.auth.profile.ProfileCredentialsProvider;
import com.amazonaws.services.glacier.AmazonGlacierClient;
import com.amazonaws.services.glacier.transfer.ArchiveTransferManager;
import com.amazonaws.services.sns.AmazonSNSClient;
import com.amazonaws.services.sqs.AmazonSQSClient;

public class ArchiveDownloadHighLevel {
    public static String vaultName = "examplevault";
    public static String archiveId = "*** provide archive ID ***";
    public static String downloadFilePath = "*** provide location to download archive ***";

    public static AmazonGlacierClient glacierClient;
```
public static AmazonSQSClient sqsClient;
public static AmazonSNSClient snsClient;

public static void main(String[] args) throws IOException {
    ProfileCredentialsProvider credentials = new ProfileCredentialsProvider();
    glacierClient = new AmazonGlacierClient(credentials);
sqsClient = new AmazonSQSClient(credentials);
snsClient = new AmazonSNSClient(credentials);
    glacierClient.setEndpoint("glacier.us-west-2.amazonaws.com");
sqsClient.setEndpoint("sqs.us-west-2.amazonaws.com");
snsClient.setEndpoint("sns.us-west-2.amazonaws.com");

    try {
        ArchiveTransferManager atm = new ArchiveTransferManager(glacierClient,
sqsClient, snsClient);
        atm.download(vaultName, archiveId, new File(downloadFilePath));
        System.out.println("Downloaded file to " + downloadFilePath);
    } catch (Exception e) {
        System.err.println(e);
    }
}

Downloading an Archive Using the Low-Level API of the AWS SDK for Java

The following are the steps to retrieve a vault inventory using the AWS SDK for Java low-level API.

1. Create an instance of the AmazonGlacierClient class (the client).
   You need to specify an AWS region from where you want to download the archive. All operations you perform using this client apply to that region.

2. Initiate an archive-retrieval job by executing the initiateJob method.
   You provide job information, such as the archive ID of the archive you want to download and the optional Amazon SNS topic to which you want Amazon S3 Glacier (Glacier) to post a job completion message, by creating an instance of the InitiateJobRequest class. Glacier returns a job ID in response. The response is available in an instance of the InitiateJobResult class.

```java
JobParameters jobParameters = new JobParameters()
    .withArchiveId("*** provide an archive id ***")
    .withDescription("archive retrieval")
    .withRetrievalByteRange("*** provide a retrieval range***") // optional
    .withType("archive-retrieval");

InitiateJobResult initiateJobResult = client.initiateJob(new InitiateJobRequest()
    .withJobParameters(jobParameters)
    .withVaultName(vaultName));

String jobId = initiateJobResult.getJobId();
```

You can optionally specify a byte range to request Glacier to prepare only a portion of the archive. For example, you can update the preceding request by adding the following statement to request Glacier to prepare only the 1 MB to 2 MB portion of the archive.
3. Wait for the job to complete.

You must wait until the job output is ready for you to download. If you have either set a notification configuration on the vault identifying an Amazon Simple Notification Service (Amazon SNS) topic or specified an Amazon SNS topic when you initiated a job, Glacier sends a message to that topic after it completes the job.

You can also poll Glacier by calling the describeJob method to determine the job completion status. Although, using an Amazon SNS topic for notification is the recommended approach.

4. Download the job output (archive data) by executing the getJobOutput method.

You provide the request information such as the job ID and vault name by creating an instance of the GetJobOutputRequest class. The output that Glacier returns is available in the GetJobOutputResult object.

```java
text
GetJobOutputRequest jobOutputRequest = new GetJobOutputRequest()
    .withJobId("*** provide a job ID ***")
    .withVaultName("*** provide a vault name ****");
GetJobOutputResult jobOutputResult = client.getJobOutput(jobOutputRequest);
// jobOutputResult.getBody() // Provides the input stream.
```

The preceding code snippet downloads the entire job output. You can optionally retrieve only a portion of the output, or download the entire output in smaller chunks by specifying the byte range in your GetJobOutputRequest.

```java
text
GetJobOutputRequest jobOutputRequest = new GetJobOutputRequest()
    .withJobId("*** provide a job ID ***")
    .withRange("bytes=0-1048575") // Download only the first 1 MB of the output.
    .withVaultName("*** provide a vault name ****");
```

In response to your GetJobOutput call, Glacier returns the checksum of the portion of the data you downloaded, if certain conditions are met. For more information, see Receiving Checksums When Downloading Data (p. 165).

To verify there are no errors in the download, you can then compute the checksum on the client-side and compare it with the checksum Glacier sent in the response.

For an archive retrieval job with the optional range specified, when you get the job description, it includes the checksum of the range you are retrieving (SHA256TreeHash). You can use this value to further verify the accuracy of the entire byte range that you later download. For example, if you initiate a job to retrieve a tree-hash aligned archive range and then download output in chunks such
that each of your `GetJobOutput` requests return a checksum, then you can compute checksum of each portion you download on the client-side and then compute the tree hash. You can compare it with the checksum Glacier returns in response to your describe job request to verify that the entire byte range you have downloaded is the same as the byte range that is stored in Glacier.

For a working example, see Example 2: Retrieving an Archive Using the Low-Level API of the AWS SDK for Java—Download Output in Chunks (p. 86).

### Example 1: Retrieving an Archive Using the Low-Level API of the AWS SDK for Java

The following Java code example downloads an archive from the specified vault. After the job completes, the example downloads the entire output in a single `getJobOutput` call. For an example of downloading output in chunks, see Example 2: Retrieving an Archive Using the Low-Level API of the AWS SDK for Java—Download Output in Chunks (p. 86).

The example performs the following tasks:

- Creates an Amazon Simple Notification Service (Amazon SNS) topic. Glacier sends a notification to this topic after it completes the job.
- Creates an Amazon Simple Queue Service (Amazon SQS) queue. The example attaches a policy to the queue to enable the Amazon SNS topic to post messages to the queue.
- Initiates a job to download the specified archive. In the job request, the Amazon SNS topic that was created is specified so that Glacier can publish a notification to the topic after it completes the job.
- Periodically checks the Amazon SQS queue for a message that contains the job ID. If there is a message, parse the JSON and check if the job completed successfully. If it did, download the archive.
- Cleans up by deleting the Amazon SNS topic and the Amazon SQS queue that it created.

```java
import java.io.BufferedInputStream;
import java.io.BufferedOutputStream;
import java.io.BufferedReader;
import java.io.BufferedWriter;
import java.io.FileOutputStream;
import java.io.FileWriter;
import java.io.IOException;
import java.io.InputStream;
import java.io.InputStreamReader;
import java.io.OutputStream;
import java.util.HashMap;
import java.util.List;
import java.util.Map;
import org.codehaus.jackson.JsonFactory;
import org.codehaus.jackson.JsonNode;
import org.codehaus.jackson.JsonParseException;
import org.codehaus.jackson.JsonParser;
import org.codehaus.jackson.map.ObjectMapper;
import com.amazonaws.AmazonClientException;
import com.amazonaws.auth.policy.Policy;
import com.amazonaws.auth.policy.Principal;
```

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import com.amazonaws.auth.policy.Resource;
import com.amazonaws.auth.policy.Statement;
import com.amazonaws.auth.policy.Statement.Effect;
import com.amazonaws.auth.policy.actions.SQSActions;
import com.amazonaws.auth.profile.ProfileCredentialsProvider;
import com.amazonaws.services.glacier.AmazonGlacierClient;
import com.amazonaws.services.glacier.model.GetJobOutputRequest;
import com.amazonaws.services.glacier.model.GetJobOutputResult;
import com.amazonaws.services.glacier.model.InitiateJobRequest;
import com.amazonaws.services.glacier.model.InitiateJobResult;
import com.amazonaws.services.glacier.model.JobParameters;
import com.amazonaws.services.sns.AmazonSNSClient;
import com.amazonaws.services.sns.model.CreateTopicRequest;
import com.amazonaws.services.sns.model.CreateTopicResult;
import com.amazonaws.services.sns.model.DeleteTopicRequest;
import com.amazonaws.services.sns.model.SubscribeRequest;
import com.amazonaws.services.sns.model.SubscribeResult;
import com.amazonaws.services.sns.model.UnsubscribeRequest;
import com.amazonaws.services.sqs.AmazonSQSClient;
import com.amazonaws.services.sqs.model.CreateQueueRequest;
import com.amazonaws.services.sqs.model.CreateQueueResult;
import com.amazonaws.services.sqs.model.DeleteQueueRequest;
import com.amazonaws.services.sqs.model.GetQueueAttributesRequest;
import com.amazonaws.services.sqs.model.GetQueueAttributesResult;
import com.amazonaws.services.sqs.model.Message;
import com.amazonaws.services.sqs.model.ReceiveMessageRequest;
import com.amazonaws.services.sqs.model.SetQueueAttributesRequest;

public class AmazonGlacierDownloadArchiveWithSQSPolling {
    public static String archiveId = "*** provide archive ID ****";
    public static String vaultName = "*** provide vault name ***";
    public static String snsTopicName = "*** provide topic name ***";
    public static String sqsQueueName = "*** provide queue name ***";
    public static String sqsQueueARN;
    public static String sqsQueueURL;
    public static String snsTopicARN;
    public static String snsSubscriptionARN;
    public static String fileName = "*** provide file name ***";
    public static String region = "*** region ***";
    public static long sleepTime = 600;
    public static AmazonGlacierClient client;
    public static AmazonSQSClient sqsClient;
    public static AmazonSNSClient snsClient;
    public static void main(String[] args) throws IOException {
        ProfileCredentialsProvider credentials = new ProfileCredentialsProvider();
        client = new AmazonGlacierClient(credentials);
        client.setEndpoint("https://glacier." + region + ".amazonaws.com");
        sqsClient = new AmazonSQSClient(credentials);
        sqsClient.setEndpoint("https://sqs." + region + ".amazonaws.com");
        snsClient = new AmazonSNSClient(credentials);
        snsClient.setEndpoint("https://sns." + region + ".amazonaws.com");

        try {
            setupSQS();
            setupSNS();

            String jobId = initiateJobRequest();
            System.out.println("Jobid = " + jobId);
            Boolean success = waitForJobToComplete(jobId, sqsQueueURL);
        }
    }
}
if (!success) { throw new Exception("Job did not complete successfully."); }
downloadJobOutput(jobId);
cleanUp();
}
catch (Exception e) {
    System.err.println("Archive retrieval failed.");
    System.err.println(e);
}

private static void setupSQS() {
    CreateQueueRequest request = new CreateQueueRequest()
        .withQueueName(sqsQueueName);
    CreateQueueResult result = sqsClient.createQueue(request);
    sqsQueueURL = result.getQueueUrl();
    GetQueueAttributesRequest qRequest = new GetQueueAttributesRequest()
        .withQueueUrl(sqsQueueURL)
        .withAttributeNames("QueueArn");
    GetQueueAttributesResult qResult = sqsClient.getQueueAttributes(qRequest);
    sqsQueueARN = qResult.getAttributes().get("QueueArn");
    Policy sqsPolicy =
        new Policy().withStatements(
            new Statement(Effect.Allow)
                .withPrincipals(Principal.AllUsers)
                .withActions(SQSActions.SendMessage)
                .withResources(new Resource(sqsQueueARN)));
    Map<String, String> queueAttributes = new HashMap<String, String>();
    queueAttributes.put("Policy", sqsPolicy.toJson());
    sqsClient.setQueueAttributes(new SetQueueAttributesRequest(sqsQueueURL,
        queueAttributes));
}

private static void setupSNS() {
    CreateTopicRequest request = new CreateTopicRequest()
        .withName(snsTopicName);
    CreateTopicResult result = snsClient.createTopic(request);
    snsTopicARN = result.getTopicArn();
    SubscribeRequest request2 = new SubscribeRequest()
        .withTopicArn(snsTopicARN)
        .withEndpoint(sqsQueueARN)
        .withProtocol("sqs");
    SubscribeResult result2 = snsClient.subscribe(request2);
    snsSubscriptionARN = result2.getSubscriptionArn();
}

private static String initiateJobRequest() {
    JobParameters jobParameters = new JobParameters()
        .withType("archive-retrieval")
        .withArchiveId(archiveId)
        .withSNSTopic(snsTopicARN);
    InitiateJobRequest request = new InitiateJobRequest()
        .withVaultName(vaultName)
        .withJobParameters(jobParameters);
    InitiateJobResult response = client.initiateJob(request);
    return response.getJobId();
}
private static Boolean waitForJobToComplete(String jobId, String sqsQueueUrl) throws 
InterruptedException, JsonParseException, IOException {

    Boolean messageFound = false;
    Boolean jobSuccessful = false;
    ObjectMapper mapper = new ObjectMapper();
    JsonFactory factory = mapper.getJsonFactory();

    while (!messageFound) {
        List<Message> msgs = sqsClient.receiveMessage(
            new
ReceiveMessageRequest(sqsQueueUrl).withMaxNumberOfMessages(10)).getMessages();

            if (msgs.size() > 0) {
                for (Message m : msgs) {
                    JsonParser jpMessage = factory.createJsonParser(m.getBody());
                    JsonNode jobMessageNode = mapper.readTree(jpMessage);
                    String jobMessage = jobMessageNode.get("Message").getTextValue();

                    JsonParser jpDesc = factory.createJsonParser(jobMessage);
                    JsonNode jobDescNode = mapper.readTree(jpDesc);
                    String retrievedJobId = jobDescNode.get("JobId").getTextValue();
                    String statusCode = jobDescNode.get("StatusCode").getTextValue();
                    if (retrievedJobId.equals(jobId)) {
                        messageFound = true;
                        if (statusCode.equals("Succeeded")) {
                            jobSuccessful = true;
                        }
                    }
                }
            } else {
                Thread.sleep(sleepTime * 1000);
            }
        return (messageFound && jobSuccessful);
    }

private static void downloadJobOutput(String jobId) throws IOException {
    GetJobOutputRequest getJobOutputRequest = new GetJobOutputRequest()
        .withVaultName(vaultName)
        .withJobId(jobId);
    GetJobOutputResult getJobOutputResult = client.getJobOutput(getJobOutputRequest);

    InputStream input = new BufferedInputStream(getJobOutputResult.getBody());
    OutputStream output = null;
    try {
        output = new BufferedOutputStream(new FileOutputStream(fileName));

        byte[] buffer = new byte[1024 * 1024];
        int bytesRead = 0;
        do {
            bytesRead = input.read(buffer);
            if (bytesRead <= 0) break;
            output.write(buffer, 0, bytesRead);
        } while (bytesRead > 0);
    } catch (IOException e) {
        throw new AmazonClientException("Unable to save archive", e);
    } finally {
        try {input.close();} catch (Exception e) {}
        try {output.close();} catch (Exception e) {}
    }
    System.out.println("Retrieved archive to " + fileName);
Example 2: Retrieving an Archive Using the Low-Level API of the AWS SDK for Java—Download Output in Chunks

The following Java code example retrieves an archive from Glacier. The code example downloads the job output in chunks by specifying byte range in a `GetJobOutputRequest` object.

```java
public class ArchiveDownloadLowLevelWithRange {
    public static String vaultName = "*** provide vault name ***";
    // Other code...
}
```
public static String archiveId = "*** provide archive id ***";
public static String snsTopicName = "glacier-temp-sns-topic";
public static String sqsQueueName = "glacier-temp-sqs-queue";
public static long downloadChunkSize = 4194304; // 4 MB
public static String sqsQueueARN;
public static String sqsQueueURL;
public static String snsTopicARN;
public static String snsSubscriptionARN;
public static String fileName = "*** provide file name to save archive to ***";
public static String region = "*** region ***";
public static long sleepTime = 600;

public static AmazonGlacierClient client;
public static AmazonSQSClient sqsClient;
public static AmazonSNSClient snsClient;

public static void main(String[] args) throws IOException {
    ProfileCredentialsProvider credentials = new ProfileCredentialsProvider();

    client = new AmazonGlacierClient(credentials);
    client.setEndpoint("https://glacier." + region + ".amazonaws.com");
    sqsClient = new AmazonSQSClient(credentials);
    sqsClient.setEndpoint("https://sqs." + region + ".amazonaws.com");
    snsClient = new AmazonSNSClient(credentials);
    snsClient.setEndpoint("https://sns." + region + ".amazonaws.com");

    try {
        setupSQS();
        setupSNS();

        String jobId = initiateJobRequest();
        System.out.println("Jobid = "+jobId);

        long archiveSizeInBytes = waitForJobToComplete(jobId, sqsQueueURL);
        if (archiveSizeInBytes==-1) { throw new Exception("Job did not complete successfully."); }

        downloadJobOutput(jobId, archiveSizeInBytes);
        cleanUp();
    }
    catch (Exception e) {
        System.err.println("Archive retrieval failed.");
        System.err.println(e);
    }
}

private static void setupSQS() {
    CreateQueueRequest request = new CreateQueueRequest()
        .withQueueName(sqsQueueName);
    CreateQueueResult result = sqsClient.createQueue(request);
    sqsQueueURL = result.getQueueUrl();

    GetQueueAttributesRequest qRequest = new GetQueueAttributesRequest()
        .withQueueUrl(sqsQueueURL)
        .withAttributeNames("QueueArn");
    GetQueueAttributesResult qResult = sqsClient.getQueueAttributes(qRequest);
    sqsQueueARN = qResult.getAttributes().get("QueueArn");

    Policy sqsPolicy =
        new Policy().withStatements(new Statement(Effect.Allow)
            .withPrincipals(Principal.AllUsers));
.withActions(SQSActions.SendMessage)
.withResources(new Resource(sqsQueueARN));
Map<String, String> queueAttributes = new HashMap<String, String>();
queueAttributes.put("Policy", sqsPolicy.toJson());
sqsClient.setQueueAttributes(new SetQueueAttributesRequest(sqsQueueURL,
queueAttributes));

private static void setupSNS() {
    CreateTopicRequest request = new CreateTopicRequest()
        .withName(snsTopicName);
CreateTopicResult result = snsClient.createTopic(request);
snsTopicARN = result.getTopicArn();
SubscribeRequest request2 = new SubscribeRequest()
    .withTopicArn(snsTopicARN)
    .withEndpoint(sqsQueueARN)
    .withProtocol("sqs");
SubscribeResult result2 = snsClient.subscribe(request2);
snsSubscriptionARN = result2.getSubscriptionArn();
}

private static void setupSNS() {
    CreateTopicRequest request = new CreateTopicRequest()
        .withName(snsTopicName);
CreateTopicResult result = snsClient.createTopic(request);
snsTopicARN = result.getTopicArn();
SubscribeRequest request2 = new SubscribeRequest()
    .withTopicArn(snsTopicARN)
    .withEndpoint(sqsQueueARN)
    .withProtocol("sqs");
SubscribeResult result2 = snsClient.subscribe(request2);
snsSubscriptionARN = result2.getSubscriptionArn();
}

private static String initiateJobRequest() {
    JobParameters jobParameters = new JobParameters()
        .withType("archive-retrieval")
        .withArchiveId(archiveId)
        .withSNSTopic(snsTopicARN);
InitiateJobRequest request = new InitiateJobRequest()
    .withVaultName(vaultName)
    .withJobParameters(jobParameters);
InitiateJobResult response = client.initiateJob(request);
    return response.getJobId();
}

private static long waitForJobToComplete(String jobId, String sqsQueueUrl) throws
InterruptedException, JsonParseException, IOException {
    Boolean messageFound = false;
    Boolean jobSuccessful = false;
    long archiveSizeInBytes = -1;
    ObjectMapper mapper = new ObjectMapper();
    JsonFactory factory = mapper.getFactory();
    while (!messageFound) {
        List<Message> msgs = sqsClient.receiveMessage(
            new ReceiveMessageRequest(sqsQueueUrl).withMaxNumberOfMessages(10)).getMessages();
        if (msgs.size() > 0) {
            for (Message m : msgs) {
                JsonParser jpMessage = factory.createJsonParser(m.getBody());
                JsonNode jobMessageNode = mapper.readTree(jpMessage);
                String jobMessage = jobMessageNode.get("Message").textValue();
                JsonParser jpDesc = factory.createJsonParser(jobMessage);
                JsonNode jobDescNode = mapper.readTree(jpDesc);
                String retrievedJobId = jobDescNode.get("JobId").textValue();
                String statusCode = jobDescNode.get("StatusCode").textValue();
                archiveSizeInBytes = jobDescNode.get("ArchiveSizeInBytes").longValue();
                if (retrievedJobId.equals(jobId)) {
                    messageFound = true;
                    if (statusCode.equals("Succeeded")) {
                        jobSuccessful = true;
                        return archiveSizeInBytes;
                    }
                }
            }
        }
    }
}
jobSuccessful = true;
}
}
}
else {
    Thread.sleep(sleepTime * 1000);
}
return (messageFound && jobSuccessful) ? archiveSizeInBytes : -1;
}

private static void downloadJobOutput(String jobId, long archiveSizeInBytes) throws IOException {
    if (archiveSizeInBytes < 0) {
        System.err.println("Nothing to download.");
        return;
    }
    System.out.println("archiveSizeInBytes: " + archiveSizeInBytes);
    FileOutputStream fstream = new FileOutputStream(fileName);
    long startRange = 0;
    long endRange = (downloadChunkSize > archiveSizeInBytes) ? archiveSizeInBytes - 1 : downloadChunkSize - 1;
    do {
        GetJobOutputRequest getJobOutputRequest = new GetJobOutputRequest()
            .withVaultName(vaultName)
            .withRange("bytes=\" + startRange + \" -\" + endRange)
            .withJobId(jobId);
        GetJobOutputResult getJobOutputResult =
            client.getJobOutput(getJobOutputRequest);
        BufferedInputStream is = new BufferedInputStream(getJobOutputResult.getBody());
        byte[] buffer = new byte[(int)(endRange - startRange + 1)];
        System.out.println("Checksum received: " + getJobOutputResult.getChecksum());
        System.out.println("Content range " + getJobOutputResult.getContentRange());
        int totalRead = 0;
        while (totalRead < buffer.length) {
            int bytesRemaining = buffer.length - totalRead;
            int read = is.read(buffer, totalRead, bytesRemaining);
            if (read > 0) {
                totalRead = totalRead + read;
            } else {
                break;
            }
        }
        System.out.println("Calculated checksum: " +
            TreeHashGenerator.calculateTreeHash(new ByteArrayInputStream(buffer)));
        System.out.println("read = " + totalRead);
        fstream.write(buffer);
        startRange = startRange + (long)totalRead;
        endRange = ((endRange + downloadChunkSize) > archiveSizeInBytes) ?
            archiveSizeInBytes : (endRange + downloadChunkSize);
        is.close();
    } while (endRange <= archiveSizeInBytes && startRange < archiveSizeInBytes);
    fstream.close();
Downloading an Archive Using the AWS SDK for .NET

Both the high-level and low-level APIs (p. 106) provided by the AWS SDK for .NET provide a method to download an archive.

Topics
- Downloading an Archive Using the High-Level API of the AWS SDK for .NET (p. 90)
- Downloading an Archive Using the Low-Level API of the AWS SDK for .NET (p. 91)

Downloading an Archive Using the High-Level API of the AWS SDK for .NET

The ArchiveTransferManager class of the high-level API provides the Download method you can use to download an archive.

Important
The ArchiveTransferManager class creates an Amazon Simple Notification Service (Amazon SNS) topic, and an Amazon Simple Queue Service (Amazon SQS) queue that is subscribed to that topic. It then initiates the archive retrieval job and polls the queue for the archive to be available. When the archive is available, download begins. For information about retrieval times, see Archive Retrieval Options (p. 76)

Example: Downloading an Archive Using the High-Level API of the AWS SDK for .NET

The following C# code example downloads an archive from a vault (examplevault) in the US West (Oregon) Region.

For step-by-step instructions on how to run this example, see Running Code Examples (p. 111). You need to update the code as shown with an existing archive ID and the local file path where you want to save the downloaded archive.

```csharp
using System;
using Amazon.Glacier;
using Amazon.Glacier.Transfer;
using Amazon.Runtime;

namespace glacier.amazon.com.docexamples
{
    class ArchiveDownloadHighLevel
    {
        static string vaultName = "examplevault";
        static string archiveId = "*** Provide archive ID ***";
        static string downloadFilePath = "*** Provide the file name and path to where to store the download ***";
```
```csharp
public static void Main(string[] args)
{
    try
    {
        var manager = new ArchiveTransferManager(Amazon.RegionEndpoint.USWest2);

        var options = new DownloadOptions();
        options.StreamTransferProgress += ArchiveDownloadHighLevel.progress;
        // Download an archive.
        Console.WriteLine("Initiating the archive retrieval job and then polling SQS queue for the archive to be available.");
        Console.WriteLine("Once the archive is available, downloading will begin.");
        manager.Download(vaultName, archiveId, downloadFilePath, options);
        Console.WriteLine("To continue, press Enter");
        Console.ReadKey();
    }
    catch (AmazonGlacierException e) { Console.WriteLine(e.Message); }
    catch (AmazonServiceException e) { Console.WriteLine(e.Message); }
    catch (Exception e) { Console.WriteLine(e.Message); }
    Console.WriteLine("To continue, press Enter");
    Console.ReadKey();
}

class Program
{
    static int currentPercentage = -1;
    static void progress(object sender, StreamTransferProgressArgs args)
    {
        if (args.PercentDone != currentPercentage)
        {
            currentPercentage = args.PercentDone;
            Console.WriteLine("Downloaded {0}%", args.PercentDone);
        }
    }
}
```

---

**Downloading an Archive Using the Low-Level API of the AWS SDK for .NET**

The following are the steps for downloading an Amazon S3 Glacier (Glacier) archive using the low-level API of the AWS SDK for .NET.

1. Create an instance of the AmazonGlacierClient class (the client).

   You need to specify an AWS region from where you want to download the archive. All operations you perform using this client apply to that region.

2. Initiate an archive-retrieval job by executing the InitiateJob method.

   You provide job information, such as the archive ID of the archive you want to download and the optional Amazon SNS topic to which you want Glacier to post a job completion message, by creating an instance of the InitiateJobRequest class. Glacier returns a job ID in response. The response is available in an instance of the InitiateJobResponse class.

```csharp
AmazonGlacierClient client;
client = new AmazonGlacierClient(Amazon.RegionEndpoint.USWest2);

InitiateJobRequest initJobRequest = new InitiateJobRequest()
{
    VaultName = vaultName,
    JobParameters = new JobParameters()
}
Type = "archive-retrieval",
ArchiveId = "*** Provide archive id ***",
SNSTopic = "*** Provide Amazon SNS topic ARN ***",
};

InitiateJobResponse initJobResponse = client.InitiateJob(initJobRequest);
string jobId = initJobResponse.JobId;

You can optionally specify a byte range to request Glacier to prepare only a portion of the archive as shown in the following request. The request specifies Glacier to prepare only the 1 MB to 2 MB portion of the archive.

AmazonGlacierClient client;
client = new AmazonGlacierClient(Amazon.RegionEndpoint.USWest2);

InitiateJobRequest initJobRequest = new InitiateJobRequest()
{
    VaultName = vaultName,
    JobParameters = new JobParameters()
    {
        Type = "archive-retrieval",
        ArchiveId = "*** Provide archive id ***",
        SNSTopic = "*** Provide Amazon SNS topic ARN ***",
    }
};

// Specify byte range.
int ONE_MEG = 1048576;
initJobRequest.JobParameters.RetrievalByteRange = string.Format("{0}-{1}", ONE_MEG, 2 * ONE_MEG -1);

InitiateJobResponse initJobResponse = client.InitiateJob(initJobRequest);
string jobId = initJobResponse.JobId;

3. Wait for the job to complete.

You must wait until the job output is ready for you to download. If you have either set a notification configuration on the vault identifying an Amazon Simple Notification Service (Amazon SNS) topic or specified an Amazon SNS topic when you initiated a job, Glacier sends a message to that topic after it completes the job. The code example given in the following section uses Amazon SNS for Glacier to publish a message.

You can also poll Glacier by calling the DescribeJob method to determine the job completion status. Although, using an Amazon SNS topic for notification is the recommended approach.

4. Download the job output (archive data) by executing the GetJobOutput method.

You provide the request information such as the job ID and vault name by creating an instance of the GetJobOutputRequest class. The output that Glacier returns is available in the GetJobOutputResponse object.

GetJobOutputRequest getJobOutputRequest = new GetJobOutputRequest()
{
    JobId = jobId,
    VaultName = vaultName
};

GetJobOutputResponse getJobOutputResponse = client.GetJobOutput(getJobOutputRequest);
using (Stream webStream = getJobOutputResponse.Body)
{
    using (Stream fileToSave = File.OpenWrite(fileName))
The preceding code snippet downloads the entire job output. You can optionally retrieve only a portion of the output, or download the entire output in smaller chunks by specifying the byte range in your `GetJobOutputRequest`.

```csharp
GetJobOutputRequest getJobOutputRequest = new GetJobOutputRequest()
{
    JobId = jobId,
    VaultName = vaultName,
};
getJobOutputRequest.SetRange(0, 1048575); // Download only the first 1 MB chunk of the output.
```

In response to your `GetJobOutput` call, Glacier returns the checksum of the portion of the data you downloaded, if certain conditions are met. For more information, see Receiving Checksums When Downloading Data (p. 165).

To verify there are no errors in the download, you can then compute the checksum on the client-side and compare it with the checksum Glacier sent in the response.

For an archive retrieval job with the optional range specified, when you get the job description, it includes the checksum of the range you are retrieving (SHA256TreeHash). You can use this value to further verify the accuracy of the entire byte range that you later download. For example, if you initiate a job to retrieve a tree-hash aligned archive range and then download output in chunks such that each of your `GetJobOutput` requests return a checksum, then you can compute checksum of each portion you download on the client-side and then compute the tree hash. You can compare it with the checksum Glacier returns in response to your describe job request to verify that the entire byte range you have downloaded is the same as the byte range that is stored in Glacier.

For a working example, see Example 2: Retrieving an Archive Using the Low-Level API of the AWS SDK for .NET—Download Output in Chunks (p. 97).

**Example 1: Retrieving an Archive Using the Low-Level API of the AWS SDK for .NET**

The following C# code example downloads an archive from the specified vault. After the job completes, the example downloads the entire output in a single `GetJobOutput` call. For an example of downloading output in chunks, see Example 2: Retrieving an Archive Using the Low-Level API of the AWS SDK for .NET—Download Output in Chunks (p. 97).

The example performs the following tasks:

- Sets up an Amazon Simple Notification Service (Amazon SNS) topic
  - Glacier sends a notification to this topic after it completes the job.
- Sets up an Amazon Simple Queue Service (Amazon SQS) queue.
  - The example attaches a policy to the queue to enable the Amazon SNS topic to post messages.
- Initiates a job to download the specified archive.
- In the job request, the example specifies the Amazon SNS topic so that Glacier can send a message after it completes the job.
- Periodically checks the Amazon SQS queue for a message.
If there is a message, parse the JSON and check if the job completed successfully. If it did, download the archive. The code example uses the JSON.NET library (see JSON.NET) to parse the JSON.

- Cleans up by deleting the Amazon SNS topic and the Amazon SQS queue it created.

```csharp
using System;
using System.Collections.Generic;
using System.IO;
using System.Threading;
using Amazon.Glacier;
using Amazon.Glacier.Model;
using Amazon.Runtime;
using Amazon.SimpleNotificationService;
using Amazon.SimpleNotificationService.Model;
using Amazon.SQS;
using Amazon.SQS.Model;
using Newtonsoft.Json;

namespace glacier.amazon.com.docsamples
{
    class ArchiveDownloadLowLevelUsingSNSSQS
    {
        static string topicArn;
        static string queueUrl;
        static string queueArn;
        static string vaultName = "*** Provide vault name ***";
        static string archiveID = "*** Provide archive ID ***";
        static string fileName = "*** Provide the file name and path to where to store downloaded archive ***";
        static AmazonSimpleNotificationServiceClient snsClient;
        static AmazonSQSClient sqsClient;
        const string SQS_POLICY = "{
            "Version" : "2012-10-17",
            "Statement" : [
                {
                    "Sid" : "sns-rule",
                    "Effect" : "Allow",
                    "Principal" : {"AWS" : "arn:aws:iam::123456789012:root" },
                    "Action" : "sqs:SendMessage",
                    "Resource" : "{QuernArn}",
                    "Condition" : {
                        "ArnLike" : {"aws:SourceArn" : "{TopicArn}"}
                    }
                }
            ]
        }";

        public static void Main(string[] args)
        {
            AmazonGlacierClient client;
            try
            {
                using (client = new AmazonGlacierClient(Amazon.RegionEndpoint.USWest2))
                {
                    Console.WriteLine("Setup SNS topic and SQS queue.");
                    SetupTopicAndQueue();
                    Console.WriteLine("To continue, press Enter");
                    Console.ReadKey();
                    RetrieveArchive(client);
                }
            }
        }
    }
}
```
```csharp
Console.WriteLine("Operations successful. To continue, press Enter");
Console.ReadKey();
}
catch (AmazonGlacierException e) { Console.WriteLine(e.Message); }
catch (AmazonServiceException e) { Console.WriteLine(e.Message); }
catch (Exception e) { Console.WriteLine(e.Message); }
finally
{
    // Delete SNS topic and SQS queue.
    snsClient.DeleteTopic(new DeleteTopicRequest() { TopicArn = topicArn });
    sqsClient.DeleteQueue(new DeleteQueueRequest() { QueueUrl = queueUrl });
}
}

static void SetupTopicAndQueue()
{
    snsClient = new AmazonSimpleNotificationServiceClient(Amazon.RegionEndpoint.USWest2);
    sqsClient = new AmazonSQSClient(Amazon.RegionEndpoint.USWest2);
    long ticks = DateTime.Now.Ticks;
    topicArn = snsClient.CreateTopic(new CreateTopicRequest { Name = "GlacierDownload-" + ticks }).TopicArn;
    Console.Write("topicArn: "); Console.WriteLine(topicArn);
    CreateQueueRequest createQueueRequest = new CreateQueueRequest();
    createQueueRequest.QueueName = "GlacierDownload-" + ticks;
    CreateQueueResponse createQueueResponse = sqsClient.CreateQueue(createQueueRequest);
    queueUrl = createQueueResponse.QueueUrl;
    Console.Write("QueueURL: "); Console.WriteLine(queueUrl);
    GetQueueAttributesRequest getQueueAttributesRequest = new GetQueueAttributesRequest();
    getQueueAttributesRequest.AttributeNames = new List<string> { "QueueArn" };//
    getQueueAttributesRequest.QueueUrl = queueUrl;
    GetQueueAttributesResponse response = sqsClient.GetQueueAttributes(getQueueAttributesRequest);
    queueArn = response.QueueARN;
    Console.Write("QueueArn: "); Console.WriteLine(queueArn);
    // Setup the Amazon SNS topic to publish to the SQS queue.
    snsClient.Subscribe(new SubscribeRequest()
    {
        Protocol = "sqs",
        Endpoint = queueArn,
        TopicArn = topicArn
    });
    // Add policy to the queue so SNS can send messages to the queue.
    var policy = SQS_POLICY.Replace("{TopicArn}", topicArn).Replace("{QueueArn}", queueArn);
    sqsClient.SetQueueAttributes(new SetQueueAttributesRequest()
    {
        QueueUrl = queueUrl,
        Attributes = new Dictionary<string, string>
        {
            { QueueAttributeName.Policy, policy }
        }
    });
}

static void RetrieveArchive(AmazonGlacierClient client)
{
    // Initiate job.
    InitiateJobRequest initJobRequest = new InitiateJobRequest()
    {
```
VaultName = vaultName,
JobParameters = new JobParameters()
{
    Type = "archive-retrieval",
    ArchiveId = archiveID,
    Description = "This job is to download archive.",
    SNSTopic = topicArn,
};
InitiateJobResponse initJobResponse = client.InitiateJob(initJobRequest);
string jobId = initJobResponse.JobId;

// Check queue for a message and if job completed successfully, download archive.
ProcessQueue(jobId, client);

private static void ProcessQueue(string jobId, AmazonGlacierClient client)
{
    ReceiveMessageRequest receiveMessageRequest = new ReceiveMessageRequest() { QueueUrl = queueUrl, MaxNumberOfMessages = 1 }; 
    bool jobDone = false;
    while (!jobDone)
    {
        Console.WriteLine("Poll SQS queue");
        ReceiveMessageResponse receiveMessageResponse = sqsClient.ReceiveMessage(receiveMessageRequest);
        if (receiveMessageResponse.Messages.Count == 0)
        {
            Thread.Sleep(10000 * 60);
            continue;
        }
        Console.WriteLine("Got message");
        Message message = receiveMessageResponse.Messages[0];
        Dictionary<string, string> outerLayer = JsonConvert.DeserializeObject<Dictionary<string, string>>(message.Body);
        string statusCode = fields["StatusCode"] as string;
        if (string.Equals(statusCode, GlacierUtils.JOB_STATUS_SUCCEEDED, StringComparison.InvariantCultureIgnoreCase))
        {
            Console.WriteLine("Downloading job output");
            DownloadOutput(jobId, client); // Save job output to the specified file location.
            jobDone = true;
            sqsClient.DeleteMessage(new DeleteMessageRequest() { QueueUrl = queueUrl, ReceiptHandle = message.ReceiptHandle });
        }
        else if (string.Equals(statusCode, GlacierUtils.JOB_STATUS_FAILED, StringComparison.InvariantCultureIgnoreCase))
        {
            Console.WriteLine("Job failed... cannot download the archive.");
            jobDone = true;
            sqsClient.DeleteMessage(new DeleteMessageRequest() { QueueUrl = queueUrl, ReceiptHandle = message.ReceiptHandle });
        }
    }
}

private static void DownloadOutput(string jobId, AmazonGlacierClient client)
{
    GetJobOutputRequest getJobOutputRequest = new GetJobOutputRequest()
    {
        JobId = jobId,
        VaultName = vaultName
    };
    GetJobOutputResponse getJobOutputResponse = client.GetJobOutput(getJobOutputRequest);
    using (Stream webStream = getJobOutputResponse.Body)
using (Stream fileToSave = File.OpenWrite(fileName))
{
    CopyStream(webStream, fileToSave);
}
}

public static void CopyStream(Stream input, Stream output)
{
    byte[] buffer = new byte[65536];
    int length;
    while ((length = input.Read(buffer, 0, buffer.Length)) > 0)
    {
        output.Write(buffer, 0, length);
    }
}

Example 2: Retrieving an Archive Using the Low-Level API of the AWS SDK for .NET—Download Output in Chunks

The following C# code example retrieves an archive from Glacier. The code example downloads the job output in chunks by specifying the byte range in a GetJobOutputRequest object.

```csharp
using System;
using System.Collections.Generic;
using System.IO;
using System.Threading;
using Amazon.Glacier;
using Amazon.Glacier.Model;
using Amazon.Glacier.Transfer;
using Amazon.Runtime;
using Amazon.SimpleNotificationService;
using Amazon.SimpleNotificationService.Model;
using Amazon.SQS;
using Amazon.SQS.Model;
using Newtonsoft.Json;
using System.Collections.Specialized;
namespace glacier.amazon.com.docsamples
{
    class ArchiveDownloadLowLevelUsingSQLSNSOutputUsingRange
    {
        static string topicArn;
        static string queueUrl;
        static string queueArn;
        static string vaultName = "*** Provide vault name ***";
        static string archiveId = "*** Provide archive ID ***";
        static string fileName = "*** Provide the file name and path to where to store downloaded archive ***";
        static AmazonSimpleNotificationServiceClient snsClient;
        static AmazonSQSClient sqsClient;
        const string SQS_POLICY = 
            "{" + 
            "   " + 
            "   \Version" : "2012-10-17"," + 
            "   " + 
            "   \Statement" : [" + 
            "   " + 
            "   \Sid" : "sns-rule"," + 
            "   " + 
            "   \Effect" : "Allow"," + 
            "   " + 
            "   \Principal" : {"AWS" : "arn:aws:iam::123456789012:root" }," + 
            "   " + 
            "   \Action" : "sqs:SendMessage"," + 
            "   " + 
            "   \Resource" : "{QuernArn}" ," + 
            "   " + 
            "   \Condition" : "{ + 
```
public static void Main(string[] args)
{
    AmazonGlacierClient client;
    try
    {
        using (client = new AmazonGlacierClient(Amazon.RegionEndpoint.USWest2))
        {
            Console.WriteLine("Setup SNS topic and SQS queue.");
            SetupTopicAndQueue();
            Console.WriteLine("To continue, press Enter"); Console.ReadKey();
            Console.WriteLine("Download archive");
            DownloadAnArchive(archiveId, client);
        }
        Console.WriteLine("Operations successful. To continue, press Enter");
        Console.ReadKey();
    }
    catch (AmazonGlacierException e) { Console.WriteLine(e.Message); }
    catch (AmazonServiceException e) { Console.WriteLine(e.Message); }
    catch (Exception e) { Console.WriteLine(e.Message); }
    finally
    {
        // Delete SNS topic and SQS queue.
        snsClient.DeleteTopic(new DeleteTopicRequest() { TopicArn = topicArn });
        sqsClient.DeleteQueue(new DeleteQueueRequest() { QueueUrl = queueUrl });
    }
}

static void SetupTopicAndQueue()
{
    long ticks = DateTime.Now.Ticks;
    // Setup SNS topic.
    snsClient = new AmazonSimpleNotificationServiceClient(Amazon.RegionEndpoint.USWest2);
    sqsClient = new AmazonSQSClient(Amazon.RegionEndpoint.USWest2);
    topicArn = snsClient.CreateTopic(new CreateTopicRequest { Name = "GlacierDownload-" + ticks }).TopicArn;
    Console.WriteLine("topicArn: "); Console.WriteLine(topicArn);
    CreateQueueRequest createQueueRequest = new CreateQueueRequest();
    createQueueRequest.QueueName = "GlacierDownload-" + ticks;
    CreateQueueResponse createQueueResponse = sqsClient.CreateQueue(createQueueRequest);
    queueUrl = createQueueResponse.QueueUrl;
    Console.WriteLine("QueueURL: "); Console.WriteLine(queueUrl);
    GetQueueAttributesRequest getQueueAttributesRequest = new GetQueueAttributesRequest();
    getQueueAttributesRequest.QueueArn = "QueueArn";
    GetQueueAttributesResponse response = sqsClient.GetQueueAttributes(getQueueAttributesRequest);
    queueArn = response.QueueArn;
    Console.WriteLine("QueueArn: "); Console.WriteLine(queueArn);
    // Setup the Amazon SNS topic to publish to the SQS queue.
    snsClient.Subscribe(new SubscribeRequest())
}
```csharp
{
    Protocol = "sqs",
    Endpoint = queueArn,
    TopicArn = topicArn
});

// Add the policy to the queue so SNS can send messages to the queue.
var policy = SQS_POLICY.Replace("{TopicArn}", topicArn).Replace("{QueueArn}", queueArn);

sqsClient.SetQueueAttributes(new SetQueueAttributesRequest()
{
    QueueUrl = queueUrl,
    Attributes = new Dictionary<string, string>
    {
        { QueueAttributeName.Policy, policy }
    }
});

static void DownloadAnArchive(string archiveId, AmazonGlacierClient client)
{
    // Initiate job.
    InitiateJobRequest initJobRequest = new InitiateJobRequest()
    {
        VaultName = vaultName,
        JobParameters = new JobParameters()
        {
            Type = "archive-retrieval",
            ArchiveId = archiveId,
            Description = "This job is to download the archive.",
            SNSTopic = topicArn,
        }
    };
    InitiateJobResponse initJobResponse = client.InitiateJob(initJobRequest);
    string jobId = initJobResponse.JobId;

    // Check queue for a message and if job completed successfully, download archive.
    ProcessQueue(jobId, client);
}

private static void ProcessQueue(string jobId, AmazonGlacierClient client)
{
    var receiveMessageRequest = new ReceiveMessageRequest() { QueueUrl = queueUrl,
MaxNumberOfMessages = 1 };;
    bool jobDone = false;
    while (!jobDone)
    {
        Console.WriteLine("Poll SQS queue");
        ReceiveMessageResponse receiveMessageResponse = sqsClient.ReceiveMessage(receiveMessageRequest);
        if (receiveMessageResponse.Messages.Count == 0)
        {
            Thread.Sleep(10000 * 60);
            continue;
        }
        Console.WriteLine("Got message");
        Message message = receiveMessageResponse.Messages[0];
        Dictionary<string, string> outerLayer = JsonConvert.DeserializeObject<Dictionary<string, string>>(message.Body);
        string statusCode = fields["StatusCode"] as string;
        if (string.Equals(statusCode, GlacierUtils.JOB_STATUS_SUCCEEDED, StringComparison.InvariantCultureIgnoreCase))
```

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long archiveSize = Convert.ToInt64(fields["ArchiveSizeInBytes"]);  
Console.WriteLine("Downloading job output");  
DownloadOutput(jobId, archiveSize, client); // This where we save job output to the specified file location. 
}  
else if (string.Equals(statusCode, GlacierUtils.JOB_STATUS_FAILED, StringComparison.InvariantCultureIgnoreCase))  
Console.WriteLine("Job failed... cannot download the archive.");  
jobDone = true;  
sqsClient.DeleteMessage(new DeleteMessageRequest() { QueueUrl = queueUrl, ReceiptHandle = message.ReceiptHandle });
}  
}

private static void DownloadOutput(string jobId, long archiveSize, AmazonGlacierClient client)  
{  
long partSize = 4 * (long)Math.Pow(2, 20); // 4 MB.  
using (Stream fileToSave = new FileStream(fileName, FileMode.Create, FileAccess.Write))  
{
long currentPosition = 0;  
do  
{
   GetJobOutputRequest getJobOutputRequest = new GetJobOutputRequest()  
   {  
      JobId = jobId,  
      VaultName = vaultName  
   };  
   long endPosition = currentPosition + partSize - 1;  
   if (endPosition > archiveSize)  
      endPosition = archiveSize;  
   getJobOutputRequest.SetRange(currentPosition, endPosition);  
   GetJobOutputResponse getJobOutputResponse = client.GetJobOutput(getJobOutputRequest);  
   using (Stream webStream = getJobOutputResponse.Body)  
   {
      CopyStream(webStream, fileToSave);  
   }  
   currentPosition += partSize;  
}  
while (currentPosition < archiveSize);  
}  
}

public static void CopyStream(Stream input, Stream output)  
{  
byte[] buffer = new byte[65536];  
int length;  
while ((length = input.Read(buffer, 0, buffer.Length)) > 0)  
{  
   output.Write(buffer, 0, length);  
}  
}  
}  

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Downloading an Archive Using the REST API

To download an archive using the REST API

Downloading an archive is a two-step process.

1. Initiate a job of the archive-retrieval type. For more information, see Initiate Job (POST jobs) (p. 251).
2. After the job completes, download the archive data. For more information, see Get Job Output (GET output) (p. 245).

Deleting an Archive in Amazon S3 Glacier

You cannot delete an archive using the Amazon S3 Glacier (Glacier) management console. To delete an archive you must use the AWS Command Line Interface (CLI) or write code to make a delete request using either the REST API directly or the AWS SDK for Java and .NET wrapper libraries. For information on using the CLI with Glacier, see AWS CLI Reference for Glacier. The following topics explain how to use the AWS SDK for Java and .NET wrapper libraries, and the REST API.

Topics
- Deleting an Archive in Amazon S3 Glacier Using the AWS SDK for Java (p. 101)
- Deleting an Archive in Amazon S3 Glacier Using the AWS SDK for .NET (p. 103)
- Deleting an Amazon S3 Glacier Archive Using the REST API (p. 105)

You can delete one archive at a time from a vault. To delete the archive you must provide its archive ID in your delete request. You can get the archive ID by downloading the vault inventory for the vault that contains the archive. For more information about downloading the vault inventory, see Downloading a Vault Inventory in Amazon S3 Glacier (p. 33).

After you delete an archive, you might still be able to make a successful request to initiate a job to retrieve the deleted archive, but the archive retrieval job will fail.

Archive retrievals that are in progress for an archive ID when you delete the archive might or might not succeed according to the following scenarios:

- If the archive retrieval job is actively preparing the data for download when Glacier receives the delete archive request, then the archival retrieval operation might fail.
- If the archive retrieval job has successfully prepared the archive for download when Glacier receives the delete archive request, then you will be able to download the output.

For more information about archive retrieval, see Downloading an Archive in Amazon S3 Glacier (p. 75).

This operation is idempotent. Deleting an already-deleted archive does not result in an error.

After you delete an archive, if you immediately download the vault inventory, it might include the deleted archive in the list because Glacier prepares vault inventory only about once a day.

Deleting an Archive in Amazon S3 Glacier Using the AWS SDK for Java

The following are the steps to delete an archive using the AWS SDK for Java low-level API.
1. Create an instance of the AmazonGlacierClient class (the client).
   You need to specify an AWS region where the archive you want to delete is stored. All operations you perform using this client apply to that region.

2. Provide request information by creating an instance of the DeleteArchiveRequest class.
   You need to provide an archive ID, a vault name, and your account ID. If you don't provide an account ID, then account ID associated with the credentials you provide to sign the request is assumed. For more information, see Using the AWS SDK for Java with Amazon S3 Glacier (p. 107).

3. Execute the deleteArchive method by providing the request object as a parameter.

The following Java code snippet illustrates the preceding steps.

```java
AmazonGlacierClient client;
DeleteArchiveRequest request = new DeleteArchiveRequest()
    .withVaultName("*** provide a vault name ***")
    .withArchiveId("*** provide an archive ID ***");
client.deleteArchive(request);
```

**Note**
For information about the underlying REST API, see Delete Archive (DELETE archive) (p. 210).

### Example: Deleting an Archive Using the AWS SDK for Java

The following Java code example uses the AWS SDK for Java to delete an archive. For step-by-step instructions on how to run this example, see Running Java Examples for Amazon S3 Glacier Using Eclipse (p. 109). You need to update the code as shown with a vault name and the archive ID of the archive you want to delete.

**Example**

```java
import java.io.IOException;
import com.amazonaws.auth.profile.ProfileCredentialsProvider;
import com.amazonaws.services.glacier.AmazonGlacierClient;
import com.amazonaws.services.glacier.model.DeleteArchiveRequest;

public class ArchiveDelete {
    public static String vaultName = "*** provide vault name ****";
    public static String archiveId = "*** provide archive ID ***";
    public static AmazonGlacierClient client;

    public static void main(String[] args) throws IOException {
        ProfileCredentialsProvider credentials = new ProfileCredentialsProvider();
        client = new AmazonGlacierClient(credentials);
        client.setEndpoint("https://glacier.us-east-1.amazonaws.com/");
        try {

            // Delete the archive.
            client.deleteArchive(new DeleteArchiveRequest()
                .withVaultName(vaultName)
                .withArchiveId(archiveId));

            System.out.println("Deleted archive successfully.");
        } catch (IOException e) {
            System.out.println("Failed to delete archive.");
        }
    }
}
```
Deleting an Archive in Amazon S3 Glacier Using the AWS SDK for .NET

Both the high-level and low-level APIs (p. 106) provided by the AWS SDK for .NET provide a method to delete an archive.

Topics
- Deleting an Archive Using the High-Level API of the AWS SDK for .NET (p. 103)
- Deleting an Archive Using the Low-Level API AWS SDK for .NET (p. 104)

Deleting an Archive Using the High-Level API of the AWS SDK for .NET

The `ArchiveTransferManager` class of the high-level API provides the `DeleteArchive` method you can use to delete an archive.

Example: Deleting an Archive Using the High-Level API of the AWS SDK for .NET

The following C# code example uses the high-level API of the AWS SDK for .NET to delete an archive. For step-by-step instructions on how to run this example, see Running Code Examples (p. 111). You need to update the code as shown with the archive ID of the archive you want to delete.

Example

```csharp
using System;
using Amazon.Glacier;
using Amazon.Glacier.Transfer;
using Amazon.Runtime;
namespace glacier.amazon.com.docsamples
{
    class ArchiveDeleteHighLevel
    {
        static string vaultName = "examplevault";
        static string archiveId = "*** Provide archive ID ***";

        public static void Main(string[] args)
        {
            try
            {
                var manager = new ArchiveTransferManager(Amazon.RegionEndpoint.USWest2);
                manager.DeleteArchive(vaultName, archiveId);
                Console.ReadKey();
            }
            catch (AmazonGlacierException e) { Console.WriteLine(e.Message); }  
            catch (AmazonServiceException e) { Console.WriteLine(e.Message); }  
            catch (Exception e) { Console.WriteLine(e.Message); }  
            Console.WriteLine("To continue, press Enter");
        }
    }
}
```
Deleting an Archive Using the Low-Level API AWS SDK for .NET

The following are the steps to delete an using the AWS SDK for .NET.

1. Create an instance of the AmazonGlacierClient class (the client).

   You need to specify an AWS region where the archive you want to delete is stored. All operations you perform using this client apply to that region.

2. Provide request information by creating an instance of the DeleteArchiveRequest class.

   You need to provide an archive ID, a vault name, and your account ID. If you don't provide an account ID, then account ID associated with the credentials you provide to sign the request is assumed. For more information, see Using the AWS SDKs with Amazon S3 Glacier (p. 106).

3. Execute the DeleteArchive method by providing the request object as a parameter.

Example: Deleting an Archive Using the Low-Level API of the AWS SDK for .NET

The following C# example illustrates the preceding steps. The example uses the low-level API of the AWS SDK for .NET to delete an archive.

Note

For information about the underlying REST API, see Delete Archive (DELETE archive) (p. 210).

For step-by-step instructions on how to run this example, see Running Code Examples (p. 111). You need to update the code as shown with the archive ID of the archive you want to delete.

Example

```csharp
using System;
using Amazon.Glacier;
using Amazon.Glacier.Model;
using Amazon.Runtime;

namespace glacier.amazon.com.docsamples
{
    class ArchiveDeleteLowLevel
    {
        static string vaultName = "examplevault";
        static string archiveId = "*** Provide archive ID ***";

        public static void Main(string[] args)
        {
            AmazonGlacierClient client;
            try
            {
                using (client = new AmazonGlacierClient(Amazon.RegionEndpoint.USWest2))
                {
                    Console.WriteLine("Deleting the archive");
                    DeleteAnArchive(client);
                }
                Console.WriteLine("Operations successful. To continue, press Enter");
                Console.ReadKey();
            }
            catch (AmazonGlacierException e) { Console.WriteLine(e.Message); }
            catch (AmazonServiceException e) { Console.WriteLine(e.Message); }
        }
    }
}
```
catch (Exception e) { Console.WriteLine(e.Message); }
Console.WriteLine("To continue, press Enter");
Console.ReadKey();
}

static void DeleteAnArchive(AmazonGlacierClient client)
{
    DeleteArchiveRequest request = new DeleteArchiveRequest()
    {
        VaultName = vaultName,
        ArchiveId = archiveId
    };
    DeleteArchiveResponse response = client.DeleteArchive(request);
}

Deleting an Amazon S3 Glacier Archive Using the
REST API

You can use the Delete Archive API to delete an archive.

- For information about the Delete Archive API, see Delete Archive (DELETE archive) (p. 210).
- For information about using the REST API, see API Reference for Glacier (p. 150).

Querying an Archives in Amazon S3 Glacier

For information about querying Amazon S3 Glacier (Glacier) archives with SQL, see Querying Archives with Glacier Select (p. 138).
Using the AWS SDKs with Amazon S3 Glacier

Amazon Web Services provides SDKs for you to develop applications for Amazon S3 Glacier (Glacier). The SDK libraries wrap the underlying Glacier API, simplifying your programming tasks. For example, for each request sent to Glacier, you must include a signature to authenticate your requests. When you use the SDK libraries, you need to provide only your AWS security credentials in your code and the libraries compute the necessary signature and include it in the request sent to Glacier. The AWS SDKs provide libraries that map to the underlying REST API and provide objects that you can use to easily construct requests and process responses.

Topics
- **AWS SDKs that Support Glacier** (p. 106)
- **AWS SDK Libraries for Java and .NET** (p. 106)
- **Using the AWS SDK for Java with Amazon S3 Glacier** (p. 107)
- **Using the AWS SDK for .NET with Amazon S3 Glacier** (p. 110)

**AWS SDKs that Support Glacier**

Glacier is supported by the following AWS SDKs:

- AWS SDK for C++
- AWS SDK for Go
- AWS SDK for Java
- AWS SDK for JavaScript in Node.js
- AWS SDK for .NET
- AWS SDK for PHP
- AWS SDK for Python (Boto)
- AWS SDK for Ruby

You can find examples of working with Glacier using the Java and .NET SDKs throughout this developer guide. For libraries and sample code in all languages, see [Sample Code & Libraries](#).

The AWS Command Line Interface (AWS CLI) is a unified tool to manage your AWS services, including Glacier. For information about downloading the AWS CLI, see [AWS Command Line Interface](#). For a list of the Glacier CLI commands, see [AWS CLI Command Reference](#).

**AWS SDK Libraries for Java and .NET**

The AWS SDKs for Java and .NET offer high-level and low-level wrapper libraries.

**What Is the Low-Level API?**

The low-level wrapper libraries map closely the underlying REST API ([API Reference for Glacier](#)) supported by Glacier. For each Glacier REST operations, the low-level API provides a corresponding...
What Is the High-Level API?

To further simplify application development, these libraries offer a higher-level abstraction for some of the operations. For example,

- Uploading an archive—To upload an archive using the low-level API in addition to the file name and the vault name where you want to save the archive, you need to provide a checksum (SHA-256 tree hash) of the payload. However, the high-level API computes the checksum for you.

- Downloading an archive or vault inventory—To download an archive using the low-level API you first initiate a job, wait for the job to complete, and then get the job output. You need to write additional code to set up an Amazon Simple Notification Service (Amazon SNS) topic for Glacier to notify you when the job is complete. You also need some polling mechanism to check if a job completion message was posted to the topic. The high-level API provides a method to download an archive that takes care of all these steps. You only specify an archive ID and a folder path where you want to save the downloaded data.

For information about these SDK libraries, see Using the AWS SDK for Java with Amazon S3 Glacier (p. 107) and Using the AWS SDK for .NET with Amazon S3 Glacier (p. 110).

When to Use the High-Level and Low-Level API

In general, if the high-level API provides methods you need to perform an operation, you should use the high-level API because of the simplicity it provides. However, if the high-level API does not offer the functionality, you can use the low-level API. Additionally, the low-level API allows granular control of the operation such as retry logic in the event of a failure. For example, when uploading an archive the high-level API uses the file size to determine whether to upload the archive in a single operation or use the multipart upload API. The API also has built-in retry logic in case an upload fails. However, your application might need granular control over these decisions, in which case you can use the low-level API.

Using the AWS SDK for Java with Amazon S3 Glacier

The AWS SDK for Java provides both high-level and low-level APIs for Amazon S3 Glacier (Glacier) as described in Using the AWS SDKs with Amazon S3 Glacier (p. 106). For information about downloading the AWS SDK for Java, see AWS SDK for Java.

**Note**
The AWS SDK for Java provides thread-safe clients for accessing Glacier. As a best practice, your applications should create one client and reuse the client between threads.

**Topics**
- Using the Low-Level API (p. 108)
- Using the High-Level API (p. 108)
Using the Low-Level API

The low-level `AmazonGlacierClient` class provides all the methods that map to the underlying REST operations of Glacier (API Reference for Glacier). When calling any of these methods, you must create a corresponding request object and provide a response object in which the method can return the Glacier response to the operation.

For example, the `AmazonGlacierClient` class provides the `createVault` method to create a vault. This method maps to the underlying Create Vault REST operation (see Create Vault (PUT vault)). To use this method, you must create instances of the `CreateVaultResult` object that receives the Glacier response as shown in the following Java code snippet:

```java
AmazonGlacierClient client = new AmazonGlacierClient(credentials);
client.setEndpoint("https://glacier.us-west-2.amazonaws.com/");
CreateVaultRequest request = new CreateVaultRequest()
    .withAccountId("-")
    .withVaultName(vaultName);
CreateVaultResult result = client.createVault(createVaultRequest);
```

All the low-level samples in the guide use this pattern.

**Note**
The preceding code segment specifies `AccountID` when creating the request. However, when using the AWS SDK for Java, the `AccountId` in the request is optional, and therefore all the low-level examples in this guide don't set this value. The `AccountId` is the AWS Account ID. This value must match the AWS Account ID associated with the credentials used to sign the request. You can specify either the AWS Account ID or optionally a ",", in which case Glacier uses the AWS Account ID associated with the credentials used to sign the request. If you specify your Account ID, do not include hyphens in it. When using AWS SDK for Java, if you don't provide the account ID, the library sets the account ID to ",".

Using the High-Level API

To further simplify your application development, the AWS SDK for Java provides the `ArchiveTransferManager` class that implements a higher-level abstraction for some of the methods in the low-level API. It provides useful methods, such as the `upload` and `download` methods for archive operations.

For example, the following Java code snippet uses the `upload` high-level method to upload an archive.

```java
String vaultName = "examplevault";
String archiveToUpload = "c:/folder/exampleArchive.zip";
ArchiveTransferManager atm = new ArchiveTransferManager(client, credentials);
String archiveId = atm.upload(vaultName, "Tax 2012 documents", new File(archiveToUpload)).getArchiveId();
```

Note that any operations you perform apply to the region you specified when creating the `ArchiveTransferManager` object. If you don't specify any region, the AWS SDK for Java sets `us-east-1` as the default region.

All the high-level examples in this guide use this pattern.
Note
The high-level ArchiveTransferManager class can be constructed with an AmazonGlacierClient instance or an AWSCredentials instance.

Running Java Examples for Amazon S3 Glacier Using Eclipse

The easiest way to get started with the Java code examples is to install the latest AWS Toolkit for Eclipse. For information on installing or updating to the latest toolkit, go to http://aws.amazon.com/eclipse. The following tasks guide you through the creation and testing of the Java code examples provided in this section.

General Process of Creating Java Code Examples

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Create a default credentials profile for your AWS credentials as described in the AWS SDK for Java topic Providing AWS Credentials in the AWS SDK for Java.</td>
</tr>
<tr>
<td>2</td>
<td>Create a new AWS Java project in Eclipse. The project is pre-configured with the AWS SDK for Java.</td>
</tr>
<tr>
<td>3</td>
<td>Copy the code from the section you are reading to your project.</td>
</tr>
<tr>
<td>4</td>
<td>Update the code by providing any required data. For example, if uploading a file, provide the file path and the bucket name.</td>
</tr>
<tr>
<td>5</td>
<td>Run the code. Verify that the object is created by using the AWS Management Console. For more information about the AWS Management Console, go to <a href="http://aws.amazon.com/console/">http://aws.amazon.com/console/</a>.</td>
</tr>
</tbody>
</table>

Setting the Endpoint

By default, the AWS SDK for Java uses the endpoint https://glacier.us-east-1.amazonaws.com. You can set the endpoint explicitly as shown in the following Java code snippets.

The following snippet shows how to set the endpoint to the US West (Oregon) region (us-west-2) in the low-level API.

Example

```java
client = new AmazonGlacierClient(credentials);
client.setEndpoint("glacier.us-west-2.amazonaws.com");
```

The following snippet shows how to set the endpoint to the US West (Oregon) region in the high-level API.

```java
glacierClient = new AmazonGlacierClient(credentials);
sqsClient = new AmazonSQSClient(credentials);
snsClient = new AmazonSNSClient(credentials);
glacierClient.setEndpoint("glacier.us-west-2.amazonaws.com");
sqsClient.setEndpoint("sqs.us-west-2.amazonaws.com");
snsClient.setEndpoint("sns.us-west-2.amazonaws.com");

ArchiveTransferManager atm = new ArchiveTransferManager(glacierClient, sqsClient, snsClient);
```
Using the AWS SDK for .NET with Amazon S3 Glacier

The AWS SDK for .NET is available in AWSSDK.dll. For information about downloading the AWS SDK for .NET, go to Sample Code Libraries. As described in Using the AWS SDKs with Amazon S3 Glacier (p. 106), the AWS SDK for .NET provides both the high-level and low-level APIs.

Note
The low-level API and high-level API provide thread-safe clients for accessing Glacier. As a best practice, your applications should create one client and reuse the client between threads.

Topics
- Using the Low-Level API (p. 110)
- Using the High-Level API (p. 111)
- Running Code Examples (p. 111)
- Setting the Endpoint (p. 111)

Using the Low-Level API

The low-level AmazonGlacierClient class provides all the methods that map to the underlying REST operations of Amazon S3 Glacier (Glacier) (API Reference for Glacier (p. 150)). When calling any of these methods, you must create a corresponding request object and provide a response object in which the method can return a Glacier response to the operation.

For example, the AmazonGlacierClient class provides the CreateVault method to create a vault. This method maps to the underlying Create Vault REST operation (see Create Vault (PUT vault) (p. 174)). To use this method, you must create instances of the CreateVaultRequest and CreateVaultResponse classes to provide request information and receive a Glacier response as shown in the following C# code snippet:

```csharp
AmazonGlacierClient client;
client = new AmazonGlacierClient(Amazon.RegionEndpoint.USEast1);
CreateVaultRequest request = new CreateVaultRequest()
{
    AccountId = "-",
    VaultName = "*** Provide vault name ***"
};
CreateVaultResponse response = client.CreateVault(request);
```

All the low-level samples in the guide use this pattern.

Note
The preceding code segment specifies AccountId when creating the request. However, when using the AWS SDK for .NET, the AccountId in the request is optional, and therefore all the low-level examples in this guide don't set this value. The AccountId is the AWS Account ID. This value must match the AWS Account ID associated with the credentials used to sign the request. You can specify either the AWS Account ID or optionally a '-', in which case Glacier uses the AWS Account ID associated with the credentials used to sign the request. If you specify your
Account ID, do not include hyphens in it. When using AWS SDK for .NET, if you don't provide the account ID, the library sets the account ID to '-'.

Using the High-Level API

To further simplify your application development, the AWS SDK for .NET provides the ArchiveTransferManager class that implements a higher-level abstraction for some of the methods in the low-level API. It provides useful methods, such as Upload and Download, for the archive operations.

For example, the following C# code snippet uses the Upload high-level method to upload an archive.

```csharp
string vaultName = "examplevault";
string archiveToUpload = "c:\folder\exampleArchive.zip";

var manager = new ArchiveTransferManager(Amazon.RegionEndpoint.USEast1);
string archiveId = manager.Upload(vaultName, "archive description", archiveToUpload).ArchiveId;
```

Running Code Examples

The easiest way to get started with the .NET code examples is to install the AWS SDK for .NET. For more information, go to AWS SDK for .NET.

The following procedure outlines steps for you to test the code examples provided in this guide.

General Process of Creating .NET Code Examples (Using Visual Studio)

1. Create a credentials profile for your AWS credentials as described in the AWS SDK for .NET topic Configuring AWS Credentials.
2. Create a new Visual Studio project using the AWS Empty Project template.
3. Replace the code in the project file, Program.cs, with the code in the section you are reading.
4. Run the code. Verify that the object is created using the AWS Management Console. For more information about AWS Management Console, go to http://aws.amazon.com/console/.

Setting the Endpoint

By default, the AWS SDK for .NET sets the endpoint to the US West (Oregon) Region (https://glacier.us-west-2.amazonaws.com). You can set the endpoint to other regions as shown in the following C# snippets.

The following snippet shows how to set the endpoint to the US West (Oregon) region (us-west-2) in the low-level API.
Example

```java
AmazonGlacierClient client = new AmazonGlacierClient(Amazon.RegionEndpoint.USWest2);
```

The following snippet shows how to set the endpoint to the US West (Oregon) region in the high-level API.

```java
var manager = new ArchiveTransferManager(Amazon.RegionEndpoint.USWest2);
```

For a current list of supported regions and endpoints, see Accessing Amazon S3 Glacier (p. 5).
Security in Amazon S3 Glacier

Cloud security at AWS is the highest priority. As an AWS customer, you benefit from a data center and network architecture that are built to meet the requirements of the most security-sensitive organizations.

Security is a shared responsibility between AWS and you. The shared responsibility model describes this as security of the cloud and security in the cloud:

• **Security of the cloud** – AWS is responsible for protecting the infrastructure that runs AWS services in the AWS Cloud. AWS also provides you with services that you can use securely. The effectiveness of our security is regularly tested and verified by third-party auditors as part of the AWS compliance programs. To learn about the compliance programs that apply to Amazon S3 Glacier (Glacier), see AWS Services in Scope by Compliance Program.

• **Security in the cloud** – Your responsibility is determined by the AWS service that you use. You are also responsible for other factors including the sensitivity of your data, your organization’s requirements, and applicable laws and regulations.

This documentation will help you understand how to apply the shared responsibility model when using Glacier. The following topics show you how to configure Glacier to meet your security and compliance objectives. You'll also learn how to use other AWS services that can help you to monitor and secure your Glacier resources.

Topics

- Data Protection in Amazon S3 Glacier (p. 113)
- Identity and Access Management in Amazon S3 Glacier (p. 114)
- Logging and Monitoring in Amazon S3 Glacier (p. 134)
- Compliance Validation for Amazon S3 Glacier (p. 135)
- Resilience in Amazon S3 Glacier (p. 136)
- Infrastructure Security in Amazon S3 Glacier (p. 137)

Data Protection in Amazon S3 Glacier

Amazon S3 Glacier (Glacier) provides highly durable cloud storage for data archiving and long-term backup. Glacier is designed to deliver 99.999999999 percent durability and provides comprehensive security and compliance capabilities that can help you meet stringent regulatory requirements. Glacier redundantly stores data in multiple AWS Availability Zones (AZ) and on multiple devices within each AZ. To increase durability, Glacier synchronously stores your data across multiple AZs before confirming a successful upload.

For more information about the AWS global cloud infrastructure, see Global Infrastructure.

Topics

- Data Encryption (p. 114)
- Key Management (p. 114)
- Internetwork Traffic Privacy (p. 114)
Data Encryption

Data protection refers to protecting data while in-transit (as it travels to and from Amazon S3 Glacier) and at rest (while it is stored in AWS data centers). You can protect data in transit that is uploaded directly to Glacier using Secure Sockets Layer (SSL) or client-side encryption.

You can also access Glacier through Amazon Simple Storage Service (Amazon S3). Amazon S3 supports lifecycle configuration on an Amazon S3 bucket, which enables you to transition objects to the Amazon S3 GLACIER storage class for archival. Data in transit between Amazon S3 and Glacier via lifecycle policies is encrypted using SSL.

Data at rest stored in Glacier is automatically server-side encrypted using 256-bit Advanced Encryption Standard (AES-256) with keys maintained by AWS. If you prefer to manage your own keys, you can also use client-side encryption before storing data in Glacier.

Key Management

Server-side encryption addresses data encryption at rest—that is, Amazon S3 Glacier encrypts your data as it writes it to its data centers and decrypts it for you when you access it. As long as you authenticate your request and you have access permissions, there is no difference in the way you access encrypted or unencrypted data.

Data at rest stored in Glacier is automatically server-side encrypted using AES-256, using keys maintained by AWS. As an additional safeguard, AWS encrypts the key itself with a master key that we regularly rotate.

Internetwork Traffic Privacy

Access to Amazon S3 Glacier via the network is through AWS published APIs. Clients must support Transport Layer Security (TLS) 1.0. We recommend TLS 1.2 or later. Clients must also support cipher suites with Perfect Forward Secrecy (PFS), such as Ephemeral Diffie-Hellman (DHE) or Elliptic Curve Diffie-Hellman Ephemeral (ECDHE). Most modern systems such as Java 7 and later support these modes. Additionally, you must sign requests using an access key ID and a secret access key that are associated with an IAM principal, or you can use the AWS Security Token Service (AWS STS) to generate temporary security credentials to sign requests.

VPC Endpoints

A virtual private cloud (VPC) endpoint enables you to privately connect your VPC to supported AWS services and VPC endpoint services powered by AWS PrivateLink without requiring an internet gateway, NAT device, VPN connection, or AWS Direct Connect connection. Although Glacier does not support VPC endpoints directly, you can take advantage of Amazon Simple Storage Service (Amazon S3) VPC endpoints if you access Glacier as a storage tier integrated with Amazon S3.

For more information about Amazon S3 lifecycle configuration and transitioning objects to the GLACIER storage class, see Object Lifecycle Management and Transitioning Objects in the Amazon Simple Storage Service Developer Guide. For more information about VPC endpoints, see VPC Endpoints in the Amazon VPC User Guide.

Identity and Access Management in Amazon S3 Glacier

Access to Amazon S3 Glacier (Glacier) requires credentials that AWS can use to authenticate your requests. Those credentials must have permissions to access AWS resources, such as a Glacier vault or an
Amazon S3 bucket. The following sections provide details on how you can use AWS Identity and Access Management (IAM) and Glacier to help secure your resources by controlling who can access them:

- Authentication (p. 115)
- Access Control (p. 116)

## Authentication

You can access AWS as any of the following types of identities:

- **AWS account root user** – When you first create an AWS account, you begin with a single sign-in identity that has complete access to all AWS services and resources in the account. This identity is called the AWS account root user and is accessed by signing in with the email address and password that you used to create the account. We strongly recommend that you do not use the root user for your everyday tasks, even the administrative ones. Instead, adhere to the best practice of using the root user only to create your first IAM user. Then securely lock away the root user credentials and use them to perform only a few account and service management tasks.

- **IAM user** – An IAM user is an identity within your AWS account that has specific custom permissions (for example, permissions to create a vault in Glacier). You can use an IAM user name and password to sign in to secure AWS webpages like the AWS Management Console, AWS Discussion Forums, or the AWS Support Center.

In addition to a user name and password, you can also generate access keys for each user. You can use these keys when you access AWS services programmatically, either through one of the several SDKs or by using the AWS Command Line Interface (CLI). The SDK and CLI tools use the access keys to cryptographically sign your request. If you don’t use AWS tools, you must sign the request yourself. Glacier supports Signature Version 4, a protocol for authenticating inbound API requests. For more information about authenticating requests, see Signature Version 4 Signing Process in the AWS General Reference.

- **IAM role** – An IAM role is an IAM identity that you can create in your account that has specific permissions. An IAM role is similar to an IAM user in that it is an AWS identity with permissions policies that determine what the identity can and cannot do in AWS. However, instead of being uniquely associated with one person, a role is intended to be assumable by anyone who needs it. Also, a role does not have standard long-term credentials such as a password or access keys associated with it. Instead, when you assume a role, it provides you with temporary security credentials for your role session. IAM roles with temporary credentials are useful in the following situations:

- **Federated user access** – Instead of creating an IAM user, you can use existing identities from AWS Directory Service, your enterprise user directory, or a web identity provider. These are known as federated users. AWS assigns a role to a federated user when access is requested through an identity provider. For more information about federated users, see Federated Users and Roles in the IAM User Guide.

- **AWS service access** – A service role is an IAM role that a service assumes to perform actions in your account on your behalf. When you set up some AWS service environments, you must define a role for the service to assume. This service role must include all the permissions that are required for the service to access the AWS resources that it needs. Service roles vary from service to service, but many allow you to choose your permissions as long as you meet the documented requirements for that service. Service roles provide access only within your account and cannot be used to grant access to services in other accounts. You can create, modify, and delete a service role from within
IAM. For example, you can create a role that allows Amazon Redshift to access an Amazon S3 bucket on your behalf and then load data from that bucket into an Amazon Redshift cluster. For more information, see Creating a Role to Delegate Permissions to an AWS Service in the IAM User Guide.

- **Applications running on Amazon EC2** – You can use an IAM role to manage temporary credentials for applications that are running on an EC2 instance and making AWS CLI or AWS API requests. This is preferable to storing access keys within the EC2 instance. To assign an AWS role to an EC2 instance and make it available to all of its applications, you create an instance profile that is attached to the instance. An instance profile contains the role and enables programs that are running on the EC2 instance to get temporary credentials. For more information, see Using an IAM Role to Grant Permissions to Applications Running on Amazon EC2 Instances in the IAM User Guide.

### Access Control

You can have valid credentials to authenticate your requests, but unless you have permissions you cannot create or access Glacier resources. For example, you must have permissions to create a Glacier vault.

The following sections describe how to manage permissions. We recommend that you read the overview first.

- Overview of Managing Access Permissions to Your Amazon S3 Glacier Resources (p. 116)
- Using Identity-Based Policies for Amazon S3 Glacier (IAM Policies) (p. 120)
- Using Resource-Based Policies for Amazon S3 Glacier (Vault Policies) (p. 124)

### Overview of Managing Access Permissions to Your Amazon S3 Glacier Resources

Every AWS resource is owned by an AWS account, and permissions to create or access a resource are governed by permissions policies. An account administrator can attach permissions policies to IAM identities (that is, users, groups, and roles) and some services (such as Amazon S3 Glacier (Glacier)) also support attaching permissions policies to resources.

**Note**

An account administrator (or administrator user) is a user with administrator privileges. For more information, see IAM Best Practices in the IAM User Guide.

When granting permissions, you decide who is getting the permissions, the resources they get permissions for, and the specific actions that you want to allow on those resources.

### Topics

- Amazon S3 Glacier Resources and Operations (p. 116)
- Understanding Resource Ownership (p. 117)
- Managing Access to Resources (p. 117)
- Specifying Policy Elements: Actions, Effects, Resources, and Principals (p. 119)
- Specifying Conditions in a Policy (p. 119)

### Amazon S3 Glacier Resources and Operations

In Glacier, the primary resource is a vault. Glacier supports policies only at the vault level. That is, in an IAM policy, the resource value that you specify can be a specific vault or a set of vaults in a specific AWS Region. Glacier doesn’t support archive-level permissions.
For all Glacier actions, **Resource** specifies the vault on which you want to grant the permissions. These resources have unique Amazon Resource Names (ARNs) associated with them as shown in the following table, and you can use a wildcard character (*) in the ARN to match any vault name.

Glacier provides a set of operations to work with the Glacier resources. For information on the available operations, see **API Reference for Glacier** (p. 150).

### Understanding Resource Ownership

A **resource owner** is the AWS account that created the resource. That is, the resource owner is the AWS account of the principal entity (the root account, an IAM user, or an IAM role) that authenticates the request that creates the resource. The following examples illustrate how this works:

- If you use the root account credentials of your AWS account to create a Glacier vault, your AWS account is the owner of the resource (in Glacier, the resource is the Glacier vault).
- If you create an IAM user in your AWS account and grant permissions to create a Glacier vault to that user, the user can create a Glacier vault. However, your AWS account, to which the user belongs, owns the Glacier vault resource.
- If you create an IAM role in your AWS account with permissions to create a Glacier vault, anyone who can assume the role can create a Glacier vault. Your AWS account, to which the role belongs, owns the Glacier vault resource.

### Managing Access to Resources

A **permissions policy** describes who has access to what. The following section explains the available options for creating permissions policies.

**Note**

This section discusses using IAM in the context of Glacier. It doesn't provide detailed information about the IAM service. For complete IAM documentation, see **What Is IAM?** in the **IAM User Guide**. For information about IAM policy syntax and descriptions, see **AWS IAM Policy Reference** in the **IAM User Guide**.

Policies attached to an IAM identity are referred to as **identity-based** policies (IAM polices) and policies attached to a resource are referred to as **resource-based** policies. Glacier supports both identity-based (IAM policies) and resource-based policies.

#### Topics

- **Identity-Based Policies (IAM policies)** (p. 117)
- **Resource-Based Policies (Amazon S3 Glacier Vault Policies)** (p. 118)

### Identity-Based Policies (IAM policies)

You can attach policies to IAM identities. For example you can do the following:

- **Attach a permissions policy to a user or a group in your account** – An account administrator can use a permissions policy that is associated with a particular user to grant permissions for that user to create a Glacier vault.
- **Attach a permissions policy to a role (grant cross-account permissions)** – You can attach an identity-based permissions policy to an IAM role to grant cross-account permissions. For example, the administrator in Account A can create a role to grant cross-account permissions to another AWS account (for example, Account B) or an AWS service as follows:
  1. Account A administrator creates an IAM role and attaches a permissions policy to the role that grants permissions on resources in Account A.
2. Account A administrator attaches a trust policy to the role identifying Account B as the principal who can assume the role.

3. Account B administrator can then delegate permissions to assume the role to any users in Account B. Doing this allows users in Account B to create or access resources in Account A. The principal in the trust policy can also be an AWS service principal if you want to grant an AWS service permissions to assume the role.

For more information about using IAM to delegate permissions, see Access Management in the IAM User Guide.

The following is an example policy that grants permissions for three Glacier vault-related actions (glacier:CreateVault, glacier:DescribeVault and glacier:ListVaults) on a resource, using the Amazon Resource Name (ARN) that identifies all of the vaults in the us-west-2 AWS Region. ARNs uniquely identify AWS resources. For more information about ARNs used with Glacier, see Amazon S3 Glacier Resources and Operations (p. 116).

```
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Effect": "Allow",
      "Action": [
        "glacier:CreateVault",
        "glacier:DescribeVault",
        "glacier:ListVaults"
      ],
    }
  ]
}
```

The policy grants permissions to create, list, and obtain descriptions of vaults in the us-west-2 region. The wildcard character (*) at the end of the ARN means that this statement can match any vault name.

**Important**
When you grant permissions to create a vault using the glacier:CreateVault operation, you must specify a wildcard character (*) because you don't know the vault name until after you create the vault.

For more information about using identity-based policies with Glacier, see Using Identity-Based Policies for Amazon S3 Glacier (IAM Policies) (p. 120). For more information about users, groups, roles, and permissions, see Identities (Users, Groups, and Roles) in the IAM User Guide.

**Resource-Based Policies (Amazon S3 Glacier Vault Policies)**

Each Glacier vault can have resource-based permissions policies associated with it. For Glacier, a Glacier vault is the primary resource and resource-based policies are referred to as vault policies.

You use Glacier vault policies to manage permissions in the following ways:

- Manage user permissions in your account in a single vault policy, instead of individual user policies.
- Manage cross-account permissions as an alternative to using IAM roles.

A Glacier vault can have one vault access policy and one Vault Lock policy associated with it. A Glacier vault access policy is a resource-based policy that you can use to manage permissions to your vault.
Vault Lock policy is a vault access policy that can be locked. After you lock a Vault Lock policy, the policy cannot be changed. You can use a Vault Lock policy to enforce compliance controls.

You can use vault policies to grant permissions to all users, or you can limit access to a vault to a few AWS accounts by attaching a policy directly to a vault resource. For example, you can use a Glacier vault policy to grant read-only permissions to all AWS accounts or to grant permissions to upload archives to a few AWS accounts.

Vault policies make it easy to grant cross-account access when you need to share your vault with other AWS accounts. You can specify controls such as “write once read many” (WORM) in a vault lock policy and lock the policy from future edits. For example, you can grant read-only access on a vault to a business partner with a different AWS account by simply including that account and allowed actions in the vault policy. You can grant cross-account access to multiple users in this fashion and have a single location to view all users with cross-account access in the vault access policy. For an example of a vault policy for cross-account access, see Example 1: Grant Cross-Account Permissions for Specific Amazon S3 Glacier Actions (p. 124).

For more information about using vault policies with Glacier, see Using Resource-Based Policies for Amazon S3 Glacier (Vault Policies) (p. 124). For additional information about IAM roles (identity-based policies) as opposed to resource-based policies, see How IAM Roles Differ from Resource-based Policies in the IAM User Guide.

Specifying Policy Elements: Actions, Effects, Resources, and Principals

For each type of Glacier resource, the service defines a set of API operations (see API Reference for Glacier (p. 150)). To grant permissions for these API operations Glacier defines a set of actions that you can specify in a policy. Note that, performing an API operation can require permissions for more than one action. When granting permissions for specific actions, you also identify the resource on which the actions are allowed or denied.

The following are the most basic policy elements:

- **Resource** – In a policy, you use an Amazon Resource Name (ARN) to identify the resource to which the policy applies. For more information, see Amazon S3 Glacier Resources and Operations (p. 116).
- **Actions** – You use action keywords to identify resource operations that you want to allow or deny. For example, the glacier:CreateVault permission allows the user permissions to perform the Glacier Create Vault operation.
- **Effect** – You specify the effect when the user requests the specific action—this can be either allow or deny. If you don't explicitly grant access to (allow) a resource, access is implicitly denied. You can also explicitly deny access to a resource, which you might do to make sure that a user cannot access it, even if a different policy grants access.
- **Principal** – In identity-based policies (IAM policies), the user that the policy is attached to is the implicit principal. For resource-based policies, you specify the user, account, service, or other entity that you want to receive permissions (applies to resource-based policies only).

To learn more about the IAM policy syntax, and descriptions, see AWS IAM Policy Reference in the IAM User Guide.

For a table showing all of the Glacier API actions and the resources that they apply to, see Amazon S3 Glacier API Permissions: Actions, Resources, and Conditions Reference (p. 128).

Specifying Conditions in a Policy

When you grant permissions, you can use the IAM policy language to specify the conditions when a policy should take effect. For example, you might want a policy to be applied only after a specific date.
For more information about specifying conditions in a policy language, see Condition in the IAM User Guide.

AWS provides a set of predefined condition keys, called AWS-wide condition keys, for all AWS services that support IAM for access control. AWS-wide condition keys use the prefix aws. Glacier supports all AWS-wide condition keys in vault access and Vault Lock policies. For example, you can use the aws:MultiFactorAuthPresent condition key to require multi-factor authentication (MFA) when requesting an action. For more information and a list of the AWS-wide condition keys, see Available Keys for Conditions in the IAM User Guide.

In addition, Glacier also provides its own condition keys that you can include in Condition elements in an IAM permissions policy. Glacier-specific condition keys are applicable only when granting Glacier-specific permissions. Glacier condition key names have the prefix glacier:. The following table shows the Glacier condition keys that apply to Glacier resources.

<table>
<thead>
<tr>
<th>Glacier Condition Key</th>
<th>Description</th>
<th>Value Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>glacier:ArchiveAgeInDays</td>
<td>Used to evaluate how long an archive has been stored in the vault, in days.</td>
<td>Integer</td>
</tr>
<tr>
<td>glacier:ResourceTag/TagKey</td>
<td>Allows you to use a tag in your policy. For information about resource tagging, see Managing Access Control with Tagging (p. 146).</td>
<td>String</td>
</tr>
</tbody>
</table>

For examples of using the Glacier-specific condition keys, see Amazon S3 Glacier Access Control with Vault Lock Policies (p. 126).

Related Topics

- Using Identity-Based Policies for Amazon S3 Glacier (IAM Policies) (p. 120)
- Using Resource-Based Policies for Amazon S3 Glacier (Vault Policies) (p. 124)
- Amazon S3 Glacier API Permissions: Actions, Resources, and Conditions Reference (p. 128)

Using Identity-Based Policies for Amazon S3 Glacier (IAM Policies)

This topic provides examples of identity-based policies in which an account administrator can attach permissions policies to IAM identities (that is, users, groups, and roles).

**Important**

We recommend that you first review the introductory topics that explain the basic concepts and options available for you to manage access to your Amazon S3 Glacier (Glacier) resources. For more information, see Overview of Managing Access Permissions to Your Amazon S3 Glacier Resources (p. 116).

The sections in this topic cover the following:

- Permissions Required to Use the Amazon S3 Glacier Console (p. 121)
- AWS Managed Policies (Predefined Policies) for Amazon S3 Glacier (p. 121)
- Customer Managed Policy Examples (p. 122)

The following shows an example of a permissions policy.
The policy grants permissions for three Glacier vault-related actions (glacier:CreateVault, glacier:DescribeVault and glacier:ListVaults), on a resource using the Amazon Resource Name (ARN) that identifies all of the vaults in the us-west-2 AWS Region.

The wildcard character (*) at the end of the ARN means that this statement can match any vault name. The statement allows the glacier:DescribeVault action on any vault in the specified region, us-west-2. If you want to limit permissions for this action to a specific vault only, you replace the wildcard character (*) with a vault name.

Permissions Required to Use the Amazon S3 Glacier Console

The Glacier console provides an integrated environment for you to create and manage Glacier vaults. At a minimum IAM users that you create must be granted permissions for the glacier:ListVaults action to view the Glacier console as shown in the following example.

Both of the Glacier AWS Managed policies discussed in the next section grant permissions for glacier:ListVaults.

AWS Managed Policies (Predefined Policies) for Amazon S3 Glacier

AWS addresses many common use cases by providing standalone IAM policies that are created and administered by AWS. Managed policies grant necessary permissions for common use cases so you can avoid having to investigate what permissions are needed. For more information, see AWS Managed Policies in the IAM User Guide.

The following AWS managed policies, which you can attach to users in your account, are specific to Glacier:

- **AmazonGlacierReadOnlyAccess** – Grants read only access to Glacier through the AWS Management Console.
• **AmazonGlacierFullAccess** – Grants full access to Glacier through the AWS Management Console.

**Note**
You can review these permissions policies by signing in to the IAM console and searching for specific policies there.

You can also create your own custom IAM policies to allow permissions for Glacier API actions and resources. You can attach these custom policies to the IAM users or groups that require those permissions or to custom execution roles (IAM roles) that you create for your Glacier vaults.

### Customer Managed Policy Examples

In this section, you can find example user policies that grant permissions for various Glacier actions. These policies work when you are using Glacier REST API, the AWS SDKs, the AWS CLI, or, if applicable, the Glacier management console.

**Note**
All examples use the US West (Oregon) Region (us-west-2) and contain fictitious account IDs.

#### Examples

- **Example 1: Allow a User to Download Archives from a Vault** (p. 122)
- **Example 2: Allow a User to Create a Vault and Configure Notifications** (p. 122)
- **Example 3: Allow a User to Upload Archives to a Specific Vault** (p. 123)
- **Example 4: Allow a User Full Permissions on a Specific Vault** (p. 123)

#### Example 1: Allow a User to Download Archives from a Vault

To download an archive, you first initiate a job to retrieve the archive. After the retrieval job is complete, you can download the data. The following example policy grants permissions for the `glacier:InitiateJob` action to initiate a job (which allows the user to retrieve an archive or a vault inventory from the vault), and permissions for the `glacier:GetJobOutput` action to download the retrieved data. The policy also grants permissions to perform the `glacier:DescribeJob` action so that the user can get the job status. For more information, see [Initiate Job (POST jobs)](p. 251).

The policy grants these permissions on a vault named `examplevault`. You can get the vault ARN from the Amazon S3 Glacier console, or programmatically by calling either the Describe Vault (GET vault) (p. 184) or the List Vaults (GET vaults) (p. 199) API actions.

```json
{
  "Version":"2012-10-17",
  "Statement": [
    {
      "Effect": "Allow",
      "Action": ["glacier:InitiateJob",
                  "glacier:GetJobOutput",
                  "glacier:DescribeJob"]
    }
  ]
}
```

#### Example 2: Allow a User to Create a Vault and Configure Notifications

The following example policy grants permissions to create a vault in the us-west-2 region as specified in the `Resource` element and configure notifications. For more information about working with...
notifications, see Configuring Vault Notifications in Amazon S3 Glacier (p. 45). The policy also grants permissions to list vaults in the region and get a specific vault description.

**Important**
When you grant permissions to create a vault using the `glacier:CreateVault` operation, you must specify a wildcard character (*) in the `Resource` value because you don’t know the vault name until after you create the vault.

```json
{
  "Version":"2012-10-17",
  "Statement": [
    {
      "Effect": "Allow",
      "Action": ["glacier:CreateVault",
                  "glacier:SetVaultNotifications",
                  "glacier:GetVaultNotifications",
                  "glacier:DeleteVaultNotifications",
                  "glacier:DescribeVault",
                  "glacier:ListVaults"]
    }
  ]
}
```

**Example 3: Allow a User to Upload Archives to a Specific Vault**

The following example policy grants permissions to upload archives to a specific vault in the us-west-2 region. These permissions allow a user to upload an archive all at once using the Upload Archive (POST archive) (p. 212) API operation or in parts using the Initiate Multipart Upload (POST multipart-uploads) (p. 221) API operation.

```json
{
  "Version":"2012-10-17",
  "Statement": [
    {
      "Effect": "Allow",
      "Action": ["glacier:UploadArchive",
                  "glacier:InitiateMultipartUpload",
                  "glacier:UploadMultipartPart",
                  "glacier:ListParts",
                  "glacier:ListMultipartUploads",
                  "glacier:CompleteMultipartUpload"]
    }
  ]
}
```

**Example 4: Allow a User Full Permissions on a Specific Vault**

The following example policy grants permissions for all Glacier actions on a vault named examplevault.

```json
{
  "Version":"2012-10-17",
  "Statement": [
    {
      "Effect": "Allow",
      "Action": ["glacier:*"]
    }
  ]
}
```
Using Resource-Based Policies for Amazon S3 Glacier (Vault Policies)

An Amazon S3 Glacier (Glacier) vault is the primary resource in Glacier. You can add permissions to the policy associated with a Glacier vault. Permissions policies attached to Glacier vaults are referred to as resource-based policies (or vault policies in Glacier). Each Glacier vault can have resource-based permissions policies associated with it. For information about available permissions policy options, see Managing Access to Resources (p. 117).

Important
Before you create resource-based policies, we recommend that you first review the introductory topics that explain the basic concepts and options available for you to manage access to your Glacier resources. For more information, see Overview of Managing Access Permissions to Your Amazon S3 Glacier Resources (p. 116).

A Glacier vault can have one vault access policy and one Vault Lock policy associated with it. An Amazon S3 Glacier vault access policy is a resource-based policy that you can use to manage permissions to your vault. A Vault Lock policy is vault access policy that can be locked. After you lock a Vault Lock policy, the policy can't be changed. You can use a Vault Lock Policy to enforce compliance controls.

For more information, see the following topics.

Topics
- Amazon S3 Glacier Access Control with Vault Access Policies (p. 124)
- Amazon S3 Glacier Access Control with Vault Lock Policies (p. 126)

Amazon S3 Glacier Access Control with Vault Access Policies

An Amazon S3 Glacier vault access policy is a resource-based policy that you can use to manage permissions to your vault. For information about the different permissions policy options available, see Managing Access to Resources (p. 117).

You can create one vault access policy for each vault to manage permissions. You can modify permissions in a vault access policy at any time. Glacier also supports a Vault Lock policy on each vault that, after you lock it, cannot be altered. For more information about working with Vault Lock policies, see Amazon S3 Glacier Access Control with Vault Lock Policies (p. 126).

You can use the Glacier API, AWS SDKs, AWS CLI, or the Glacier console to create and manage vault access policies. For a list of operations allowed for vault access resource-based policies, see Amazon S3 Glacier API Permissions: Actions, Resources, and Conditions Reference (p. 128).

Examples
- Example 1: Grant Cross-Account Permissions for Specific Amazon S3 Glacier Actions (p. 124)
- Example 2: Grant Cross-Account Permissions for MFA Delete Operations (p. 125)

Example 1: Grant Cross-Account Permissions for Specific Amazon S3 Glacier Actions

The following example policy grants cross-account permissions to two AWS accounts for a set of Glacier operations on a vault named examplevault.
Note
The account that owns the vault is billed for all costs associated with the vault. All requests, data transfer, and retrieval costs made by allowed external accounts are billed to the account that owns the vault.

```json
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Sid": "cross-account-upload",
      "Principal": {
        "AWS": [
          "arn:aws:iam::123456789012:root",
          "arn:aws:iam::44455556666:root"
        ]
      },
      "Effect": "Allow",
      "Action": [
        "glacier:UploadArchive",
        "glacier:InitiateMultipartUpload",
        "glacier:AbortMultipartUpload",
        "glacier:CompleteMultipartUpload"
      ],
      "Resource": [
      ]
    }
  ]
}
```

Example 2: Grant Cross-Account Permissions for MFA Delete Operations

You can use multi-factor authentication (MFA) to protect your Glacier resources. To provide an extra level of security, MFA requires users to prove physical possession of an MFA device by providing a valid MFA code. For more information about configuring MFA access, see Configuring MFA-Protected API Access in the IAM User Guide.

The example policy grants an AWS account with temporary credentials permission to delete archives from a vault named examplevault, provided the request is authenticated with an MFA device. The policy uses the `aws:MultiFactorAuthPresent` condition key to specify this additional requirement. For more information, see Available Keys for Conditions in the IAM User Guide.

```json
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Sid": "add-mfa-delete-requirement",
      "Principal": {
        "AWS": [
          "arn:aws:iam::123456789012:root"
        ]
      },
      "Effect": "Allow",
      "Action": [
        "glacier:Delete*"
      ],
      "Resource": [
      ],
      "Condition": {
        "Bool": {
          "aws:MultiFactorAuthPresent": true
        }
      }
    }
  ]
}
```
"aws:MultiFactorAuthPresent": true
}]
}
}

Related Sections

- Delete Vault Access Policy (DELETE access-policy) (p. 180)
- Get Vault Access Policy (GET access-policy) (p. 186)
- Set Vault Access Policy (PUT access-policy) (p. 206)

Amazon S3 Glacier Access Control with Vault Lock Policies

An Amazon S3 Glacier (Glacier) vault can have one resource-based vault access policy and one Vault Lock policy attached to it. A Vault Lock policy is a vault access policy that you can lock. Using a Vault Lock policy can help you enforce regulatory and compliance requirements. Amazon S3 Glacier provides a set of API operations for you to manage the Vault Lock policies, see Locking a Vault by Using the Amazon S3 Glacier API (p. 57).

As an example of a Vault Lock policy, suppose that you are required to retain archives for one year before you can delete them. To implement this requirement, you can create a Vault Lock policy that denies users permissions to delete an archive until the archive has existed for one year. You can test this policy before locking it down. After you lock the policy, the policy becomes immutable. For more information about the locking process, see Amazon S3 Glacier Vault Lock (p. 56). If you want to manage other user permissions that can be changed, you can use the vault access policy (see Amazon S3 Glacier Access Control with Vault Access Policies (p. 124)).

You can use the Glacier API, AWS SDKs, AWS CLI, or the Glacier console to create and manage Vault Lock policies. For a list of Glacier actions allowed for vault resource-based policies, see Amazon S3 Glacier API Permissions: Actions, Resources, and Conditions Reference (p. 128).

Examples

- Example 1: Deny Deletion Permissions for Archives Less Than 365 Days Old (p. 126)
- Example 2: Deny Deletion Permissions Based on a Tag (p. 127)

Example 1: Deny Deletion Permissions for Archives Less Than 365 Days Old

Suppose that you have a regulatory requirement to retain archives for up to one year before you can delete them. You can enforce this requirement by implementing the following Vault Lock policy. The policy denies the glacier:DeleteArchive action on the examplevault vault if the archive being deleted is less than one year old. The policy uses the Glacier-specific condition key ArchiveAgeInDays to enforce the one-year retention requirement.

```json
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Sid": "deny-based-on-archive-age",
      "Principal": "*",
      "Effect": "Deny",
      "Action": "glacier:DeleteArchive",
      "Resource": [
        "arn:aws:glacier:us-west-2:123456789012:vaults/examplevault"
      ],
      "Condition": {
        "aws:MultiFactorAuthPresent": true
      }
    }
  ]
}
```

API Version 2012-06-01
Example 2: Deny Deletion Permissions Based on a Tag

Suppose that you have a time-based retention rule that an archive can be deleted if it is less than a year old. At the same time, suppose that you need to place a legal hold on your archives to prevent deletion or modification for an indefinite duration during a legal investigation. In this case, the legal hold takes precedence over the time-based retention rule specified in the Vault Lock policy.

To put these two rules in place, the following example policy has two statements:

- The first statement denies deletion permissions for everyone, locking the vault. This lock is performed by using the `LegalHold` tag.
- The second statement grants deletion permissions when the archive is less than 365 days old. But even when archives are less than 365 days old, no one can delete them when the condition in the first statement is met.

```json
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Sid": "lock-vault",
      "Principal": "*",
      "Effect": "Deny",
      "Action": [
        "glacier:DeleteArchive"
      ],
      "Resource": [
        "arn:aws:glacier:us-west-2:123456789012:vaults/examplevault"
      ],
      "Condition": {
        "StringLike": {
          "glacier:ResourceTag/LegalHold": [
            "true",
            ""
          ]
        }
      }
    },
    {
      "Sid": "you-can-delete-archive-less-than-1-year-old",
      "Principal": {
        "AWS": "arn:aws:iam::123456789012:root"
      },
      "Effect": "Allow",
      "Action": [
        "glacier:DeleteArchive"
      ],
      "Resource": [
        "arn:aws:glacier:us-west-2:123456789012:vaults/examplevault"
      ],
      "Condition": {
        "NumericLessThan": {
          "glacier:ArchiveAgeInDays": "365"
        }
      }
    }
  ]
}
```
Related Sections

- Amazon S3 Glacier Vault Lock (p. 56)
- Abort Vault Lock (DELETE lock-policy) (p. 170)
- Complete Vault Lock (POST lockId) (p. 176)
- Get Vault Lock (GET lock-policy) (p. 189)
- Initiate Vault Lock (POST lock-policy) (p. 194)

Amazon S3 Glacier API Permissions: Actions, Resources, and Conditions Reference

When you are setting up Access Control (p. 116) and writing a permissions policy that you can attach to an IAM identity (identity-based policies) or a resource (resource-based policies), you can use the following table as a reference. The list includes each Glacier API operation, the corresponding actions for which you can grant permissions to perform the action, and the AWS resource for which you can grant the permissions.

You specify the actions in the policy's `Action` element, and you specify the resource value in the policy's `Resource` element. Also, you can use the IAM policy language `Condition` element to specify when a policy should take effect.

To specify an action, use the `glacier:` prefix followed by the API operation name (for example, `glacier:CreateVault`). For most Glacier actions, `Resource` is the vault on which you want to grant the permissions. You specify a vault as the `Resource` value by using the vault ARN. To express conditions, you use predefined condition keys. For more information, see Overview of Managing Access Permissions to Your Amazon S3 Glacier Resources (p. 116).

The following table lists actions that can be used with identity-based policies and resource-based policies.

**Note**
Some actions can only be used with identity-based policies. These actions are marked by a red asterisk (*) after the name of the API operation in the first column.

**Glacier API and Required Permissions for Actions**

**Abort Multipart Upload (DELETE uploadID) (p. 216)**

**Required Permissions (API Actions):** `glacier:AbortMultipartUpload`


**Glacier Condition Keys:**

**Abort Vault Lock (DELETE lock-policy) (p. 170)**

**Required Permissions (API Actions):** `glacier:AbortVaultLock`

**Resources:**

**Glacier Condition Keys:**
Add Tags To Vault (POST tags add) (p. 172)

Required Permissions (API Actions): glacier:AddTagsToVault


Glacier Condition Keys: glacier:ResourceTag/TagKey

Complete Multipart Upload (POST uploadID) (p. 218)

Required Permissions (API Actions): glacier:CompleteMultipartUpload


Glacier Condition Keys: glacier:ResourceTag/TagKey

Complete Vault Lock (POST lockId) (p. 176)

Required Permissions (API Actions): glacier:CompleteVaultLock

Resources: 

Glacier Condition Keys: glacier:ResourceTag/TagKey

Create Vault (PUT vault) (p. 174) *

Required Permissions (API Actions): glacier:CreateVault

Resources: 

Glacier Condition Keys: 

Delete Archive (DELETE archive) (p. 210)

Required Permissions (API Actions): glacier:DeleteArchive


Glacier Condition Keys: glacier:ArchiveAgeInDays, glacier:ResourceTag/TagKey

Delete Vault (DELETE vault) (p. 178)

Required Permissions (API Actions): glacier:DeleteVault


Glacier Condition Keys: glacier:ResourceTag/TagKey

Delete Vault Access Policy (DELETE access-policy) (p. 180)

Required Permissions (API Actions): glacier:DeleteVaultAccessPolicy


Glacier Condition Keys: glacier:ResourceTag/TagKey
Delete Vault Notifications (DELETE notification-configuration) (p. 182)

**Required Permissions (API Actions):** glacier:DeleteVaultNotifications

**Resources:**
- arn:aws:glacier:region:account-id:vaults/vault-name
- arn:aws:glacier:region:account-id:vaults/example*,
- arn:aws:glacier:region:account-id:vaults/*

**Glacier Condition Keys:**
- glacier:ResourceTag/TagKey

Describe Job (GET JobID) (p. 238)

**Required Permissions (API Actions):** glacier:DescribeJob

**Resources:**
- arn:aws:glacier:region:account-id:vaults/vault-name
- arn:aws:glacier:region:account-id:vaults/example*,
- arn:aws:glacier:region:account-id:vaults/*

Describe Vault (GET vault) (p. 184)

**Required Permissions (API Actions):** glacier:DescribeVault

**Resources:**
- arn:aws:glacier:region:account-id:vaults/vault-name
- arn:aws:glacier:region:account-id:vaults/example*,
- arn:aws:glacier:region:account-id:vaults/*

Get Data Retrieval Policy (GET policy) (p. 280)

**Required Permissions (API Actions):** glacier:GetDataRetrievalPolicy

**Resources:**

Get Job Output (GET output) (p. 245)

**Required Permissions (API Actions):** glacier:GetJobOutput

**Resources:**
- arn:aws:glacier:region:account-id:vaults/vault-name
- arn:aws:glacier:region:account-id:vaults/example*,
- arn:aws:glacier:region:account-id:vaults/*

Get Vault Access Policy (GET access-policy) (p. 186)

**Required Permissions (API Actions):** glacier:GetVaultAccessPolicy

**Resources:**
- arn:aws:glacier:region:account-id:vaults/vault-name
- arn:aws:glacier:region:account-id:vaults/example*,
- arn:aws:glacier:region:account-id:vaults/*

Get Vault Lock (GET lock-policy) (p. 189)

**Required Permissions (API Actions):** glacier:GetVaultLock

**Resources:**
- arn:aws:glacier:region:account-id:vaults/vault-name
- arn:aws:glacier:region:account-id:vaults/example*,
- arn:aws:glacier:region:account-id:vaults/*
Glacier Condition Keys:
Get Vault Notifications (GET notification-configuration) (p. 192)

Required Permissions (API Actions): glacier:GetVaultNotifications


Glacier Condition Keys:
Initiate Job (POST jobs) (p. 251)

Required Permissions (API Actions): glacier:InitiateJob


Glacier Condition Keys: glacier:ArchiveAgeInDays, glacier:ResourceTag/TagKey

Initiate Multipart Upload (POST multipart-uploads) (p. 221)

Required Permissions (API Actions): glacier:InitiateMultipartUpload


Glacier Condition Keys: glacier:ResourceTag/TagKey

Initiate Vault Lock (POST lock-policy) (p. 194)

Required Permissions (API Actions): glacier:InitiateVaultLock

Resources:

Glacier Condition Keys: glacier:ResourceTag/TagKey

List Jobs (GET jobs) (p. 261)

Required Permissions (API Actions): glacier:ListJobs


Glacier Condition Keys:
List Multipart Uploads (GET multipart-uploads) (p. 229)

Required Permissions (API Actions): glacier:ListMultipartUploads


Glacier Condition Keys:
List Parts (GET uploadID) (p. 224)

Required Permissions (API Actions): glacier:ListParts

Glacier Condition Keys:
List Tags For Vault (GET tags) (p. 197)

Required Permissions (API Actions): glacier:ListTagsForVault


Glacier Condition Keys:
List Vaults (GET vaults) (p. 199)

Required Permissions (API Actions): glacier:ListVaults

Resources:

Glacier Condition Keys:
Remove Tags From Vault (POST tags remove) (p. 203)

Required Permissions (API Actions): glacier:RemoveTagsFromVault


Glacier Condition Keys: glacier:ResourceTag/TagKey

Set Data Retrieval Policy (PUT policy) (p. 287)

Required Permissions (API Actions): glacier:SetDataRetrievalPolicy


Glacier Condition Keys:
Set Vault Access Policy (PUT access-policy) (p. 206)

Required Permissions (API Actions): glacier:SetVaultAccessPolicy


Glacier Condition Keys: glacier:ResourceTag/TagKey

Set Vault Notification Configuration (PUT notification-configuration) (p. 208)

Required Permissions (API Actions): glacier:SetVaultNotifications


Glacier Condition Keys: glacier:ResourceTag/TagKey

Upload Archive (POST archive) (p. 212)

Required Permissions (API Actions): glacier:UploadArchive

Glacier Condition Keys: glacier:ResourceTag/TagKey

Upload Part (PUT uploadID) (p. 234)

Required Permissions (API Actions): glacier:UploadMultipartPart


Glacier Condition Keys: glacier:ResourceTag/TagKey
Logging and Monitoring in Amazon S3 Glacier

Monitoring is an important part of maintaining the reliability, availability, and performance of Amazon S3 Glacier (Glacier) and your AWS solutions. You should collect monitoring data from all of the parts of your AWS solution so that you can more easily identify and debug the source of a failure if one occurs. AWS provides the following tools for monitoring your Glacier resources and responding to potential incidents:

**Amazon CloudWatch Alarms**

When using Glacier via Amazon S3, you can use Amazon CloudWatch alarms to watch a single metric over a time period that you specify. If the metric exceeds a given threshold, a notification is sent to an Amazon SNS topic or AWS Auto Scaling policy. CloudWatch alarms do not invoke actions because they are in a particular state. Rather the state must have changed and been maintained for a specified number of periods. For more information, see [Monitoring Metrics with Amazon CloudWatch](#).

**AWS CloudTrail Logs**

CloudTrail provides a record of actions taken by a user, role, or an AWS service in Glacier. CloudTrail captures all API calls for Glacier as events, including calls from the Glacier console and from code calls to the Glacier APIs. For more information, see [Logging Amazon S3 Glacier API Calls with AWS CloudTrail](p. 147).

**AWS Trusted Advisor**

Trusted Advisor draws upon best practices learned from serving hundreds of thousands of AWS customers. Trusted Advisor inspects your AWS environment and then makes recommendations when opportunities exist to save money, improve system availability and performance, or help close security gaps. All AWS customers have access to five Trusted Advisor checks. Customers with a Business or Enterprise support plan can view all Trusted Advisor checks.

For more information, see [AWS Trusted Advisor](#) in the [AWS Support User Guide](#).
Compliance Validation for Amazon S3 Glacier

The security and compliance of Amazon S3 Glacier (Glacier) is assessed by third-party auditors as part of multiple AWS compliance programs, including the following:

- System and Organization Controls (SOC)
- Payment Card Industry Data Security Standard (PCI DSS)
- Federal Risk and Authorization Management Program (FedRAMP)
- Health Insurance Portability and Accountability Act (HIPAA)

AWS provides a frequently updated list of AWS services in scope of specific compliance programs at AWS Services in Scope by Compliance Program.

Third-party audit reports are available for you to download using AWS Artifact. For more information, see Downloading Reports in AWS Artifact in the AWS Artifact User Guide.

For more information about AWS compliance programs, see AWS Compliance Programs.

Your compliance responsibility when using Glacier is determined by the sensitivity of your data, your organization’s compliance objectives, and applicable laws and regulations. If your use of Glacier is subject to compliance with standards like HIPAA, PCI, or FedRAMP, AWS provides resources to help:

- Amazon S3 Glacier Vault Lock (p. 56) allows you to easily deploy and enforce compliance controls for individual Glacier vaults with a vault lock policy. You can specify controls such as “write once read many” (WORM) in a vault lock policy and lock the policy from future edits. After the policy is locked, it can no longer be changed. Vault lock policies can help you comply with regulatory frameworks such as SEC17a-4 and HIPAA.
- Security and Compliance Quick Start Guides discuss architectural considerations and steps for deploying security- and compliance-focused baseline environments on AWS.
- Architecting for HIPAA Security and Compliance whitepaper outlines how companies use AWS to help them meet HIPAA requirements.
- The AWS Well-Architected Tool (AWS WA Tool) is a service in the cloud that provides a consistent process for you to review and measure your architecture using AWS best practices. The AWS WA Tool provides recommendations for making your workloads more reliable, secure, efficient, and cost-effective.
- AWS Compliance Resources provide several different workbooks and guides that might apply to your industry and location.
- AWS Config can help you assess how well your resource configurations comply with internal practices, industry guidelines, and regulations.
- AWS Security Hub provides you with a comprehensive view of your security state within AWS and helps you check your compliance with security industry standards and best practices.
Resilience in Amazon S3 Glacier

The AWS global infrastructure is built around Regions and Availability Zones. AWS Regions provide multiple, physically separated and isolated Availability Zones that are connected with low latency, high throughput, and highly redundant networking. These Availability Zones offer you an effective way to design and operate applications and databases. They are more highly available, fault tolerant, and scalable than traditional single data center infrastructures or multi-data center infrastructures. Glacier redundantly stores data in multiple AWS Availability Zones (AZ) and on multiple devices within each AZ. To increase durability, Glacier synchronously stores your data across multiple AZs before confirming a successful upload.

For more information about AWS Regions and Availability Zones, see AWS Global Infrastructure.
Infrastructure Security in Amazon S3 Glacier

As a managed service, Amazon S3 Glacier (Glacier) is protected by the AWS global network security procedures that are described in the Amazon Web Services: Overview of Security Processes whitepaper.

Access to Glacier via the network is through AWS published APIs. Clients must support Transport Layer Security (TLS) 1.0. We recommend TLS 1.2 or later. Clients must also support cipher suites with Perfect Forward Secrecy (PFS) such as Ephemeral Diffie-Hellman (DHE) or Elliptic Curve Diffie-Hellman Ephemeral (ECDHE). Most modern systems such as Java 7 and later support these modes. Additionally, requests must be signed using an access key ID and a secret access key that is associated with an IAM principal, or you can use the AWS Security Token Service (AWS STS) to generate temporary security credentials to sign requests.

VPC Endpoints

A virtual private cloud (VPC) endpoint enables you to privately connect your VPC to supported AWS services and VPC endpoint services powered by AWS PrivateLink without requiring an internet gateway, NAT device, VPN connection, or AWS Direct Connect connection. Although Glacier does not support VPC endpoints directly, you can take advantage of Amazon S3 VPC endpoints if you access Glacier as a storage tier integrated with Amazon S3.

For more information about Amazon S3 lifecycle configuration and transitioning objects to the GLACIER storage class, see Object Lifecycle Management and Transitioning Objects in the Amazon Simple Storage Service Developer Guide. For more information about VPC endpoints, see VPC Endpoints in the Amazon VPC User Guide.
Querying Archives with Glacier Select

With Glacier Select, you can perform filtering operations using simple Structured Query Language (SQL) statements directly on your data in Glacier. When you provide an SQL query for a Glacier archive object, Glacier Select runs the query in place and writes the output results to Amazon S3. With Glacier Select, you can run queries and custom analytics on your data that is stored in Glacier, without having to restore your data to a hotter tier like Amazon S3.

When you perform select queries, Glacier provides three data access tiers—*expedited*, *standard*, and *bulk*. All of these tiers provide different data access times and costs, and you can choose any one of them depending on how quickly you want your data to be available. For all but the largest archives (250 MB +), data that is accessed using the expedited tier is typically made available within 1–5 minutes. The standard tier finishes within 3–5 hours. The bulk retrievals finish within 5–12 hours. For information about tier pricing, see Glacier Pricing.

You can use Glacier Select with the AWS SDKs, the Glacier REST API, and the AWS Command Line Interface (AWS CLI).

Topics

- Glacier Select Requirements and Limits (p. 138)
- How Do I Query Data Using Glacier Select? (p. 138)
- Error Handling (p. 140)
- More Info (p. 140)

Glacier Select Requirements and Limits

The following are requirements for using Glacier Select:

- Archive objects that are queried by Glacier Select must be formatted as uncompressed comma-separated values (CSV).
- You must have an S3 bucket to work with. In addition, the AWS account that you use to initiate a Glacier Select job must have write permissions for the S3 bucket. The Amazon S3 bucket must be in the same AWS Region as the vault that contains the archive object that is being queried.
- You must have permission to call Get Job Output (GET output) (p. 245).

The following limits apply when using Glacier Select:

- There are no limits on the number of records that Glacier Select can process. An input or output record must not exceed 1 MB; otherwise, the query fails. There is a limit of 1,048,576 columns per record.
- There is no limit on the size of your final result. However, your results are broken into multiple parts.
- An SQL expression is limited to 128 KB.

How Do I Query Data Using Glacier Select?

Using Glacier Select, you can use SQL commands to query Glacier archive objects that are in uncompressed CSV format. With this restriction, you can perform simple query operations on your text-
based data in Glacier. For example, you might look for a specific name or ID among a set of archive text files.

To query your Glacier data, create a select job using the `Initiate Job (POST jobs)` operation. When initiating a select job, you provide the SQL expression, the archive to query, and the location to store the results in Amazon S3.

The following example expression returns all records from the archive specified by the archive ID in `Initiate Job (POST jobs)`.

```
SELECT * FROM archive
```

Glacier Select supports a subset of the ANSI SQL language. It supports common filtering SQL clauses like `SELECT`, `FROM`, and `WHERE`. It does not support `SUM`, `COUNT`, `GROUP BY`, `JOINS`, `DISTINCT`, `UNION`, `ORDER BY`, and `LIMIT`. For more information about support for SQL, see [SQL Reference for Amazon S3 Select and Glacier Select](#).

## Glacier Select Output

When you initiate a select job, you define an output location for the results of your select query. This location must be an Amazon S3 bucket in the same AWS Region as the vault that contains the archive object that is being queried. The AWS account that initiates the job must have permissions to write to the S3 bucket.

You can specify the S3 storage class and encryption for the output objects stored in Amazon S3. Glacier Select supports SSE-KMS and SSE-S3 encryption. Glacier Select doesn't support SSE-C and client-side encryption. For more information about Amazon S3 storage classes and encryption, see [Storage Classes](#) and [Protecting Data Using Server-Side Encryption](#) in the [Amazon Simple Storage Service Developer Guide](#).

Glacier Select results are stored in the S3 bucket using the prefix provided in the output location specified in `Initiate Job (POST jobs)`.

From this information, Glacier Select creates a unique prefix referring to the job ID. This job ID prefix is returned in the `x-amz-job-output-path` header in an `Initiate Job (POST jobs)` response. (Prefixes are used to group S3 objects together by beginning object names with a common string.) Under this unique prefix, there are two new prefixes created, `results` for results and `errors` for logs and errors. Upon completion of the job, a result manifest is written which contains the location of all results.

There is also a placeholder file named `job.txt` that is written to the output location. After it is written it is never updated. The placeholder file is used for the following:

- Validation of the write permission and majority of SQL syntax errors synchronously.
- Provides a static output similar to `Describe Job (GET JobID)` that you can easily reference whenever you want.

For example, suppose that you initiate a Glacier Select job with the output location for the results specified as `s3://example-bucket/my-prefix`, and the job response returns the job ID as `examplekne1209ualkdjh812elkasdu9012e`. After the select job finishes, you can see the following Amazon S3 objects in your bucket:

```
http://example-bucket/my-prefix/examplekne1209ualkdjh812elkasdu9012e/job.txt
http://example-bucket/my-prefix/examplekne1209ualkdjh812elkasdu9012e/results/abc
http://example-bucket/my-prefix/examplekne1209ualkdjh812elkasdu9012e/results/def
http://example-bucket/my-prefix/examplekne1209ualkdjh812elkasdu9012e/results/ghi
http://example-bucket/my-prefix/examplekne1209ualkdjh812elkasdu9012e/result_manifest.txt
```

The select query results are broken into multiple parts. In the example, Glacier Select uses the prefix that you specified when setting the output location and appends the job ID and the `results` prefix. It then...
writes the results in three parts, with the object names ending in abc, def, and ghi. The result manifest contains all the three files to allow programmatic retrieval. If the job fails with any error, then a file is visible under the error prefix and an error_manifest.txt is produced.

Presence of a result_manifest.txt file along with the absence of error_manifest.txt guarantees that the job finished successfully. There is no guarantee provided on how results are ordered.

Note
The length of an Amazon S3 object name, also referred to as the key, can be no more than 1024 bytes. Glacier reserves 128 bytes for prefixes. And, the length of your Amazon S3 location path cannot be more than 512 bytes. A request with a length greater than 512 bytes returns an exception, and the request is not accepted.

Error Handling

Glacier Select notifies you of two kinds of errors. The first set of errors is sent to you synchronously when you submit the query in Initiate Job (POST jobs) (p. 251). These errors are sent to you as part of the HTTP response. Another set of errors can occur after the query has been accepted successfully, but they happen during query execution. In this case, the errors are written to the specified output location under the errors prefix.

Glacier Select will stop executing the query after encountering an error. To execute the query successfully, you must resolve all errors. You can check the logs to identify which records caused a failure.

Because queries run in parallel across multiple compute nodes, the errors that you get are not in sequential order. For example, if your query fails with an error in row 6234, it does not mean that all rows before row 6234 were successfully processed. The next run of the query might show an error in a different row.

More Info

- Initiate Job (POST jobs) (p. 251)
- Describe Job (GET JobID) (p. 238)
- List Jobs (GET jobs) (p. 261)
- Working with Archives in Amazon S3 Glacier (p. 59)
Amazon S3 Glacier Data Retrieval Policies

With Amazon S3 Glacier (Glacier) data retrieval policies, you can easily set data retrieval limits and manage the data retrieval activities across your AWS account in each region. For more information about Glacier data retrieval charges, see Glacier pricing.

Important

A data retrieval policy applies to standard retrievals only and manages retrieval requests made directly to Glacier. It does not manage data restore requests for the Amazon Simple Storage Service (Amazon S3) GLACIER storage class. For more information about the GLACIER storage class, see GLACIER Storage Class and Transitioning Objects in the Amazon Simple Storage Service Developer Guide.

Topics

- Choosing an Amazon S3 Glacier Data Retrieval Policy (p. 141)
- Using the Amazon S3 Glacier Console to Set Up a Data Retrieval Policy (p. 142)
- Using the Amazon S3 Glacier API to Set Up a Data Retrieval Policy (p. 143)

Choosing an Amazon S3 Glacier Data Retrieval Policy

You can choose from three types of Glacier data retrieval policies: No Retrieval Limit, Free Tier Only, and Max Retrieval Rate. No Retrieval Limit is the default data retrieval policy used for retrievals. If you use the No Retrieval Limit policy, no retrieval limit is set and all valid data retrieval requests are accepted.

By using a Free Tier Only policy, you can keep your retrievals within your daily free tier allowance and not incur any data retrieval cost. If you want to retrieve more data than the free tier, you can use a Max Retrieval Rate policy to set a bytes-per-hour retrieval rate limit. The Max Retrieval Rate policy ensures that the peak retrieval rate from all retrieval jobs across your account in a region does not exceed the bytes-per-hour limit you set.

With both Free Tier Only and Max Retrieval Rate policies, data retrieval requests that would exceed the retrieval limits you specified will not be accepted. If you use a Free Tier Only policy, Glacier will synchronously reject retrieval requests that would exceed your free tier allowance. If you use a Max Retrieval Rate policy, Glacier will reject retrieval requests that would cause the peak retrieval rate of the in progress jobs to exceed the bytes-per-hour limit set by the policy. These policies help you simplify data retrieval cost management.

The following are some useful facts about data retrieval policies:

- Data retrieval policy settings do not change the 3 to 5 hour period that it takes to retrieve data from Glacier using standard retrievals.
- Setting a new data retrieval policy does not affect previously accepted retrieval jobs that are already in progress.
Free Tier Only Policy

You can set a data retrieval policy to Free Tier Only to ensure that your retrievals will always stay within your free tier allowance, so you don't incur data retrieval charges. If a retrieval request is rejected, you will receive an error message stating that the request has been denied by the current data retrieval policy.

You set the data retrieval policy to Free Tier Only for a particular AWS region. Once the policy is set, you cannot retrieve more data in a day than your prorated daily free retrieval allowance for that region and you will not incur data retrieval fees.

You can switch to a Free Tier Only policy after you have incurred data retrieval charges within a month. The Free Tier Only policy will take effect for new retrieval requests, but will not affect past requests. You will be billed for the previously incurred charges.

Max Retrieval Rate Policy

You can set your data retrieval policy to Max Retrieval Rate to control the peak retrieval rate by specifying a data retrieval limit that has a bytes-per-hour maximum. When you set the data retrieval policy to Max Retrieval Rate, a new retrieval request will be rejected if it would cause the peak retrieval rate of the in progress jobs to exceed the bytes-per-hour limit specified by the policy. If a retrieval job request is rejected, you will receive an error message stating that the request has been denied by the current data retrieval policy.

Setting your data retrieval policy to the Max Retrieval Rate policy can affect how much free tier you can use in a day. For example, suppose you set Max Retrieval Rate to 1 MB per hour. This is less than the free tier policy rate of 14 MB per hour. To ensure you make good use of the daily free tier allowance, you can first set your policy to Free Tier Only and then switch to the Max Retrieval Rate policy later if you need to. For more information on how your retrieval allowance is calculated, go to Glacier FAQs.

No Retrieval Limit Policy

If your data retrieval policy is set to No Retrieval Limit, all valid data retrieval requests will be accepted and your data retrieval costs will vary based on your usage.

Using the Amazon S3 Glacier Console to Set Up a Data Retrieval Policy

You can view and update the data retrieval policies in the Glacier console or by using the Glacier API. To setup a data retrieval policy in the console, choose an AWS region and then click Settings.
You can select one of the three data retrieval policies: **Free Tier Only**, **Max Retrieval Rate**, or **No Retrieval Limit**. If you click **Max Retrieval Rate**, you'll need to specify a value in the **GB/ Hour** box. When you type a value in **GB/Hour**, the console will calculate an estimated cost for you. Click **No Retrieval Limit** if you don't want any restrictions placed on the rate of your data retrievals.

You can configure a data retrieval policy for each region. Each policy will take effect within a few minutes after you click **Save**.

### Using the Amazon S3 Glacier API to Set Up a Data Retrieval Policy

You can view and set a data retrieval policy by using the Glacier REST API or by using the AWS SDKs.

#### Using the Amazon S3 Glacier REST API to Set Up a Data Retrieval Policy

You can view and set a data retrieval policy by using the Glacier REST API. You can view an existing data retrieval policy by using the **Get Data Retrieval Policy (GET policy)** (p. 280) operation. You set a data retrieval policy using the **Set Data Retrieval Policy (PUT policy)** (p. 287) operation.

When using the PUT policy operation you select the data retrieval policy type by setting the **JSON Strategy** field value to **BytesPerHour**, **FreeTier**, or **None**. **BytesPerHour** is equivalent to selecting **Max Retrieval Rate** in the console, **FreeTier** to selecting **Free Tier Only**, and **None** to selecting **No Retrieval Policy**.

When you use the **Initiate Job (POST jobs)** (p. 251) operation to initiate a data retrieval job that will exceed the maximum retrieval rate set in your data retrieval policy, the Initiate Job operation will abort and throw an exception.
Using the AWS SDKs to Set Up a Data Retrieval Policy

AWS provides SDKs for you to develop applications for Glacier. These SDKs provide libraries that map to underlying REST API and provide objects that enable you to easily construct requests and process responses. For more information, see Using the AWS SDKs with Amazon S3 Glacier (p. 106).
Tagging Amazon S3 Glacier Resources

A tag is a label that you assign to an AWS resource. Each tag consists of a key and a value, both of which you define. You can assign the tags that you define to Amazon S3 Glacier (Glacier) vault resources. Using tags is a simple yet powerful way to manage AWS resources and organize data, including billing data.

Topics
- Tagging Basics (p. 145)
- Tag Restrictions (p. 145)
- Tracking Costs Using Tagging (p. 146)
- Managing Access Control with Tagging (p. 146)
- Related Sections (p. 146)

Tagging Basics

You use the Glacier console, AWS Command Line Interface (AWS CLI), or Glacier API to complete the following tasks:

- Adding tags to a vault
- Listing the tags for a vault
- Removing tags from a vault

For information about how to add, list, and remove tags, see Tagging Your Amazon S3 Glacier Vaults (p. 55).

You can use tags to categorize your vaults. For example, you can categorize vaults by purpose, owner, or environment. Because you define the key and value for each tag, you can create a custom set of categories to meet your specific needs. For example, you might define a set of tags that helps you track vaults by owner and purpose for the vault. Following are a few examples of tags:

- Owner: Name
- Purpose: Video archives
- Environment: Production

Tag Restrictions

Basic tag restrictions are as follows:

- The maximum number of tags for a resource (vault) is 50.
- Tag keys and values are case-sensitive.

Tag key restrictions are as follows:
Within a set of tags for a vault, each tag key must be unique. If you add a tag with a key that's already in use, your new tag overwrites the existing key-value pair.

- Tag keys cannot start with `aws:` because this prefix is reserved for use by AWS. AWS can create tags that begin with this prefix on your behalf, but you can't edit or delete them.
- Tag keys must be from 1 to 128 Unicode characters in length.
- Tag keys must consist of the following characters: Unicode letters, digits, white space, and the following special characters: _ . / = + - @.

Tag value restrictions are as follows:

- Tag values must be from 0 to 255 Unicode characters in length.
- Tag values can be blank. Otherwise, they must consist of the following characters: Unicode letters, digits, white space, and any of the following special characters: _ . / = + - @.

Tracking Costs Using Tagging

You can use tags to categorize and track your AWS costs. When you apply tags to any AWS resources, including vaults, your AWS cost allocation report includes usage and costs aggregated by tags. You can apply tags that represent business categories (such as cost centers, application names, and owners) to organize your costs across multiple services. For more information, see [Use Cost Allocation Tags for Custom Billing Reports](https://docs.aws.amazon.com/aws-cost-management/latest/userguide/cost-allocation-tag.html) in the [AWS Billing and Cost Management User Guide](https://docs.aws.amazon.com/aws-cost-management/latest/userguide/).

Managing Access Control with Tagging

You can use tags as a condition in an access policy statement. For example, you can set up a legal hold tag and include it as a condition in a data retention policy that states that "archive deletion from everyone will be denied if the legal hold tag value is set to `true`." You can deploy the data retention policy and set the legal hold tag to `false` under normal conditions. If your data must be put on hold to assist an investigation, you can easily turn on the legal hold by setting the tag value to `true` and removing the hold in a similar way later on. For more information, see [Controlling Access Using Tags](https://docs.aws.amazon.com/IAM/latest/UserGuide/id-policies-tag xy.html) in the [IAM User Guide](https://docs.aws.amazon.com/IAM/latest/UserGuide/id-policies-tag xy.html).

Related Sections

- [Tagging Your Amazon S3 Glacier Vaults](https://docs.aws.amazon.com/SGlacier/latest/dev/tagging.html) (p. 55)
Logging Amazon S3 Glacier API Calls with AWS CloudTrail

Amazon S3 Glacier (Glacier) is integrated with AWS CloudTrail, a service that provides a record of actions taken by a user, role, or an AWS service in Glacier. CloudTrail captures all API calls for Glacier as events, including calls from the Glacier console and from code calls to the Glacier APIs. If you create a trail, you can enable continuous delivery of CloudTrail events to an Amazon S3 bucket, including events for Glacier. If you don't configure a trail, you can still view the most recent events in the CloudTrail console in Event history. Using the information collected by CloudTrail, you can determine the request that was made to Glacier, the IP address from which the request was made, who made the request, when it was made, and additional details.

To learn more about CloudTrail, see the AWS CloudTrail User Guide.

Amazon S3 Glacier Information in CloudTrail

CloudTrail is enabled on your AWS account when you create the account. When activity occurs in Glacier, that activity is recorded in a CloudTrail event along with other AWS service events in Event history. You can view, search, and download recent events in your AWS account. For more information, see Viewing Events with CloudTrail Event History.

For an ongoing record of events in your AWS account, including events for Glacier, create a trail. A trail enables CloudTrail to deliver log files to an Amazon S3 bucket. By default, when you create a trail in the console, the trail applies to all regions. The trail logs events from all regions in the AWS partition and delivers the log files to the Amazon S3 bucket that you specify. Additionally, you can configure other AWS services to further analyze and act upon the event data collected in CloudTrail logs. For more information, see:

- Overview for Creating a Trail
- CloudTrail Supported Services and Integrations
- Configuring Amazon SNS Notifications for CloudTrail
- Receiving CloudTrail Log Files from Multiple Regions and Receiving CloudTrail Log Files from Multiple Accounts

All Glacier actions are logged by CloudTrail and are documented in the API Reference for Glacier (p. 150). For example, calls to the Create Vault (PUT vault) (p. 174), Delete Vault (DELETE vault) (p. 178), and List Vaults (GET vaults) (p. 199) actions generate entries in the CloudTrail log files.

Every event or log entry contains information about who generated the request. The identity information helps you determine the following:

- Whether the request was made with root or IAM user credentials.
- Whether the request was made with temporary security credentials for a role or federated user.
- Whether the request was made by another AWS service.

For more information, see the CloudTrail userIdentity Element.
A trail is a configuration that enables delivery of events as log files to an Amazon S3 bucket that you specify. CloudTrail log files contain one or more log entries. An event represents a single request from any source and includes information about the requested action, the date and time of the action, request parameters, and so on. CloudTrail log files are not an ordered stack trace of the public API calls, so they do not appear in any specific order.

The following example shows a CloudTrail log entry that demonstrates the Create Vault (PUT vault) (p. 174), Delete Vault (DELETE vault) (p. 178), List Vaults (GET vaults) (p. 199), and Describe Vault (GET vault) (p. 184) actions.

```
{
    "Records": [
    {
        "awsRegion": "us-east-1",
        "eventID": "52f8c821-002e-4549-857f-8193a15246fa",
        "eventName": "CreateVault",
        "eventSource": "glacier.amazonaws.com",
        "eventTime": "2014-12-10T19:05:15Z",
        "eventType": "AwsApiCall",
        "eventVersion": "1.02",
        "recipientAccountId": "999999999999",
        "requestID": "HJiLgvfXCY88Q5AC6rRoexS9ThvI21Q1Nqkfly02hcUPPo",
        "requestParameters": {
            "accountId": "-",
            "vaultName": "myVaultName"
        },
        "responseElements": {
            "location": "/999999999999/vaults/myVaultName"
        },
        "sourceIPAddress": "127.0.0.1",
        "userAgent": "aws-sdk-java/1.9.6 Mac_OS_X/10.9.5 Java_HotSpot(TM)_64-Bit_Server_VM/25.25-b02/1.8.0_25",
        "userIdentity": {
            "accessKeyId": "AKIAIOSFODNN7EXAMPLE",
            "accountId": "999999999999",
            "arn": "arn:aws:iam::999999999999:user/myUserName",
            "principalId": "A1B2C3D4E5F6G7EXAMPLE",
            "type": "IAMUser",
            "userName": "myUserName"
        }
    },
    {
        "awsRegion": "us-east-1",
        "eventID": "cdd33060-4758-416a-b7b9-daf3af6e90",
        "eventName": "DeleteVault",
        "eventSource": "glacier.amazonaws.com",
        "eventTime": "2014-12-10T19:05:15Z",
        "eventType": "AwsApiCall",
        "eventVersion": "1.02",
        "recipientAccountId": "999999999999",
        "requestID": "GGdw-VfhVFCfAM61VUVQ6-eFmwsqS09FmRdoRSa_Fc7c",
        "requestParameters": {
            "accountId": "-",
            "vaultName": "myVaultName"
        },
        "responseElements": null,
        "sourceIPAddress": "127.0.0.1",
        "userAgent": "aws-sdk-java/1.9.6 Mac_OS_X/10.9.5 Java_HotSpot(TM)_64-Bit_Server_VM/25.25-b02/1.8.0_25",
        "userIdentity": {
            "accessKeyId": "AKIAIOSFODNN7EXAMPLE",
            "accountID": "999999999999",
            "arn": "arn:aws:iam::999999999999:user/myUserName",
            "principalId": "A1B2C3D4E5F6G7EXAMPLE",
            "type": "IAMUser",
            "userName": "myUserName"
        }
    }
    ]
}
```
Amazon S3 Glacier Developer Guide
Understanding Amazon S3 Glacier Log File Entries

},
{

}

"accountId": "999999999999",
"arn": "arn:aws:iam::999999999999:user/myUserName",
"principalId": "A1B2C3D4E5F6G7EXAMPLE",
"type": "IAMUser",
"userName": "myUserName"

"awsRegion": "us-east-1",
"eventID": "355750b4-e8b0-46be-9676-e786b1442470",
"eventName": "ListVaults",
"eventSource": "glacier.amazonaws.com",
"eventTime": "2014-12-10T19:05:15Z",
"eventType": "AwsApiCall",
"eventVersion": "1.02",
"recipientAccountId": "999999999999",
"requestID": "yPTs22ghTsWprFivb-2u30FAaDALIZP17t4jM_xL9QJQyVA",
"requestParameters": {
"accountId": "-"
},
"responseElements": null,
"sourceIPAddress": "127.0.0.1",
"userAgent": "aws-sdk-java/1.9.6 Mac_OS_X/10.9.5 Java_HotSpot(TM)_64Bit_Server_VM/25.25-b02/1.8.0_25",
"userIdentity": {
"accessKeyId": "AKIAIOSFODNN7EXAMPLE",
"accountId": "999999999999",
"arn": "arn:aws:iam::999999999999:user/myUserName",
"principalId": "A1B2C3D4E5F6G7EXAMPLE",
"type": "IAMUser",
"userName": "myUserName"
}
},
{
"awsRegion": "us-east-1",
"eventID": "569e830e-b075-4444-a826-aa8b0acad6c7",
"eventName": "DescribeVault",
"eventSource": "glacier.amazonaws.com",
"eventTime": "2014-12-10T19:05:15Z",
"eventType": "AwsApiCall",
"eventVersion": "1.02",
"recipientAccountId": "999999999999",
"requestID": "QRt1ZdFLGn0TCm784HmKafBmcB2lVaV81UU3fsOR3PtoIiM",
"requestParameters": {
"accountId": "-",
"vaultName": "myVaultName"
},
"responseElements": null,
"sourceIPAddress": "127.0.0.1",
"userAgent": "aws-sdk-java/1.9.6 Mac_OS_X/10.9.5 Java_HotSpot(TM)_64Bit_Server_VM/25.25-b02/1.8.0_25",
"userIdentity": {
"accessKeyId": "AKIAIOSFODNN7EXAMPLE",
"accountId": "999999999999",
"arn": "arn:aws:iam::999999999999:user/myUserName",
"principalId": "A1B2C3D4E5F6G7EXAMPLE",
"type": "IAMUser",
"userName": "myUserName"
}
}
]
}

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API Reference for Glacier

Amazon S3 Glacier (Glacier) supports a set of operations—specifically, a set of RESTful API calls—that enable you to interact with the service.

You can use any programming library that can send HTTP requests to send your REST requests to Glacier. When sending a REST request, Glacier requires that you authenticate every request by signing the request. Additionally, when uploading an archive, you must also compute the checksum of the payload and include it in your request. For more information, see Signing Requests (p. 153).

If an error occurs, you need to know what Glacier sends in an error response so that you can process it. This section provides all this information, in addition to documenting the REST operations, so that you can make REST API calls directly.

You can either use the REST API calls directly or use the AWS SDKs that provide wrapper libraries to simplify your coding task. These libraries sign each request you send and compute the checksum of the payload in your request. Therefore, using the AWS SDKs simplifies your coding task. This developer guide provides working examples of basic Glacier operations using the AWS SDK for Java and .NET. For more information see, Using the AWS SDKs with Amazon S3 Glacier (p. 106).

Topics

• Common Request Headers (p. 150)
• Common Response Headers (p. 152)
• Signing Requests (p. 153)
• Computing Checksums (p. 156)
• Error Responses (p. 166)
• Vault Operations (p. 170)
• Archive Operations (p. 210)
• Multipart Upload Operations (p. 216)
• Job Operations (p. 237)
• Data Types Used in Job Operations (p. 267)
• Data Retrieval Operations (p. 280)

Common Request Headers

Amazon S3 Glacier (Glacier) REST requests include headers that contain basic information about the request. The following table describes headers that can be used by all Glacier REST requests.

<table>
<thead>
<tr>
<th>Header Name</th>
<th>Description</th>
<th>Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Authorization</td>
<td>The header that is required to sign requests. Glacier requires Signature Version 4. For more information, see Signing Requests (p. 153). Type: String</td>
<td>Yes</td>
</tr>
<tr>
<td>Content-Length</td>
<td>The length of the request body (without the headers). Type: String</td>
<td>Conditional</td>
</tr>
<tr>
<td></td>
<td>Condition: Required only for the Upload Archive (POST archive) (p. 212) API.</td>
<td></td>
</tr>
<tr>
<td>Header Name</td>
<td>Description</td>
<td>Required</td>
</tr>
<tr>
<td>-------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>----------------</td>
</tr>
<tr>
<td>Date</td>
<td>The date that can be used to create the signature contained in the Authorization header. If the Date header is to be used for signing it must be specified in the ISO 8601 basic format. In this case, the x-amz-date header is not needed. Note that when x-amz-date is present, it always overrides the value of the Date header. If the Date header is not used for signing, it can be one of the full date formats specified by RFC 2616, section 3.3. For example, the following date/time Wed, 10 Feb 2017 12:00:00 GMT is a valid date/time header for use with Glacier. If you are using the Date header for signing, then it must be in the ISO 8601 basic YYYYMMDD'T'HHMMSS'Z' format. Type: String Condition: If Date is specified but is not in ISO 8601 basic format, then you must also include the x-amz-date header. If Date is specified in ISO 8601 basic format, then this is sufficient for signing requests and you do not need the x-amz-date header. For more information, see Handling Dates in Signature Version 4 in the Amazon Web Services Glossary.</td>
<td></td>
</tr>
<tr>
<td>Host</td>
<td>This header specifies the service endpoint to which you send your requests. The value must be of the form &quot;glacier.&lt;region&gt;.amazonaws.com&quot;, where region is replaced with a region designation such as us-west-2. Type: String</td>
<td></td>
</tr>
<tr>
<td>x-amz-content-sha256</td>
<td>The computed SHA256 checksum of an entire payload that is uploaded with either Upload Archive (POST archive) (p. 212) or Upload Part (PUT uploadID) (p. 234). This header is not the same as the x-amz-sha256-tree-hash header, though, for some small payloads the values are the same. When x-amz-content-sha256 is required, both x-amz-content-sha256 and x-amz-sha256-tree-hash must be specified. Type: String Condition: Required for streaming API, Upload Archive (POST archive) (p. 212) and Upload Part (PUT uploadID) (p. 234).</td>
<td></td>
</tr>
</tbody>
</table>
Common Response Headers

The following table describes response headers that are common to most API responses.

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Content-Length</td>
<td>The length in bytes of the response body.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Type: String</td>
<td></td>
</tr>
<tr>
<td>Date</td>
<td>The date and time Amazon S3 Glacier (Glacier) responded, for example, Wed, 10 Feb 2017 12:00:00 GMT. The format of the date must be one of the full date formats specified by RFC 2616, section 3.3. Note that Date returned may drift slightly from other dates, so for example, the date returned from an Upload Archive (POST archive) (p. 212) request may not match the date shown for the archive in an inventory list for the vault.</td>
<td></td>
</tr>
</tbody>
</table>

Header Name | Description                                                                                                                                                                                                 | Required |
---          | ---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|
|x-amz-date  | The date used to create the signature in the Authorization header. The format must be ISO 8601 basic in the `YYYYMMDD'T'HHMMSS'Z'` format. For example, the following date/time `20170210T120000Z` is a valid x-amz-date for use with Glacier. Type: String  
Condition: x-amz-date is optional for all requests; it can be used to override the date used for signing requests. If the Date header is specified in the ISO 8601 basic format, then x-amz-date is not needed. When x-amz-date is present, it always overrides the value of the Date header. For more information, see Handling Dates in Signature Version 4 in the Amazon Web Services Glossary. | Conditional |
|x-amz-glacier-version| The Glacier API version to use. The current version is 2012-06-01. Type: String | Yes |
|x-amz-sha256-tree-hash| The computed SHA256 tree-hash checksum for an uploaded archive (Upload Archive (POST archive) (p. 212)) or archive part (Upload Part (PUT uploadID) (p. 234)). For more information about calculating this checksum, see Computing Checksums (p. 156). Type: String  
Default: None  
Condition: Required for Upload Archive (POST archive) (p. 212) and Upload Part (PUT uploadID) (p. 234). | Conditional |
## Signing Requests

Glacier requires that you authenticate every request you send by signing the request. To sign a request, you calculate a digital signature using a cryptographic hash function. A cryptographic hash is a function that returns a unique hash value based on the input. The input to the hash function includes the text of your request and your secret access key. The hash function returns a hash value that you include in the request as your signature. The signature is part of the `Authorization` header of your request.

After receiving your request, Glacier recalculates the signature using the same hash function and input that you used to sign the request. If the resulting signature matches the signature in the request, Glacier processes the request. Otherwise, the request is rejected.

Glacier supports authentication using AWS Signature Version 4. The process for calculating a signature can be broken into three tasks:

1. **Task 1: Create a Canonical Request**
   Rearrange your HTTP request into a canonical format. Using a canonical form is necessary because Glacier uses the same canonical form when it recalculates a signature to compare with the one you sent.

2. **Task 2: Create a String to Sign**
   Create a string that you will use as one of the input values to your cryptographic hash function. The string, called the `string to sign`, is a concatenation of the name of the hash algorithm, the request date, a `credential scope` string, and the canonicalized request from the previous task. The `credential scope` string itself is a concatenation of date, region, and service information.

3. **Task 3: Create a Signature**
   Create a signature for your request by using a cryptographic hash function that accepts two input strings: `your string to sign` and a `derived key`. The `derived key` is calculated by starting with your secret access key and using the `credential scope` string to create a series of hash-based message authentication codes (HMACs). Note that the hash function used in this signing step is not the tree-hash algorithm used in Glacier APIs that upload data.

### Topics

- Example Signature Calculation (p. 154)
- Calculating Signatures for the Streaming Operations (p. 155)
Example Signature Calculation

The following example walks you through the details of creating a signature for Create Vault (PUT vault) (p. 174). The example could be used as a reference to check your signature calculation method. Other reference calculations are included in the Signature Version 4 Test Suite of the Amazon Web Services Glossary.

The example assumes the following:

- The time stamp of the request is Fri, 25 May 2012 00:24:53 GMT.
- The endpoint is US East (N. Virginia) Region us-east-1.

The general request syntax (including the JSON body) is:

```
PUT /-/vaults/examplevault HTTP/1.1
Host: glacier.us-east-1.amazonaws.com
Date: Fri, 25 May 2012 00:24:53 GMT
Authorization: SignatureToBeCalculated
x-amz-glacier-version: 2012-06-01
```

The canonical form of the request calculated for Task 1: Create a Canonical Request (p. 153) is:

```
P/-/vaults/examplevault
host:glacier.us-east-1.amazonaws.com
x-amz-date:20120525T002453Z
x-amz-glacier-version:2012-06-01
host;x-amz-date;x-amz-glacier-version
```

The last line of the canonical request is the hash of the request body. Also, note the empty third line in the canonical request. This is because there are no query parameters for this API.

The string to sign for Task 2: Create a String to Sign (p. 153) is:

```
AWS4-HMAC-SHA256
20120525T002453Z
20120525/us-east-1/glacier/aws4_request
```

The first line of the string to sign is the algorithm, the second line is the time stamp, the third line is the credential scope, and the last line is a hash of the canonical request from Task 1: Create a Canonical Request (p. 153). The service name to use in the credential scope is glacier.

For Task 3: Create a Signature (p. 153), the derived key can be represented as:

```
derived key = HMAC(HMAC(HMAC(HMAC("AWS4" + YourSecretAccessKey,"20120525"),"us-east-1"),"glacier"),"aws4_request")
```

If the secret access key, wJalrXUtnFEMI/K7MDENG/bPxRfiCYEXAMPLEKEY, is used, then the calculated signature is:

```
3ce5b2f2ffac9262b4da9256f8d086b4aaf42eba5f111c21681a65a127b7c2a
```
Calculating Signatures for the Streaming Operations

Upload Archive (POST archive) (p. 212) and Upload Part (PUT uploadID) (p. 234) are streaming operations that require you to include an additional header `x-amz-content-sha256` when signing and sending your request. The signing steps for the streaming operations are exactly the same as those for other operations, with the addition of the streaming header.

The calculation of the streaming header `x-amz-content-sha256` is based on the SHA256 hash of the entire content (payload) that is to be uploaded. Note that this calculation is different from the SHA256 tree hash (Computing Checksums (p. 156)). Besides trivial cases, the SHA 256 hash value of the payload data will be different from the SHA256 tree hash of the payload data.

If the payload data is specified as a byte array, you can use the following Java code snippet to calculate the SHA256 hash.

```java
class com.amazonaws.util.EC2MetadataUtils
{
    public static byte[] computePayloadSHA256Hash2(byte[] payload) throws
    NoSuchAlgorithmException, IOException {
        BufferedInputStream bis =
        new BufferedInputStream(new ByteArrayInputStream(payload));
        MessageDigest messageDigest = MessageDigest.getInstance("SHA-256");
        byte[] buffer = new byte[4096];
        int bytesRead = -1;
        while ( (bytesRead = bis.read(buffer, 0, buffer.length)) != -1 ) {
            messageDigest.update(buffer, 0, bytesRead);
        }
        return messageDigest.digest();
    }
}
```

Similarly, in C# you can calculate the SHA256 hash of the payload data as shown in the following code snippet.

```csharp
class com.amazonaws.util.EC2MetadataUtils
{
    public static byte[] CalculateSHA256Hash(byte[] payload)
    {
        byte[] hash = sha256.ComputeHash(payload);
        return hash;
    }
}
```

Example Signature Calculation for Streaming API

The following example walks you through the details of creating a signature for Upload Archive (POST archive) (p. 212), one of the two streaming APIs in Glacier. The example assumes the following:

- The time stamp of the request is Mon, 07 May 2012 00:00:00 GMT.
- The endpoint is the US East (N. Virginia) Region, us-east-1.
- The content payload is a string "Welcome to Glacier."
Computing Checksums

When uploading an archive, you must include both the x-amz-sha256-tree-hash and x-amz-content-sha256 headers. The x-amz-sha256-tree-hash header is a checksum of the payload in your request body. This topic describes how to calculate the x-amz-sha256-tree-hash header. The x-amz-content-sha256 header is a hash of the entire payload and is required for authorization. For more information, see Example Signature Calculation for Streaming API (p. 155).

The payload of your request can be an:

- **Entire archive**— When uploading an archive in a single request using the Upload Archive API, you send the entire archive in the request body. In this case, you must include the checksum of the entire archive.

- **Archive part**— When uploading an archive in parts using the multipart upload API, you send only a part of the archive in the request body. In this case, you include the checksum of the archive part. And after you upload all the parts, you send a Complete Multipart Upload request, which must include the checksum of the entire archive.
The checksum of the payload is a SHA-256 tree hash. It is called a tree hash because in the process of computing the checksum you compute a tree of SHA-256 hash values. The hash value at the root is the checksum for the entire archive.

**Note**
This section describes a way to compute the SHA-256 tree hash. However, you may use any procedure as long as it produces the same result.

You compute the SHA-256 tree hash as follows:

1. For each 1 MB chunk of payload data, compute the SHA-256 hash. The last chunk of data can be less than 1 MB. For example, if you are uploading a 3.2 MB archive, you compute the SHA-256 hash values for each of the first three 1 MB chunks of data, and then compute the SHA-256 hash of the remaining 0.2 MB data. These hash values form the leaf nodes of the tree.
2. Build the next level of the tree.
   a. Concatenate two consecutive child node hash values and compute the SHA-256 hash of the concatenated hash values. This concatenation and generation of the SHA-256 hash produces a parent node for the two child nodes.
   b. When only one child node remains, you promote that hash value to the next level in the tree.
3. Repeat step 2 until the resulting tree has a root. The root of the tree provides a hash of the entire archive and a root of the appropriate subtree provides the hash for the part in a multipart upload.

**Topics**
- Tree Hash Example 1: Uploading an archive in a single request (p. 157)
- Tree Hash Example 2: Uploading an archive using a multipart upload (p. 158)
- Computing the Tree Hash of a File (p. 159)
- Receiving Checksums When Downloading Data (p. 165)

**Tree Hash Example 1: Uploading an archive in a single request**

When you upload an archive in a single request using the Upload Archive API (see Upload Archive (POST archive) (p. 212)), the request payload includes the entire archive. Accordingly, you must include the tree hash of the entire archive in the `x-amz-sha256-tree-hash` request header. Suppose you want to upload a 6.5 MB archive. The following diagram illustrates the process of creating the SHA-256 hash of the archive. You read the archive and compute the SHA-256 hash for each 1 MB chunk. You also compute the hash for the remaining 0.5 MB data and then build the tree as outlined in the preceding procedure.
Tree Hash Example 2: Uploading an archive using a multipart upload

The process of computing the tree hash when uploading an archive using multipart upload is the same when uploading the archive in a single request. The only difference is that in a multipart upload you upload only a part of the archive in each request (using the Upload Part (PUT uploadID) (p. 234) API), and therefore you provide the checksum of only the part in the x-amz-sha256-tree-hash request header. However, after you upload all parts, you must send the Complete Multipart Upload (see Complete Multipart Upload (POST uploadID) (p. 218)) request with a tree hash of the entire archive in the x-amz-sha256-tree-hash request header.
Computing the Tree Hash of a File

The algorithms shown here are selected for demonstration purposes. You can optimize the code as needed for your implementation scenario. If you are using an AWS SDK to program against Amazon S3 Glacier (Glacier), the tree hash calculation is done for you and you only need to provide the file reference.

Example 1: Java Example

The following example shows how to calculate the SHA256 tree hash of a file using Java. You can run this example by either supplying a file location as an argument or you can use the `TreeHashExample.computeSHA256TreeHash` method directly from your code.

```java
import java.io.File;
import java.io.FileInputStream;
import java.io.IOException;
import java.security.MessageDigest;
import java.security.NoSuchAlgorithmException;

public class TreeHashExample {

    static final int ONE_MB = 1024 * 1024;

    public static void main(String[] args) {
        if (args.length < 1) {
            System.err.println("Missing required filename argument");
            System.exit(-1);
        }

        File inputFile = new File(args[0]);
        try {
            byte[] treeHash = computeSHA256TreeHash(inputFile);
            System.out.printf("SHA-256 Tree Hash = %s
", toHex(treeHash));
        } catch (IOException ioe) {
            System.err.format("Exception when reading from file %s: %s", inputFile, ioe.getMessage());
            System.exit(-1);
        } catch (NoSuchAlgorithmException nsae) {
            System.err.format("Cannot locate MessageDigest algorithm for SHA-256: %s", nsae.getMessage());
            System.exit(-1);
        }
    }

    public static byte[] computeSHA256TreeHash(File inputFile) throws IOException, NoSuchAlgorithmException {
        FileInputStream fis = new FileInputStream(inputFile);
        MessageDigest md = MessageDigest.getInstance("SHA-256");
        byte[] buffer = new byte[ONE_MB];
        int n;
        while ((n = fis.read(buffer)) > 0) {
            md.update(buffer, 0, n);
        }
        fis.close();
        return md.digest();
    }
}
```

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public static byte[][] computeSHA256TreeHash(File inputFile) throws IOException, NoSuchAlgorithmException {
    byte[][] chunkSHA256Hashes = getChunkSHA256Hashes(inputFile);
    return computeSHA256TreeHash(chunkSHA256Hashes);
}

/**
 * Computes a SHA256 checksum for each 1 MB chunk of the input file. This
 * includes the checksum for the last chunk even if it is smaller than 1 MB.
 * @param file
 *            A file to compute checksums on
 * @return a byte[][] containing the checksums of each 1 MB chunk
 * @throws IOException
 *             Thrown if there's an IOException when reading the file
 * @throws NoSuchAlgorithmException
 *             Thrown if SHA-256 MessageDigest can't be found
 */
public static byte[][] getChunkSHA256Hashes(File file) throws IOException, NoSuchAlgorithmException {
    MessageDigest md = MessageDigest.getInstance("SHA-256");
    long numChunks = file.length() / ONE_MB;
    if (file.length() % ONE_MB > 0) {
        numChunks++;
    }
    byte[][] chunkSHA256Hashes = new byte[(int) numChunks][];
    FileInputStream fileStream = null;
    try {
        fileStream = new FileInputStream(file);
        byte[] buff = new byte[ONE_MB];
        int bytesRead;
        int idx = 0;
        while ((bytesRead = fileStream.read(buff, 0, ONE_MB)) > 0) {
            md.reset();
            md.update(buff, 0, bytesRead);
            chunkSHA256Hashes[idx++] = md.digest();
        }
        return chunkSHA256Hashes;
    } finally {
        if (fileStream != null) {
            try {
                fileStream.close();
            } catch (IOException ioe) {
                System.err.printf("Exception while closing %s.\n %s", file.getName(), ioe.getMessage());
            }
        }
    }
}

/**
 * Computes the SHA-256 tree hash for the passed array of 1 MB chunk

* This method uses a pair of arrays to iteratively compute the tree hash level by level. Each iteration takes two adjacent elements from the previous level source array, computes the SHA-256 hash on their concatenated value and places the result in the next level's destination array. At the end of an iteration, the destination array becomes the source array for the next level.

* @param chunkSHA256Hashes
* An array of SHA-256 checksums
* @return A byte[] containing the SHA-256 tree hash for the input chunks
* @throws NoSuchAlgorithmException
* Thrown if SHA-256 MessageDigest can't be found
*/
public static byte[] computeSHA256TreeHash(byte[][] chunkSHA256Hashes)
throws NoSuchAlgorithmException {
    MessageDigest md = MessageDigest.getInstance("SHA-256");
    byte[][] prevLvlHashes = chunkSHA256Hashes;

    while (prevLvlHashes.length > 1) {
        int len = prevLvlHashes.length / 2;
        if (prevLvlHashes.length % 2 != 0) {
            len++;
        }

        byte[][] currLvlHashes = new byte[len][];
        int j = 0;
        for (int i = 0; i < prevLvlHashes.length; i = i + 2, j++) {
            // If there are at least two elements remaining
            if (prevLvlHashes.length - i > 1) {
                // Calculate a digest of the concatenated nodes
                md.reset();
                md.update(prevLvlHashes[i]);
                md.update(prevLvlHashes[i + 1]);
                currLvlHashes[j] = md.digest();
            } else { // Take care of remaining odd chunk
                currLvlHashes[j] = prevLvlHashes[i];
            }
        }

        prevLvlHashes = currLvlHashes;
    }
    return prevLvlHashes[0];
}

/**
 * Returns the hexadecimal representation of the input byte array
 * @param data
 * a byte[] to convert to Hex characters
 * @return A String containing Hex characters
 */
public static String toHex(byte[] data) {
    StringBuilder sb = new StringBuilder(data.length * 2);
    for (int i = 0; i < data.length; i++) {
        String hex = Integer.toHexString(data[i] & 0xFF);
        sb.append(hex);
    }
    return sb.toString();
}
if (hex.length() == 1) {
    // Append leading zero.
    sb.append("0");
} else {
    sb.append(hex);
}
return sb.toString().toLowerCase();

Example 2: C# .NET Example

The following example shows how to calculate the SHA256 tree hash of a file. You can run this example by supplying a file location as an argument.

```csharp
using System;
using System.IO;

namespace ExampleTreeHash
{
    class Program
    {
        static int ONE_MB = 1024 * 1024;

        /**
         * Compute the Hex representation of the SHA-256 tree hash for the
         * specified file
         *
         * @param args
         *            args[0]: a file to compute a SHA-256 tree hash for
         */
        public static void Main(string[] args)
        {
            if (args.Length < 1)
            {
                Console.WriteLine("Missing required filename argument");
                Environment.Exit(-1);
            }
            try
            {
                FileStream inputFile = File.Open(args[0], FileMode.Open, FileAccess.Read);
                byte[] treeHash = ComputeSHA256TreeHash(inputFile);
                Console.WriteLine("SHA-256 Tree Hash = {0}", BitConverter.ToString(treeHash).Replace("-", ",").ToLower());
                Console.ReadLine();
                Environment.Exit(-1);
            }
            catch (IOException ioe)
            {
                Console.WriteLine("Exception when reading from file {0}: {1}", inputFile, ioe.Message);
                Console.ReadLine();
                Environment.Exit(-1);
            }
            catch (Exception e)
            {
                Console.WriteLine("Cannot locate MessageDigest algorithm for SHA-256: {0}", e.Message);
                Console.ReadLine();
                Environment.Exit(-1);
            }
        }
    }
}
```
/**
 * Computes the SHA-256 tree hash for the given file
 * @param inputFile
 * A file to compute the SHA-256 tree hash for
 * @return a byte[] containing the SHA-256 tree hash
 */
public static byte[] ComputeSHA256TreeHash(FileStream inputFile)
{
    byte[][] chunkSHA256Hashes = GetChunkSHA256Hashes(inputFile);
    return ComputeSHA256TreeHash(chunkSHA256Hashes);
}

/**
 * Computes a SHA256 checksum for each 1 MB chunk of the input file. This
 * includes the checksum for the last chunk even if it is smaller than 1 MB.
 * @param file
 * A file to compute checksums on
 * @return a byte[][] containing the checksums of each 1MB chunk
 */
public static byte[][] GetChunkSHA256Hashes(FileStream file)
{
    long numChunks = file.Length / ONE_MB;
    if (file.Length % ONE_MB > 0)
    {
        numChunks++;
    }
    if (numChunks == 0)
    {
        return new byte[][][] { CalculateSHA256Hash(null, 0) };
    }
    byte[][] chunkSHA256Hashes = new byte[(int)numChunks][];
    try
    {
        byte[] buff = new byte[ONE_MB];
        int bytesRead;
        int idx = 0;
        while ((bytesRead = file.Read(buff, 0, ONE_MB)) > 0)
        {
            chunkSHA256Hashes[idx++] = CalculateSHA256Hash(buff, bytesRead);
        }
        return chunkSHA256Hashes;
    }
    finally
    {
        if (file != null)
        {
            try
            {
                file.Close();
            }
            catch (IOException ioe)
            {
                throw ioe;
            }
        }
    }
}
Computing the Tree Hash of a File

/**
 * Computes the SHA-256 tree hash for the passed array of 1MB chunk checksums.
 * This method uses a pair of arrays to iteratively compute the tree hash level by level. Each iteration takes two adjacent elements from the previous level source array, computes the SHA-256 hash on their concatenated value and places the result in the next level’s destination array. At the end of an iteration, the destination array becomes the source array for the next level.
 *
 * @param chunkSHA256Hashes            An array of SHA-256 checksums
 * @return A byte[] containing the SHA-256 tree hash for the input chunks
 */
public static byte[] ComputeSHA256TreeHash(byte[][] chunkSHA256Hashes)
{
    byte[][] prevLvlHashes = chunkSHA256Hashes;
    while (prevLvlHashes.GetLength(0) > 1)
    {
        int len = prevLvlHashes.GetLength(0) / 2;
        if (prevLvlHashes.GetLength(0) % 2 != 0)
        {
            len++;
        }

        byte[][] currLvlHashes = new byte[len][];
        int j = 0;
        for (int i = 0; i < prevLvlHashes.GetLength(0); i = i + 2, j++)
        {
            // If there are at least two elements remaining
            if (prevLvlHashes.GetLength(0) - i > 1)
            {
                // Calculate a digest of the concatenated nodes
                byte[] firstPart = prevLvlHashes[i];
                byte[] secondPart = prevLvlHashes[i + 1];
                byte[] concatenation = new byte[firstPart.Length + secondPart.Length];
                System.Buffer.BlockCopy(firstPart, 0, concatenation, 0, firstPart.Length);
                System.Buffer.BlockCopy(secondPart, 0, concatenation, firstPart.Length, secondPart.Length);

                currLvlHashes[j] = CalculateSHA256Hash(concatenation, concatenation.Length);
            }
            else
            {
                // Take care of remaining odd chunk
                currLvlHashes[j] = prevLvlHashes[i];
            }
        }

        prevLvlHashes = currLvlHashes;
    }

    return prevLvlHashes[0];
}
Receiving Checksums When Downloading Data

When you retrieve an archive using the Initiate Job API (see Initiate Job (POST jobs) (p. 251)), you can optionally specify a range to retrieve of the archive. Similarly, when you download your data using the Get Job Output API (see Get Job Output (GET output) (p. 245)), you can optionally specify a range of data to download. There are two characteristics of these ranges that are important to understand when you are retrieving and downloading your archive's data. The range to retrieve is required to be megabyte aligned to the archive. Both the range to retrieve and the range to download must be tree hash aligned in order to receive checksum values when you download your data. The definition of these two types of range alignments are as follows:

- **Megabyte aligned** - A range $[\text{StartByte}, \text{EndBytes}]$ is megabyte (1024*1024) aligned when $\text{StartBytes}$ is divisible by 1 MB and $\text{EndBytes} + 1$ is divisible by 1 MB or is equal to the end of the archive specified (archive byte size minus 1). A range used in the Initiate Job API, if specified, is required to be megabyte aligned.

- **Tree-hash aligned** - A range $[\text{StartBytes}, \text{EndBytes}]$ is tree hash aligned with respect to an archive if and only if the root of the tree hash built over the range is equivalent to a node in the tree hash of the whole archive. Both the range to retrieve and range to download must be tree hash aligned in order to receive checksum values for the data you download. For an example of ranges and their relationship to the archive tree hash, see Tree Hash Example: Retrieving an archive range that is tree-hash aligned (p. 166).

Note that a range that is tree-hash aligned is also megabyte aligned. However, a megabyte aligned range is not necessarily tree-hash aligned.

The following cases describe when you receive a checksum value when you download your archive data:

- If you do not specify a range to retrieve in the Initiate Job request and you download the whole archive in the Get Job Request.
- If you do not specify a range to retrieve in the Initiate Job request and you do specify a tree-hash aligned range to download in the Get Job Request.
- If you specify a tree-hash aligned range to retrieve in the Initiate Job request and you download the whole range in the Get Job Request.
- If you specify a tree-hash aligned range to retrieve in the Initiate Job request and you specify a tree-hash aligned range to download in the Get Job Request.

If you specify a range to retrieve in the Initiate Job request that is not tree hash aligned, then you can still get your archive data but no checksum values are returned when you download data in the Get Job Request.
Tree Hash Example: Retrieving an archive range that is tree-hash aligned

Suppose you have a 6.5 MB archive in your vault and you want to retrieve 2 MB of the archive. How you specify the 2 MB range in the Initiate Job request determines if you receive data checksum values when you download your data. The following diagram illustrates two 2 MB ranges for the 6.5 MB archive that you could download. Both ranges are megabyte aligned, but only one is tree-hash aligned.

Tree-Hash Aligned Range Specification

This section gives the exact specification for what constitutes a tree-hash aligned range. Tree-hash aligned ranges are important when you are downloading a portion of an archive and you specify the range of data to retrieve and the range to download from the retrieved data. If both of these ranges are tree-hash aligned, then you will receive checksum data when you download the data.

A range \([A, B]\) is tree-hash aligned with respect to an archive if and only if when a new tree hash is built over \([A, B]\), the root of the tree hash of that range is equivalent to a node in the tree hash of the whole archive. You can see this shown in the diagram in Tree Hash Example: Retrieving an archive range that is tree-hash aligned (p. 166). In this section, we provide the specification for tree-hash alignment.

Consider \([P, Q]\) as the range query for an archive of \(N\) megabytes (MB) and \(P\) and \(Q\) are multiples of one MB. Note that the actual inclusive range is \([P\ MB, Q\ MB – 1\ byte]\), but for simplicity, we show it as \([P, Q]\). With these considerations, then

- If \(P\) is an odd number, there is only one possible tree-hash aligned range—that is \([P, P + 1\ MB]\).
- If \(P\) is an even number and \(k\) is the maximum number, where \(P\) can be written as \(2k * X\), then there are at most \(k\) tree-hash aligned ranges that start with \(P\). \(X\) is an integer greater than 0. The tree-hash aligned ranges fall in the following categories:
  - For each \(i\), where \((0 \leq i \leq k)\) and where \(P + 2^i < N\), then \([P, Q + 2^i]\) is a tree-hash aligned range.
  - \(P = 0\) is the special case where \(A = 2[\log_2 N]^0\)

Error Responses

In the event of an error, the API returns one of the following exceptions:
<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>HTTP Status Code</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>AccessDeniedException</td>
<td>Returned if there was an attempt to access a resource not allowed by an AWS Identity and Access Management (IAM) policy, or the incorrect AWS Account ID was used in the request URI. For more information, see Identity and Access Management in Amazon S3 Glacier (p. 114).</td>
<td>403 Forbidden</td>
<td>Client</td>
</tr>
<tr>
<td>BadRequest</td>
<td>Returned if the request cannot be processed.</td>
<td>400 Bad Request</td>
<td>Client</td>
</tr>
<tr>
<td>ExpiredTokenException</td>
<td>Returned if the security token used in the request has expired.</td>
<td>403 Forbidden</td>
<td>Client</td>
</tr>
<tr>
<td>InsufficientCapacityException</td>
<td>Returned if there is insufficient capacity to process the expedited request. This error only applies to expedited retrievals and not to standard or bulk retrievals.</td>
<td>503 Service Unavailable</td>
<td>Server</td>
</tr>
<tr>
<td>InvalidParameterValueException</td>
<td>Returned if a parameter of the request is incorrectly specified.</td>
<td>400 Bad Request</td>
<td>Client</td>
</tr>
<tr>
<td>InvalidSignatureException</td>
<td>Returned if the request signature is invalid.</td>
<td>403 Forbidden</td>
<td>Client</td>
</tr>
<tr>
<td>LimitExceededException</td>
<td>Returned if the request results in one of the following limits being exceeded, a vault limit, a tags limit, or the provisioned capacity limit.</td>
<td>400 Bad Request</td>
<td>Client</td>
</tr>
<tr>
<td>MissingAuthenticationTokenException</td>
<td>Returned if no authentication data is found for the request.</td>
<td>400 Bad Request</td>
<td>Client</td>
</tr>
<tr>
<td>MissingParameterValueException</td>
<td>Returned if a required header or parameter is missing from the request.</td>
<td>400 Bad Request</td>
<td>Client</td>
</tr>
<tr>
<td>PolicyEnforcedException</td>
<td>Returned if a retrieval job will exceed the current data policy's retrieval rate limit. For more information about data retrieval policies, see Amazon S3 Glacier Data Retrieval Policies (p. 141).</td>
<td>400 Bad Request</td>
<td>Client</td>
</tr>
<tr>
<td>ResourceNotFoundException</td>
<td>Returned if the specified resource such as a vault, upload ID, or job ID does not exist.</td>
<td>404 Not Found</td>
<td>Client</td>
</tr>
<tr>
<td>RequestTimeoutException</td>
<td>Returned if uploading an archive and Amazon S3 Glacier (Glacier) times out while receiving the upload.</td>
<td>408 Request Timeout</td>
<td>Client</td>
</tr>
</tbody>
</table>
Example 1: Describe Job request with a job ID that does not exist

Suppose you send a Describe Job (GET JobID) request for a job that does not exist. That is, you specify a job ID that does not exist.

```
GET /-/vaults/examplevault/jobs/HkF9p6o7yjhFx-K3CGl6fuSm6VzW9T7easQFco8nUXVYwSojib5gq1JZ55yHgt5vP542ShjoQsQVVEAMPLEbadJobID HTTP/1.1
Host: glacier.us-west-2.amazonaws.com
Date: 20170210T120000Z
x-amz-glacier-version: 2012-06-01
Authorization: AWS4-HMAC-SHA256 Credential=AKIAIOSFODNN7EXAMPLE/20141123/us-west-2/glacier/aws4_request,SignedHeaders=host;x-amz-date;x-amz-glacier-version,Signature=9257c16da6b25a715ce900a5b45b03da0447acf430195dcb540091b129666f2a2
```

In response, Glacier returns the following error response.

```
HTTP/1.1 404 Not Found
x-amzn-RequestId: AAABaZ9N91iyv4N7srw3ABEpSQkuFtmH3NP6aAC51ixfjg
Content-Type: application/json
Content-Length: 185
Date: Wed, 10 Feb 2017 12:00:00 GMT
{
"code": "ResourceNotFoundException",
"message": "The job ID was not found: HkF9p6o7yjhFx-K3CGl6fuSm6VzW9T7easQFco8nUXVYwSojib5gq1JZ55yHgt5vP542ShjoQsQVVEAMPLEbadJobID",
"type": "Client"
}
```

Where:

**Code**

One of the general exceptions.
Type: String

Message

A generic description of the error condition specific to the API that returns the error.

Type: String

Type

The source of the error. The field can be one of the following values: Client, Server, or Unknown.

Type: String.

Note the following in the preceding response:

- For the error response, Glacier returns status code values of 4xx and 5xx. In this example, the status code is 404 Not Found.
- The Content-Type header value application/json indicates JSON in the body
- The JSON in the body provides the error information.

In the previous request, instead of a bad job ID, suppose you specify a vault that does not exist. The response returns a different message.

```
HTTP/1.1 404 Not Found
x-amzn-RequestId: AAABBeC92w0rp_5D0L8Vf3FA_WITupqTKAuehMcPhdgni0
Content-Type: application/json
Content-Length: 154
Date: Wed, 10 Feb 2017 12:00:00 GMT
{
    "code": "ResourceNotFoundException",
    "type": "Client"
}
```

Example 2: List Jobs request with an invalid value for the request parameter

In this example you send a List Jobs (GET jobs) request to retrieve vault jobs with a specific statuscode, and you provide an incorrect statuscode value finished, instead of the acceptable values InProgress, Succeeded, or Failed.

```
GET /-/vaults/examplevault/jobs?statuscode=finished HTTP/1.1
Host: glacier.us-west-2.amazonaws.com
Date: 20170210T120000Z
x-amz-glacier-version: 2012-06-01
Authorization: AWS4-HMAC-SHA256 Credential=AKIAIOSFODNN7EXAMPLE/20141123/us-west-2/glacier/aws4_request,SignedHeaders=host;x-amz-date;x-amz-glacier-version,Signature=9257c16da6b25a715ce900a5b45b03da0447acf430195dcb540091b12966f2a2

Glacier returns the InvalidParameterValueException with an appropriate message.
```

HTTP/1.1 400 Bad Request
x-amzn-RequestId: AAABa29N92I1yv4N7sru3ABEp5QkuFtmHSNP6aAC5ilxfjg
Content-Type: application/json
Vault Operations

The following are the vault operations available in Glacier.

Topics

- Abort Vault Lock (DELETE lock-policy) (p. 170)
- Add Tags To Vault (POST tags add) (p. 172)
- Create Vault (PUT vault) (p. 174)
- Complete Vault Lock (POST lockId) (p. 176)
- Delete Vault (DELETE vault) (p. 178)
- Delete Vault Access Policy (DELETE access-policy) (p. 180)
- Delete Vault Notifications (DELETE notification-configuration) (p. 182)
- Describe Vault (GET vault) (p. 184)
- Get Vault Access Policy (GET access-policy) (p. 186)
- Get Vault Lock (GET lock-policy) (p. 189)
- Get Vault Notifications (GET notification-configuration) (p. 192)
- Initiate Vault Lock (POST lock-policy) (p. 194)
- List Tags For Vault (GET tags) (p. 197)
- List Vaults (GET vaults) (p. 199)
- Remove Tags From Vault (POST tags remove) (p. 203)
- Set Vault Access Policy (PUT access-policy) (p. 206)
- Set Vault Notification Configuration (PUT notification-configuration) (p. 208)

Abort Vault Lock (DELETE lock-policy)

Description

This operation aborts the vault locking process if the vault lock is not in the Locked state. If the vault lock is in the InProgress state when this operation is requested, the operation returns an AccessDeniedException error. Aborting the vault locking process removes the vault lock policy from the specified vault.

A vault lock is put into the InProgress state by calling Initiate Vault Lock (POST lock-policy) (p. 194). A vault lock is put into the Locked state by calling Complete Vault Lock (POST lockId) (p. 176). You can get the state of a vault lock by calling Get Vault Lock (GET lock-policy) (p. 189). For more information about the vault locking process, see Amazon S3 Glacier Vault Lock (p. 56). For more information about vault lock policies, see Amazon S3 Glacier Access Control with Vault Lock Policies (p. 126).

This operation is idempotent. You can successfully invoke this operation multiple times, if the vault lock is in the InProgress state or if there is no policy associated with the vault.
Requests

To delete the vault lock policy, send an HTTP DELETE request to the URI of the vault's lock-policy subresource.

Syntax

```
DELETE /AccountId/vaults/vaultName/lock-policy HTTP/1.1
Host: glacier.Region.amazonaws.com
Date: Date
Authorization: SignatureValue
x-amz-glacier-version: 2012-06-01
```

Note

The AccountId value is the AWS account ID. This value must match the AWS account ID associated with the credentials used to sign the request. You can either specify an AWS account ID or optionally a single '-' (hyphen), in which case Amazon S3 Glacier uses the AWS account ID associated with the credentials used to sign the request. If you specify your account ID, do not include any hyphens ('-') in the ID.

Request Parameters

This operation does not use request parameters.

Request Headers

This operation uses only request headers that are common to all operations. For information about common request headers, see Common Request Headers (p. 150).

Request Body

This operation does not have a request body.

Responses

If the policy is successfully deleted, Glacier returns an HTTP 204 No Content response.

Syntax

```
HTTP/1.1 204 No Content
x-amzn-RequestId: x-amzn-RequestId
Date: Date
```

Response Headers

This operation uses only response headers that are common to most responses. For information about common response headers, see Common Response Headers (p. 152).

Response Body

This operation does not return a response body.

Errors

For information about Amazon S3 Glacier exceptions and error messages, see Error Responses (p. 166).
Examples

The following example demonstrates how to abort the vault locking process.

Example Request

In this example, a DELETE request is sent to the lock-policy subresource of the vault named examplevault.

```
DELETE /-/vaults/examplevault/lock-policy HTTP/1.1
Host: glacier.us-west-2.amazonaws.com
x-amz-Date: 20170210T120000Z
Authorization: AWS4-HMAC-SHA256 Credential=AKIAIOSFODNN7EXAMPLE/20141123/us-west-2/glacier/aws4_request,SignedHeaders=host;x-amz-date;x-amz-glacier-version,Signature=9257c16da6b25a715ce900a5b45b03da0447acf430195dc940091b12966f2a2
x-amz-glacier-version: 2012-06-01
```

Example Response

If the policy is successfully deleted Glacier returns an HTTP 204 No Content response, as shown in the following example.

```
HTTP/1.1 204 No Content
x-amzn-RequestId: AAABZpJrTyicDC_HsOnHae8EzE9p_uBSJr6cnGOLKp_XJCl-Q
Date: Wed, 10 Feb 2017 12:00:00 GMT
```

Related Sections

- Complete Vault Lock (POST lockId) (p. 176)
- Get Vault Lock (GET lock-policy) (p. 189)
- Initiate Vault Lock (POST lock-policy) (p. 194)

Add Tags To Vault (POST tags add)

This operation adds the specified tags to a vault. Each tag is composed of a key and a value. Each vault can have up to 50 tags. If your request would cause the tag limit for the vault to be exceeded, the operation throws the LimitExceededException error.

If a tag already exists on the vault under a specified key, the existing key value will be overwritten. For more information about tags, see Tagging Amazon S3 Glacier Resources (p. 145).

Request Syntax

To add tags to a vault, send an HTTP POST request to the tags URI as shown in the following syntax example.

```
POST /AccountID/vaults/vaultName/tags?operation=add HTTP/1.1
Host: glacier.Region.amazonaws.com
Date: Date
Authorization: SignatureValue
Content-Length: Length
x-amz-glacier-version: 2012-06-01
```
Add Tags To Vault

```json
{
  "Tags":
  {
    "string": "string",
    "string": "string"
  }
}
```

**Note**
The `AccountId` value is the AWS account ID. This value must match the AWS account ID associated with the credentials used to sign the request. You can either specify an AWS account ID or optionally a single '-' (hyphen), in which case Amazon S3 Glacier uses the AWS account ID associated with the credentials used to sign the request. If you specify your account ID, do not include any hyphens ('-') in the ID.

**Request Parameters**

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>operation=add</td>
<td>A single query string parameter operation with a value of add to distinguish it from Remove Tags From Vault (POST tags remove) (p. 203).</td>
<td>Yes</td>
</tr>
</tbody>
</table>

**Request Headers**

This operation uses only request headers that are common to all operations. For information about common request headers, see Common Request Headers (p. 150).

**Request Body**

The request body contains the following JSON fields.

**Tags**

The tags to add to the vault. Each tag is composed of a key and a value. The value can be an empty string.

*Type:* String to String map


*Required:* Yes

**Responses**

If the operation request is successful, the service returns an HTTP 204 No Content response.

**Syntax**

```
HTTP/1.1 204 No Content
x-amzn-RequestId: x-amzn-RequestId
Date: Date
```

**Response Headers**

This operation uses only response headers that are common to most responses. For information about common response headers, see Common Response Headers (p. 152).
Response Body
This operation does not return a response body.

Errors
For information about Amazon S3 Glacier exceptions and error messages, see Error Responses (p. 166).

Examples

Example Request
The following example sends an HTTP POST request with the tags to add to the vault.

```
POST /-/vaults/examplevault/tags?operation=add HTTP/1.1
Host: glacier.us-west-2.amazonaws.com
x-amz-date: 20170210T120000Z
Authorization: AWS4-HMAC-SHA256 Credential=AKIAIOSFODNN7EXAMPLE/20141123/us-west-2/glacier/aws4_request,SignedHeaders=host;x-amz-date;x-amz-glacier-version,Signature=9257c16da6b25a715ce900a5b45b03daa47ac4f30195dc540091b12966f2a2
Content-Length: length
x-amz-glacier-version: 2012-06-01
{
    "Tags":
    {
        "examplekey1": "examplevalue1",
        "examplekey2": "examplevalue2"
    }
}
```

Example Response
If the request was successful Glacier returns a HTTP 204 No Content as shown in the following example.

```
HTTP/1.1 204 No Content
x-amzn-RequestId: AAABZpJrTyioDC_HsOmHae8EZp_uBSJr6cnGOLKp_XJCl-Q
Date: Wed, 10 Feb 2017 12:02:00 GMT
```

Related Sections

- List Tags For Vault (GET tags) (p. 197)
- Remove Tags From Vault (POST tags remove) (p. 203)

Create Vault (PUT vault)

Description
This operation creates a new vault with the specified name. The name of the vault must be unique within a region for an AWS account. You can create up to 1,000 vaults per account. For information on creating more vaults, go to the Amazon S3 Glacier product detail page.
You must use the following guidelines when naming a vault.

- Names can be between 1 and 255 characters long.
- Allowed characters are a–z, A–Z, 0–9, '_' (underscore), '-' (hyphen), and '.' (period).

This operation is idempotent, you can send the same request multiple times and it has no further effect after the first time Amazon S3 Glacier (Glacier) creates the specified vault.

Requests

Syntax

To create a vault, send an HTTP PUT request to the URI of the vault to be created.

```
PUT /AccountId/vaults/VaultName HTTP/1.1
Host: glacier.Region.amazonaws.com
Date: Date
Authorization: SignatureValue
Content-Length: Length
x-amz-glacier-version: 2012-06-01
```

Note

The AccountId value is the AWS account ID. This value must match the AWS account ID associated with the credentials used to sign the request. You can either specify an AWS account ID or optionally a single '-' (hyphen), in which case Amazon S3 Glacier uses the AWS account ID associated with the credentials used to sign the request. If you specify your account ID, do not include any hyphens ('-') in the ID.

Request Parameters

This operation does not use request parameters.

Request Headers

This operation uses only request headers that are common to all operations. For information about common request headers, see Common Request Headers (p. 150).

Request Body

The request body for this operation must be empty (0 bytes).

Responses

Syntax

```
HTTP/1.1 201 Created
x-amzn-RequestId: x-amzn-RequestId
Date: Date
Location: Location
```

Response Headers

A successful response includes the following response headers, in addition to the response headers that are common to all operations. For more information about common response headers, see Common Response Headers (p. 152).
Complete Vault Lock

Name | Description
---|---
Location | The relative URI path of the vault that was created.

Response Body

This operation does not return a response body.

Errors

For information about Amazon S3 Glacier exceptions and error messages, see Error Responses (p. 166).

Examples

Example Request

The following example sends an HTTP PUT request to create a vault named `examplevault`.

```
PUT /-/vaults/examplevault HTTP/1.1
Host: glacier.us-west-2.amazonaws.com
x-amz-Date: 20170210T120000Z
x-amz-glacier-version: 2012-06-01
Content-Length: 0
Authorization: AWS4-HMAC-SHA256 Credential=AKIAIOSFODNN7EXAMPLE/20141123/
us-west-2/glacier/aws4_request,SignedHeaders=host;x-amz-date;x-amz-glacier-
version,Signature=9257c16da6b25a715ce900a5b45b03da0447acf430195dcb540091b12966f2a2
```

Example Response

Glacier creates the vault and returns the relative URI path of the vault in the Location header. The account ID is always displayed in the Location header regardless of whether the account ID or a hyphen (`-`) was specified in the request.

```
HTTP/1.1 201 Created
x-amzn-RequestId: AAABZpJrTyioDC_HsOmHa6EZp_uBSJr6cnGOLKp_XJCl-Q
Date: Wed, 10 Feb 2017 12:02:00 GMT
Location: /111122223333/vaults/examplevault
```

Related Sections

- List Vaults (GET vaults) (p. 199)
- Delete Vault (DELETE vault) (p. 178)
- Identity and Access Management in Amazon S3 Glacier (p. 114)

Complete Vault Lock (POST lockId)

Description

This operation completes the vault locking process by transitioning the vault lock from the InProgress state to the Locked state, which causes the vault lock policy to become unchangeable. A vault lock is put into the InProgress state by calling Initiate Vault Lock (POST lock-policy) (p. 194). You can obtain
the state of the vault lock by calling Get Vault Lock (GET lock-policy) (p. 189). For more information about the vault locking process, see Amazon S3 Glacier Vault Lock (p. 56).

This operation is idempotent. This request is always successful if the vault lock is in the Locked state and the provided lock ID matches the lock ID originally used to lock the vault.

If an invalid lock ID is passed in the request when the vault lock is in the Locked state, the operation returns an AccessDeniedException error. If an invalid lock ID is passed in the request when the vault lock is in the InProgress state, the operation throws an InvalidParameter error.

Requests

To complete the vault locking process, send an HTTP POST request to the URI of the vault's lock-policy subresource with a valid lock ID.

Syntax

```
POST /AccountId/vaults/vaultName/lock-policy/lockId HTTP/1.1
Host: glacier.Region.amazonaws.com
Date: Date
Authorization: SignatureValue
Content-Length: Length
x-amz-glacier-version: 2012-06-01
```

Note

The AccountId value is the AWS account ID. This value must match the AWS account ID associated with the credentials used to sign the request. You can either specify an AWS account ID or optionally a single '-' (hyphen), in which case Amazon S3 Glacier uses the AWS account ID associated with the credentials used to sign the request. If you specify your account ID, do not include any hyphens ('-') in the ID.

The lockId value is the lock ID obtained from a Initiate Vault Lock (POST lock-policy) (p. 194) request.

Request Parameters

Request Headers

This operation uses only request headers that are common to all operations. For information about common request headers, see Common Request Headers (p. 150).

Request Body

This operation does not have a request body.

Responses

If the operation request is successful, the service returns an HTTP 204 No Content response.

Syntax

```
HTTP/1.1 204 No Content
x-amzn-RequestId: x-amzn-RequestId
Date: Date
```

Response Headers

This operation uses only response headers that are common to most responses. For information about common response headers, see Common Response Headers (p. 152).
Response Body

This operation does not return a response body.

Errors

For information about Amazon S3 Glacier exceptions and error messages, see Error Responses (p. 166).

Examples

Example Request

The following example sends an HTTP POST request with the lock ID to complete the vault locking process.

```
POST /-/vaults/examplevault/lock-policy/AE863rKkWZU53SLW5be4DUCW HTTP/1.1
Host: glacier.us-west-2.amazonaws.com
x-amz-Date: 20170210T120000Z
Authorization: AWS4-HMAC-SHA256 Credential=AKIAIOSFODNN7EXAMPLE/20141123/
us-west-2/glacier/aws4_request,SignedHeaders=host;x-amz-date;x-amz-glacier-
version,Signature=9257c16da6b25a715ce900a5b45b03da0447acf430195db540091b12966f2a2
Content-Length: length
x-amz-glacier-version: 2012-06-01
```

Example Response

If the request was successful, Amazon S3 Glacier (Glacier) returns an HTTP 204 No Content response, as shown in the following example.

```
HTTP/1.1 204 No Content
x-amzn-RequestId: AAABZpJrTyioDC_HsOmHae8EZp_uBSJr6cnGOLKp_XJCl-Q
Date: Wed, 10 Feb 2017 12:02:00 GMT
```

Related Sections

- Abort Vault Lock (DELETE lock-policy) (p. 170)
- Get Vault Lock (GET lock-policy) (p. 189)
- Initiate Vault Lock (POST lock-policy) (p. 194)

Delete Vault (DELETE vault)

Description

This operation deletes a vault. Amazon S3 Glacier (Glacier) will delete a vault only if there are no archives in the vault as per the last inventory and there have been no writes to the vault since the last inventory. If either of these conditions is not satisfied, the vault deletion fails (that is, the vault is not removed) and Glacier returns an error.

You can use the Describe Vault (GET vault) (p. 184) operation that provides vault information, including the number of archives in the vault; however, the information is based on the vault inventory Glacier last generated.
Delete Vault

This operation is idempotent.

**Note**
When you delete a vault, the vault access policy attached to the vault is also deleted. For more information about vault access policies, see Amazon S3 Glacier Access Control with Vault Access Policies (p. 124).

**Requests**

To delete a vault, send a DELETE request to the vault resource URI.

**Syntax**

```plaintext
DELETE /AccountId/vaults/VaultName HTTP/1.1
Host: glacier.Region.amazonaws.com
Date: Date
Authorization: SignatureValue
x-amz-glacier-version: 2012-06-01
```

**Note**
The `AccountId` value is the AWS account ID of the account that owns the vault. You can either specify an AWS account ID or optionally a single '-' (hyphen), in which case Amazon S3 Glacier uses the AWS account ID associated with the credentials used to sign the request. If you use an account ID, do not include any hyphens ('-') in the ID.

**Request Parameters**

This operation does not use request parameters.

**Request Headers**

This operation uses only request headers that are common to all operations. For information about common request headers, see Common Request Headers (p. 150).

**Request Body**

This operation does not have a request body.

**Responses**

**Syntax**

```plaintext
HTTP/1.1 204 No Content
x-amzn-RequestId: x-amzn-RequestId
Date: Date
```

**Response Headers**

This operation uses only response headers that are common to most responses. For information about common response headers, see Common Response Headers (p. 152).

**Response Body**

This operation does not return a response body.
Errors
For information about Amazon S3 Glacier exceptions and error messages, see Error Responses (p. 166).

Examples
Example Request
The following example deletes a vault named examplevault. The example request is a DELETE request to the URI of the resource (the vault) to delete.

```
DELETE /-/vaults/examplevault HTTP/1.1
Host: glacier.us-west-2.amazonaws.com
x-amz-Date: 20170210T120000Z
x-amz-glacier-version: 2012-06-01
Authorization: AWS4-HMAC-SHA256 Credential=AKIAIOSFODNN7EXAMPLE/20141123/us-west-2/glacier/aws4_request,SignedHeaders=host;x-amz-date;x-amz-glacier-version,Signature=9257c16a6b25a715ce90a6b45b03da0447acf430195dcb540091b12966f2a2
```

Example Response
```
HTTP/1.1 204 No Content
x-amzn-RequestId: AAABZpJrTyioDC_HsOmHaeEZp_uBSJr6cnGQLkp_XJCl-Q
Date: Wed, 10 Feb 2017 12:02:00 GMT
```

Related Sections
- Create Vault (PUT vault) (p. 174)
- List Vaults (GET vaults) (p. 199)
- Initiate Job (POST jobs) (p. 251)
- Identity and Access Management in Amazon S3 Glacier (p. 114)

Delete Vault Access Policy (DELETE access-policy)

Description
This operation deletes the access policy associated with the specified vault. The operation is eventually consistent—that is, it might take some time for Amazon S3 Glacier (Glacier) to completely remove the access policy, and you might still see the effect of the policy for a short time after you send the delete request.

This operation is idempotent. You can invoke delete multiple times, even if there is no policy associated with the vault. For more information about vault access policies, see Amazon S3 Glacier Access Control with Vault Access Policies (p. 124).

Requests
To delete the current vault access policy, send an HTTP DELETE request to the URI of the vault's access-policy subresource.

Syntax
```
DELETE /AccountID/vaults/vaultName/access-policy HTTP/1.1
```
Amazon S3 Glacier Developer Guide
Delete Vault Access Policy

| Host: glacier.Region.amazonaws.com |
| Date: Date |
| Authorization: SignatureValue |
| x-amz-glacier-version: 2012-06-01 |

**Note**
The AccountId value is the AWS account ID of the account that owns the vault. You can either specify an AWS account ID or optionally a single ‘-’ (hyphen), in which case Amazon S3 Glacier uses the AWS account ID associated with the credentials used to sign the request. If you use an account ID, do not include any hyphens (‘-’) in the ID.

**Request Parameters**
This operation does not use request parameters.

**Request Headers**
This operation uses only request headers that are common to all operations. For information about common request headers, see Common Request Headers (p. 150).

**Request Body**
This operation does not have a request body.

**Responses**
In response, Glacier returns 204 No Content if the policy is successfully deleted.

**Syntax**
```
HTTP/1.1 204 No Content
x-amzn-RequestId: x-amzn-RequestId
Date: Date
```

**Response Headers**
This operation uses only response headers that are common to most responses. For information about common response headers, see Common Response Headers (p. 152).

**Response Body**
This operation does not return a response body.

**Errors**
For information about Amazon S3 Glacier exceptions and error messages, see Error Responses (p. 166).

**Examples**
The following example demonstrates how to delete a vault access policy.

**Example Request**
In this example, a DELETE request is sent to the access-policy subresource of the vault named examplevault.
Delete Vault Notifications (DELETE notification-configuration)

Description

This operation deletes the notification configuration set for a vault Set Vault Notification Configuration (PUT notification-configuration) (p. 208). The operation is eventually consistent—that is, it might take some time for Amazon S3 Glacier (Glacier) to completely disable the notifications, and you might still receive some notifications for a short time after you send the delete request.

Requests

To delete a vault's notification configuration, send a DELETE request to the vault's notification-configuration subresource.

Syntax

```
DELETE /AccountId/vaults/VaultName/notification-configuration HTTP/1.1
Host: glacier.Region.amazonaws.com
Date: Date
Authorization: SignatureValue
x-amz-glacier-version: 2012-06-01
```

Note

The AccountId value is the AWS account ID of the account that owns the vault. You can either specify an AWS account ID or optionally a single '-' (hyphen), in which case Amazon S3 Glacier uses the AWS account ID associated with the credentials used to sign the request. If you use an account ID, do not include any hyphens ('-') in the ID.
Request Parameters

This operation does not use request parameters.

Request Headers

This operation uses only request headers that are common to all operations. For information about common request headers, see Common Request Headers (p. 150).

Request Body

This operation does not have a request body.

Responses

Syntax

HTTP/1.1 204 No Content
x-amzn-RequestId: x-amzn-RequestId
Date: Date

Response Headers

This operation uses only response headers that are common to most responses. For information about common response headers, see Common Response Headers (p. 152).

Response Body

This operation does not return a response body.

Errors

For information about Amazon S3 Glacier exceptions and error messages, see Error Responses (p. 166).

Examples

The following example demonstrates how to remove notification configuration for a vault.

Example Request

In this example, a DELETE request is sent to the notification-configuration subresource of the vault called examplevault.

```
DELETE /111122223333/vaults/examplevault/notification-configuration HTTP/1.1
Host: glacier.us-west-2.amazonaws.com
x-amz-Date: 20170210T120000Z
x-amz-glacier-version: 2012-06-01
Authorization: AWS4-HMAC-SHA256 Credential=AKIAIOSFODNN7EXAMPLE/20141123/us-west-2/glacier/aws4_request,SignedHeaders=host;x-amz-date;x-amz-glacier-version,Signature=9257c16da6b25a715ce900a5b45b03da0447acf430195dcb540091b12966f2a2
```

Example Response

```
HTTP/1.1 204 No Content
x-amzn-RequestId: AAABZpJrTyioDC_HsOmHae8EZp_uBSJr6cnGOLKp_XJCl-Q
Date: Wed, 10 Feb 2017 12:00:00 GMT
```
Describe Vault (GET vault)

Description

This operation returns information about a vault, including the vault Amazon Resource Name (ARN), the date the vault was created, the number of archives contained within the vault, and the total size of all the archives in the vault. The number of archives and their total size are as of the last vault inventory Amazon S3 Glacier (Glacier) generated (see Working with Vaults in Amazon S3 Glacier (p. 22)). Glacier generates vault inventories approximately daily. This means that if you add or remove an archive from a vault, and then immediately send a Describe Vault request, the response might not reflect the changes.

Requests

To get information about a vault, send a GET request to the URI of the specific vault resource.

Syntax

```
GET /AccountId/vaults/VaultName HTTP/1.1
Host: glacier.Region.amazonaws.com
Date: Date
Authorization: SignatureValue
x-amz-glacier-version: 2012-06-01
```

Note

The `AccountId` value is the AWS account ID of the account that owns the vault. You can either specify an AWS account ID or optionally a single `-` (hyphen), in which case Amazon S3 Glacier uses the AWS account ID associated with the credentials used to sign the request. If you use an account ID, do not include any hyphens ('-') in the ID.

Request Parameters

This operation does not use request parameters.

Request Headers

This operation uses only request headers that are common to all operations. For information about common request headers, see Common Request Headers (p. 150).

Request Body

This operation does not have a request body.

Responses

Syntax

```
HTTP/1.1 200 OK
```
Describe Vault

Response Headers

This operation uses only response headers that are common to most responses. For information about common response headers, see Common Response Headers (p. 152).

Response Body

The response body contains the following JSON fields.

**CreationDate**

The UTC date when the vault was created.

*Type:* A string representation in the ISO 8601 date format, for example 2013-03-20T17:03:43.221Z.

**LastInventoryDate**

The UTC date when Glacier completed the last vault inventory. For information about initiating an inventory for a vault, see Initiate Job (POST jobs) (p. 251).

*Type:* A string representation in the ISO 8601 date format, for example 2013-03-20T17:03:43.221Z.

**NumberOfArchives**

The number of archives in the vault as per the last vault inventory. This field will return null if an inventory has not yet run on the vault, for example, if you just created the vault.

*Type:* Number

**SizeInBytes**

The total size in bytes of the archives in the vault including any per-archive overhead, as of the last inventory date. This field will return null if an inventory has not yet run on the vault, for example, if you just created the vault.

*Type:* Number

**VaultARN**

The Amazon Resource Name (ARN) of the vault.

*Type:* String

**VaultName**

The vault name that was specified at creation time. The vault name is also included in the vault’s ARN.
Type: String

Errors

For information about Amazon S3 Glacier exceptions and error messages, see Error Responses (p. 166).

Examples

Example Request

The following example demonstrates how to get information about the vault named examplevault.

```
GET /-/vaults/examplevault HTTP/1.1
Host: glacier.us-west-2.amazonaws.com
x-amz-Date: 20170210T120000Z
x-amz-glacier-version: 2012-06-01
Authorization: AWS4-HMAC-SHA256 Credential=AKIAIOSFODNN7EXAMPLE/20141123/us-west-2/glacier/aws4_request,SignedHeaders=host;x-amz-date;x-amz-glacier-version,Signature=9257c16da6b25a71ce90a5b45b03da0447acf430195dc54091b12966f2a2
```

Example Response

```
HTTP/1.1 200 OK
x-amzn-RequestId: AAABZpJrTyioDC_HsOmHae8EZp_uBSJr6cnGOLKp_XJCl-Q
Date: Wed, 10 Feb 2017 12:02:00 GMT
Content-Type: application/json
Content-Length: 260

{
  "CreationDate" : "2012-02-20T17:01:45.198Z",
  "LastInventoryDate" : "2012-03-20T17:03:43.221Z",
  "NumberOfArchives" : 192,
  "SizeInBytes" : 78088912,
  "VaultName" : "examplevault"
}
```

Related Sections

- Create Vault (PUT vault) (p. 174)
- List Vaults (GET vaults) (p. 199)
- Delete Vault (DELETE vault) (p. 178)
- Initiate Job (POST jobs) (p. 251)
- Identity and Access Management in Amazon S3 Glacier (p. 114)

Get Vault Access Policy (GET access-policy)

Description

This operation retrieves the access-policy subresource set on the vault—for more information on setting this subresource, see Set Vault Access Policy (PUT access-policy) (p. 206). If there is no access policy set on the vault, the operation returns a 404 Not found error. For more information about vault access policies, see Amazon S3 Glacier Access Control with Vault Access Policies (p. 124).
Requests

To return the current vault access policy, send an HTTP GET request to the URI of the vault's access-policy subresource.

Syntax

GET /AccountId/vaults/vaultName/access-policy HTTP/1.1
Host: glacier.Region.amazonaws.com
Date: Date
Authorization: SignatureValue
x-amz-glacier-version: 2012-06-01

Note

The AccountId value is the AWS account ID of the account that owns the vault. You can either specify an AWS account ID or optionally a single '-' (hyphen), in which case Amazon S3 Glacier uses the AWS account ID associated with the credentials used to sign the request. If you use an account ID, do not include any hyphens ('-') in the ID.

Request Parameters

This operation does not use request parameters.

Request Headers

This operation uses only request headers that are common to all operations. For information about common request headers, see Common Request Headers (p. 150).

Request Body

This operation does not have a request body.

Responses

In response, Amazon S3 Glacier (Glacier) returns the vault access policy in JSON format in the body of the response.

Syntax

HTTP/1.1 200 OK
x-amzn-RequestId: x-amzn-RequestId
Date: Date
Content-Type: application/json
Content-Length: length

{
   "Policy": "string"
}

Response Headers

This operation uses only response headers that are common to most responses. For information about common response headers, see Common Response Headers (p. 152).

Response Body

The response body contains the following JSON fields.
Policy

The vault access policy as a JSON string, which uses "\" as an escape character.

Type: String

Errors

For information about Amazon S3 Glacier exceptions and error messages, see Error Responses (p. 166).

Examples

The following example demonstrates how to get a vault access policy.

Example Request

In this example, a GET request is sent to the URI of a vault's access-policy subresource.

```plaintext
GET /-/vaults/examplevault/access-policy HTTP/1.1
Host: glacier.us-west-2.amazonaws.com
x-amz-date: 20170210T120000Z
x-amz-glacier-version: 2012-06-01
Authorization: AWS4-HMAC-SHA256 Credential=AKIAIOSFODNN7EXAMPLE/20141123/us-west-2/glacier/aws4_request,SignedHeaders=host;x-amz-date;x-amz-glacier-version,Signature=9257c16da6b25a715ce900a5b45b03da0447acf430195dcb54091b12966f2a2
```

Example Response

If the request was successful, Glacier returns the vault access policy as a JSON string in the body of the response. The returned JSON string uses "\" as an escape character, as shown in the Set Vault Access Policy (PUT access-policy) (p. 206) examples. However, the following example shows the returned JSON string without escape characters for readability.

```plaintext
HTTP/1.1 200 OK
x-amzn-RequestId: AAABZpJrTyicDC_HsOmhHae6EZp_uBSJr6cnGOLKp_XJCl-Q
Date: Wed, 10 Feb 2017 12:00:00 GMT
Content-Type: application/json
Content-Length: length

{
  "Policy": "
  {
    "Version": "2012-10-17",
    "Statement": [
      {
        "Sid": "allow-time-based-deletes",
        "Principal": {
          "AWS": "999999999999"
        },
        "Effect": "Allow",
        "Action": "glacier:Delete*",
        "Condition": {
          "DateGreaterThan": {
            "aws:CurrentTime": "2018-12-31T00:00:00Z"
          }
        }
      }
    ]
  }
}
```
Get Vault Lock (GET lock-policy)

Description

This operation retrieves the following attributes from the lock-policy subresource set on the specified vault:

- The vault lock policy set on the vault.
- The state of the vault lock, which is either InProgress or Locked.
- When the lock ID expires. The lock ID is used to complete the vault locking process.
- When the vault lock was initiated and put into the InProgress state.

A vault lock is put into the InProgress state by calling Initiate Vault Lock (POST lock-policy) (p. 194). A vault lock is put into the Locked state by calling Complete Vault Lock (POST lockId) (p. 176). You can abort the vault locking process by calling Abort Vault Lock (DELETE lock-policy) (p. 170). For more information about the vault locking process, see Amazon S3 Glacier Vault Lock (p. 56).

If there is no vault lock policy set on the vault, the operation returns a 404 Not found error. For more information about vault lock policies, see Amazon S3 Glacier Access Control with Vault Lock Policies (p. 126).

Requests

To return the current vault lock policy and other attributes, send an HTTP GET request to the URI of the vault's lock-policy subresource as shown in the following syntax example.

Syntax

```
GET /AccountId/vaults/vaultName/lock-policy HTTP/1.1
Host: glacier.Region.amazonaws.com
Date: Date
Authorization: SignatureValue
x-amz-glacier-version: 2012-06-01
```

Note

The AccountId value is the AWS account ID of the account that owns the vault. You can either specify an AWS account ID or optionally a single '-' (hyphen), in which case Amazon S3 Glacier uses the AWS account ID associated with the credentials used to sign the request. If you use an account ID, do not include any hyphens ('-') in the ID.

Request Parameters

This operation does not use request parameters.
Request Headers

This operation uses only request headers that are common to all operations. For information about common request headers, see Common Request Headers (p. 150).

Request Body

This operation does not have a request body.

Responses

In response, Amazon S3 Glacier (Glacier) returns the vault access policy in JSON format in the body of the response.

Syntax

```
HTTP/1.1 200 OK
x-amzn-RequestId: x-amzn-RequestId
Date: Date
Content-Type: application/json
Content-Length: length
{
  "Policy": "string",
  "State": "string",
  "ExpirationDate": "string",
  "CreationDate": "string"
}
```

Response Headers

This operation uses only response headers that are common to most responses. For information about common response headers, see Common Response Headers (p. 152).

Response Body

The response body contains the following JSON fields.

Policy

The vault lock policy as a JSON string, which uses "\" as an escape character.

Type: String

State

The state of the vault lock.

Type: String

Valid values:InProgress|Locked

ExpirationDate

The UTC date and time at which the lock ID expires. This value can be null if the vault lock is in a Locked state.

Type: A string representation in the ISO 8601 date format, for example 2013-03-20T17:03:43.221Z.

CreationDate

The UTC date and time at which the vault lock was put into the InProgress state.
Get Vault Lock

Type: A string representation in the ISO 8601 date format, for example 2013-03-20T17:03:43.221Z.

Errors
For information about Amazon S3 Glacier exceptions and error messages, see Error Responses (p. 166).

Examples
The following example demonstrates how to get a vault lock policy.

Example Request
In this example, a GET request is sent to the URI of a vault's lock-policy subresource.

```
GET /-/vaults/examplevault/lock-policy HTTP/1.1
Host: glacier.us-west-2.amazonaws.com
x-amz-Date: 20170210T120000Z
x-amz-glacier-version: 2012-06-01
Authorization: AWS4-HMAC-SHA256 Credential=AKIAIOSFODNN7EXAMPLE/20141123/us-west-2/glacier/aws4_request,SignedHeaders=host;x-amz-date;x-amz-glacier-version,Signature=9257c16da6b25a715ce900a5b45b03da0447acf430195db54091b12966f2a2
```

Example Response
If the request was successful, Glacier returns the vault access policy as a JSON string in the body of the response. The returned JSON string uses "\" as an escape character, as shown in the Initiate Vault Lock (POST lock-policy) (p. 194) example request. However, the following example shows the returned JSON string without escape characters for readability.

```
HTTP/1.1 200 OK
x-amzn-RequestId: AAABZjhrTyioDC_HsOmHae8EZeP_uBSjK6cmGOLKp_XJCl-Q
Date: Wed, 10 Feb 2017 12:00:00 GMT
Content-Type: application/json
Content-Length: length

{
  "Policy": "
    {
      "Version": "2012-10-17",
      "Statement": [
        {
          "Sid": "Define-vault-lock",
          "Principal": {"AWS": "arn:aws:iam::999999999999:root"},
          "Effect": "Deny",
          "Action": "glacier:DeleteArchive",
          "Condition": {
            "NumericLessThanEquals": {"glacier:ArchiveAgeInDays": "365"}
          }
        }
      ]
    },
    "State": "InProgress",
```

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Get Vault Notifications (GET notification-configuration)

Description

This operation retrieves the notification-configuration subresource set on the vault (see Set Vault Notification Configuration (PUT notification-configuration) (p. 208). If notification configuration for a vault is not set, the operation returns a 404 Not Found error. For more information about vault notifications, see Configuring Vault Notifications in Amazon S3 Glacier (p. 45).

Requests

To retrieve the notification configuration information, send a GET request to the URI of a vault’s notification-configuration subresource.

Syntax

GET /AccountId/vaults/VaultName/notification-configuration HTTP/1.1
Host: glacier.Region.amazonaws.com
Date: Date
Authorization: SignatureValue
x-amz-glacier-version: 2012-06-01

Note

The AccountId value is the AWS account ID of the account that owns the vault. You can either specify an AWS account ID or optionally a single '-' (hyphen), in which case Amazon S3 Glacier uses the AWS account ID associated with the credentials used to sign the request. If you use an account ID, do not include any hyphens ('-') in the ID.

Request Parameters

This operation does not use request parameters.

Request Headers

This operation uses only request headers that are common to all operations. For information about common request headers, see Common Request Headers (p. 150).

Request Body

This operation does not have a request body.
Responses

Syntax

HTTP/1.1 200 OK
x-amzn-RequestId: x-amzn-RequestId
Date: Date
Content-Type: application/json
Content-Length: length
{
  "Events": [
    String,
    ...
  ],
  "SNSTopic": String
}

Response Headers

This operation uses only response headers that are common to most responses. For information about common response headers, see Common Response Headers (p. 152).

Response Body

The response body contains the following JSON fields.

Events

A list of one or more events for which Amazon S3 Glacier (Glacier) will send a notification to the specified Amazon SNS topic. For information about vault events for which you can configure a vault to publish notifications, see Set Vault Notification Configuration (PUT notification-configuration) (p. 208).

Type: Array

SNSTopic

The Amazon Simple Notification Service (Amazon SNS) topic Amazon Resource Name (ARN). For more information, see Getting Started with Amazon SNS in the Amazon Simple Notification Service Getting Started Guide.

Type: String

Errors

For information about Amazon S3 Glacier exceptions and error messages, see Error Responses (p. 166).

Examples

The following example demonstrates how to retrieve the notification configuration for a vault.

Example Request

In this example, a GET request is sent to the notification-configuration subresource of a vault.

GET /-/vaults/examplevault/notification-configuration HTTP/1.1
Host: glacier.us-west-2.amazonaws.com
x-amz-Date: 20170210T120000Z
x-amz-glacier-version: 2012-06-01
Initiate Vault Lock

Description

This operation initiates the vault locking process by doing the following:

- Installing a vault lock policy on the specified vault.
- Setting the lock state of vault lock to InProgress.
- Returning a lock ID, which is used to complete the vault locking process.

You can set one vault lock policy for each vault and this policy can be up to 20 KB in size. For more information about vault lock policies, see Amazon S3 Glacier Access Control with Vault Lock Policies (p. 126).

You must complete the vault locking process within 24 hours after the vault lock enters the InProgress state. After the 24 hour window ends, the lock ID expires, the vault automatically exits the InProgress state, and the vault lock policy is removed from the vault. You call Complete Vault Lock (POST lockId) (p. 176) to complete the vault locking process by setting the state of the vault lock to Locked.

**Note**

After a vault lock is in the Locked state, you cannot initiate a new vault lock for the vault.

You can abort the vault locking process by calling Abort Vault Lock (DELETE lock-policy) (p. 170).

You can get the state of the vault lock by calling Get Vault Lock (GET lock-policy) (p. 189). For more information about the vault locking process, see Amazon S3 Glacier Vault Lock (p. 56).

Example Response

A successful response shows the audit logging configuration document in the body of the response in JSON format. In this example, the configuration shows that notifications for two events (ArchiveRetrievalCompleted and InventoryRetrievalCompleted) are sent to the Amazon SNS topic arn:aws:sns:us-west-2:012345678901:mytopic.

```
HTTP/1.1 200 OK
x-amzn-RequestId: AAABZpJrTyioDC_HsOmHae8EZp_uBSJr6cnGOLKp_XJCl-Q
Date: Wed, 10 Feb 2017 12:00:00 GMT
Content-Type: application/json
Content-Length: 150

{
  "Events": [
    "ArchiveRetrievalCompleted",
    "InventoryRetrievalCompleted"
  ],
}
```

Related Sections

- Delete Vault Notifications (DELETE notification-configuration) (p. 182)
- Set Vault Notification Configuration (PUT notification-configuration) (p. 208)
- Identity and Access Management in Amazon S3 Glacier (p. 114)
If this operation is called when the vault lock is in the InProgress state, the operation returns an AccessDeniedException error. When the vault lock is in the InProgress state you must call Abort Vault Lock (DELETE lock-policy) (p. 170) before you can initiate a new vault lock policy.

Requests

To initiate the vault locking process, send an HTTP POST request to the URI of the lock-policy subresource of the vault, as shown in the following syntax example.

Syntax

```plaintext
POST /AccountId/vaults/vaultName/lock-policy HTTP/1.1
Host: glacier.Region.amazonaws.com
Date: Date
Authorization: SignatureValue
Content-Length: Length
x-amz-glacier-version: 2012-06-01
{
  "Policy": "string"
}
```

Note
The AccountId value is the AWS account ID. This value must match the AWS account ID associated with the credentials used to sign the request. You can either specify an AWS account ID or optionally a single '-' (hyphen), in which case Amazon S3 Glacier uses the AWS account ID associated with the credentials used to sign the request. If you specify your account ID, do not include any hyphens ('-') in the ID.

Request Parameters

This operation does not use request parameters.

Request Headers

This operation uses only request headers that are common to all operations. For information about common request headers, see Common Request Headers (p. 150).

Request Body

The request body contains the following JSON fields.

Policy

The vault lock policy as a JSON string, which uses "\" as an escape character.

Type: String

Required: Yes

Responses

Amazon S3 Glacier (Glacier) returns an HTTP 201 Created response, if the policy is accepted.

Syntax

```
HTTP/1.1 201 Created
```
x-amzn-Request-Id:  x-amzn-Request-Id
Date:  Date
x-amz-lock-id:  lockId

Response Headers

A successful response includes the following response headers, in addition to the response headers that are common to all operations. For more information about common response headers, see Common Response Headers (p. 152).

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>x-amz-lock-id</td>
<td>The lock ID, which is used to complete the vault locking process.</td>
</tr>
<tr>
<td>Type: String</td>
<td></td>
</tr>
</tbody>
</table>

Response Body

This operation does not return a response body.

Errors

For information about Amazon S3 Glacier exceptions and error messages, see Error Responses (p. 166).

Examples

Example Request

The following example sends an HTTP PUT request to the URI of the vault's lock-policy subresource. The Policy JSON string uses "\" as an escape character.

```
PUT /-/vaults/examplevault/lock-policy HTTP/1.1
Host: glacier.us-west-2.amazonaws.com
x-amz-Date: 20170210T120000Z
Authorization: AWS4-HMAC-SHA256 Credential=AKIAIOSFODNN7EXAMPLE/20141123/
us-west-2/glacier/aws4_request,SignedHeaders=host;x-amz-date;x-amz-glacier-
version,Signature=9257c16da6b25a715ce900a5b45b03da0447acf430195dcb540091b12966f2a2
Content-Length: length
x-amz-glacier-version: 2012-06-01

```

Example Response

If the request was successful, Glacier returns an HTTP 201 Created response, as shown in the following example.

```
HTTP/1.1 201 Created
x-amzn-Request-Id:  AAABZp3rTyicDC_HsOmHae8Ezp_uBSJr6cnGOLKp_XJC1-Q
Date:  Wed, 10 Feb 2017 12:02:00 GMT
x-amz-lock-id:  AE863rKkWZU53SLW5be4DUcW
```
Related Sections

- Abort Vault Lock (DELETE lock-policy) (p. 170)
- Complete Vault Lock (POST lockId) (p. 176)
- Get Vault Lock (GET lock-policy) (p. 189)

List Tags For Vault (GET tags)

This operation lists all the tags attached to a vault. The operation returns an empty map if there are no tags. For more information about tags, see Tagging Amazon S3 Glacier Resources (p. 145).

Request Syntax

To list the tags for a vault, send an HTTP GET request to the tags URI as shown in the following syntax example.

```
GET /AccountId/vaults/vaultName/tags HTTP/1.1
Host: glacier.Region.amazonaws.com
Date: Date
Authorization: SignatureValue
x-amz-glacier-version: 2012-06-01
```

**Note**

The `AccountId` value is the AWS account ID. This value must match the AWS account ID associated with the credentials used to sign the request. You can either specify an AWS account ID or optionally a single '-' (hyphen), in which case Amazon S3 Glacier uses the AWS account ID associated with the credentials used to sign the request. If you specify your account ID, do not include any hyphens ('-') in the ID.

Request Parameters

This operation does not use request parameters.

Request Headers

This operation uses only request headers that are common to all operations. For information about common request headers, see Common Request Headers (p. 150).

Request Body

This operation does not have a request body.

Responses

If the operation is successful, the service sends back an HTTP 200 OK response.

Response Syntax

```
HTTP/1.1 200 OK
```
Response Headers

This operation uses only response headers that are common to most responses. For information about common response headers, see Common Response Headers (p. 152).

Response Body

The response body contains the following JSON fields.

Tags

The tags attached to the vault. Each tag is composed of a key and a value.

Type: String to String map

Required: Yes

Errors

For information about Amazon S3 Glacier exceptions and error messages, see Error Responses (p. 166).

Examples

Example: List Tags For a Vault

The following example lists the tags for a vault.

Example Request

In this example, a GET request is sent to retrieve a list of tags from the specified vault.

GET /-/vaults/examplevault/tags HTTP/1.1
Host: glacier.us-west-2.amazonaws.com
x-amzn-RequestId: x-amzn-RequestId
Date: Date
Content-Type: application/json
Content-Length: Length
{
    "Tags":
    {
        "string" : "string",
        "string" : "string"
    }
}

Example Response

If the request was successful, Amazon S3 Glacier (Glacier) returns a HTTP 200 OK with a list of tags for the vault as shown in the following example.

HTTP/1.1 200 OK
List Vaults (GET vaults)

Description

This operation lists all vaults owned by the calling user's account. The list returned in the response is ASCII-sorted by vault name.

By default, this operation returns up to 10 items per request. If there are more vaults to list, the marker field in the response body contains the vault Amazon Resource Name (ARN) at which to continue the list with a new List Vaults request; otherwise, the marker field is null. In your next List Vaults request you set the marker parameter to the value Amazon S3 Glacier (Glacier) returned in the responses to your previous List Vaults request. You can also limit the number of vaults returned in the response by specifying the limit parameter in the request.

Requests

To get a list of vaults, you send a GET request to the vaults resource.

Syntax

```
GET /AccountId/vaults HTTP/1.1
Host: glacier.Region.amazonaws.com
Date: Date
Authorization: SignatureValue
x-amz-glacier-version: 2012-06-01
```

Note

The AccountId value is the AWS account ID. This value must match the AWS account ID associated with the credentials used to sign the request. You can either specify an AWS account ID or optionally a single '-' (hyphen), in which case Amazon S3 Glacier uses the AWS account ID associated with the credentials used to sign the request. If you specify your account ID, do not include any hyphens ('-') in the ID.

Request Parameters

This operation uses the following request parameters.
List Vaults

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>limit</td>
<td>The maximum number of vaults to be returned. The default limit is 10. The number of vaults returned might be fewer than the specified limit, but the number of returned vaults never exceeds the limit. Type: String Constraints: Minimum integer value of 1. Maximum integer value of 10.</td>
<td>No</td>
</tr>
<tr>
<td>marker</td>
<td>A string used for pagination. marker specifies the vault ARN after which the listing of vaults should begin. (The vault specified by marker is not included in the returned list.) Get the marker value from a previous List Vaults response. You need to include the marker only if you are continuing the pagination of results started in a previous List Vaults request. Specifying an empty value (&quot;&quot;) for the marker returns a list of vaults starting from the first vault. Type: String Constraints: None</td>
<td>No</td>
</tr>
</tbody>
</table>

**Request Headers**

This operation uses only request headers that are common to all operations. For information about common request headers, see Common Request Headers (p. 150).

**Request Body**

This operation does not have a request body.

**Responses**

**Syntax**

```json
HTTP/1.1 200 OK
x-amzn-RequestId: x-amzn-RequestId
Date: Date
Content-Type: application/json
Content-Length: Length

{
  "Marker": String
  "VaultList": [
    {
      "CreationDate": String,
      "LastInventoryDate": String,
      "NumberOfArchives": Number,
      "SizeInBytes": Number,
      "VaultARN": String,
      "VaultName": String
    },
    ...
  ]
}
```
Response Headers

This operation uses only response headers that are common to most responses. For information about common response headers, see Common Response Headers (p. 152).

Response Body

The response body contains the following JSON fields.

CreationDate

The date the vault was created, in Coordinated Universal Time (UTC).

Type: String. A string representation in the ISO 8601 date format, for example 2013-03-20T17:03:43.221Z.

LastInventoryDate

The date of the last vault inventory, in Coordinated Universal Time (UTC). This field can be null if an inventory has not yet run on the vault, for example, if you just created the vault. For information about initiating an inventory for a vault, see Initiate Job (POST jobs) (p. 251).

Type: A string representation in the ISO 8601 date format, for example 2013-03-20T17:03:43.221Z.

Marker

The vaultARN that represents where to continue pagination of the results. You use the marker in another List Vaults request to obtain more vaults in the list. If there are no more vaults, this value is null.

Type: String

NumberOfArchives

The number of archives in the vault as of the last inventory date.

Type: Number

SizeInBytes

The total size, in bytes, of all the archives in the vault including any per-archive overhead, as of the last inventory date.

Type: Number

VaultARN

The Amazon Resource Name (ARN) of the vault.

Type: String

VaultList

An array of objects, with each object providing a description of a vault.

Type: Array

VaultName

The vault name.

Type: String

Errors

For information about Amazon S3 Glacier exceptions and error messages, see Error Responses (p. 166).
Examples

Example: List All Vaults

The following example lists vaults. Because the marker and limit parameters are not specified in the request, up to 10 vaults are returned.

Example Request

```
GET /-/vaults HTTP/1.1
Host: glacier.us-west-2.amazonaws.com
x-amz-Date: 20170210T120000Z
x-amz-glacier-version: 2012-06-01
Authorization: AWS4-HMAC-SHA256 Credential=AKIAIOSFODNN7EXAMPLE/20141123/us-west-2/glacier/aws4_request,SignedHeaders=host;x-amz-date;x-amz-glacier-version,Signature=9257c16da6b25a715ce900a5b45b03da0447acf430195dcb540091b12966f2a2
```

Example Response

The Marker is null indicating there are no more vaults to list.

```
HTTP/1.1 200 OK
x-amzn-RequestId: AAABZpJrTyioDC_HsOmHae6EZp_uBSJr6cnGOLKp_XJCl-Q
Date: Wed, 10 Feb 2017 12:02:00 GMT
Content-Type: application/json
Content-Length: 497
{
  "Marker": null,
  "VaultList": [
    {
      "CreationDate": "2012-03-16T22:22:47.214Z",
      "LastInventoryDate": "2012-03-21T22:06:51.218Z",
      "NumberOfArchives": 2,
      "SizeInBytes": 12334,
      "VaultName": "examplevault1"
    },
    {
      "CreationDate": "2012-03-19T22:06:51.218Z",
      "LastInventoryDate": "2012-03-21T22:06:51.218Z",
      "NumberOfArchives": 0,
      "SizeInBytes": 0,
      "VaultName": "examplevault2"
    },
    {
      "CreationDate": "2012-03-19T22:06:51.218Z",
      "LastInventoryDate": "2012-03-25T12:14:31.121Z",
      "NumberOfArchives": 0,
      "SizeInBytes": 0,
      "VaultName": "examplevault3"
    }
  ]
}
```

Example: Partial List of Vaults

The following example returns two vaults starting at the vault specified by the marker.
Example Request

```
GET /-/vaults?limit=2&marker=arn:aws:glacier:us-west-2:012345678901:vaults/examplevault1 HTTP/1.1
Host: glacier.us-west-2.amazonaws.com
x-amz-date: 20170210T120000Z
x-amz-glacier-version: 2012-06-01
Authorization: AWS4-HMAC-SHA256 Credential=AKIAIOSFODNN7EXAMPLE/20141123/us-west-2/glacier/aws4_request,SignedHeaders=host;x-amz-date;x-amz-glacier-version,Signature=9257c16da6b25a715ce900a5b45b03da0447acf430195dc54091b12966f2a2
```

Example Response

Two vaults are returned in the list. The Marker contains the vault ARN to continue pagination in another List Vaults request.

```
HTTP/1.1 200 OK
x-amzn-RequestId: AAABZpJrTyioDC_HsOmHae8EZp_uBSJr6cmGOLKp_XJCl-Q
Date: Wed, 10 Feb 2017 12:02:00 GMT
Content-Type: application/json
Content-Length: 497

{
    "VaultList": [
        {
            "CreationDate": "2012-03-16T22:22:47.214Z",
            "LastInventoryDate": "2012-03-21T22:06:51.218Z",
            "NumberOfArchives": 2,
            "SizeInBytes": 12334,
            "VaultName": "examplevault1"
        },
        {
            "CreationDate": "2012-03-19T22:06:51.218Z",
            "LastInventoryDate": "2012-03-21T22:06:51.218Z",
            "NumberOfArchives": 0,
            "SizeInBytes": 0,
            "VaultName": "examplevault2"
        }
    ]
}
```

Related Sections

- Create Vault (PUT vault) (p. 174)
- Delete Vault (DELETE vault) (p. 178)
- Initiate Job (POST jobs) (p. 251)
- Identity and Access Management in Amazon S3 Glacier (p. 114)

Remove Tags From Vault (POST tags remove)

This operation removes one or more tags from the set of tags attached to a vault. For more information about tags, see Tagging Amazon S3 Glacier Resources (p. 145).

This operation is idempotent. The operation will be successful, even if there are no tags attached to the vault.
Request Syntax

To remove tags from a vault, send an HTTP POST request to the tags URI as shown in the following syntax example.

```
POST /AccountId/vaults/vaultName/tags?operation=remove HTTP/1.1
Host: glacier.Region.amazonaws.com
Date: Date
Authorization: SignatureValue
Content-Length: Length
x-amz-glacier-version: 2012-06-01
{
    "TagKeys": [
        "string",
        "string"
    ]
}
```

Note

The AccountId value is the AWS account ID. This value must match the AWS account ID associated with the credentials used to sign the request. You can either specify an AWS account ID or optionally a single '-' (hyphen), in which case Amazon S3 Glacier uses the AWS account ID associated with the credentials used to sign the request. If you specify your account ID, do not include any hyphens ('-') in the ID.

Request Parameters

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>operation=remove</td>
<td>A single query string parameter operation with a value of remove to distinguish it from Add Tags To Vault (POST tags add) (p. 172).</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Request Headers

This operation uses only request headers that are common to all operations. For information about common request headers, see Common Request Headers (p. 150).

Request Body

The request body contains the following JSON fields.

TagKeys

A list of tag keys. Each corresponding tag is removed from the vault.

Type: array of Strings

Length constraint: Minimum of 1 item in the list. Maximum of 10 items in the list.

Required: Yes

Responses

If the action is successful, the service sends back an HTTP 204 No Content response with an empty HTTP body.

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Syntax

HTTP/1.1 204 No Content
x-amzn-RequestId: x-amzn-RequestId
Date: Date

Response Headers

This operation uses only response headers that are common to most responses. For information about common response headers, see Common Response Headers (p. 152).

Response Body

This operation does not return a response body.

Errors

For information about Amazon S3 Glacier exceptions and error messages, see Error Responses (p. 166).

Examples

Example Request

The following example sends an HTTP POST request to remove the specified tags.

```
POST /-/vaults/examplevault/tags?operation=remove HTTP/1.1
Host: glacier.us-west-2.amazonaws.com
x-amz-Date: 20170210T120000Z
Authorization: AWS4-HMAC-SHA256 Credential=AKIAIOSFODNN7EXAMPLE/20141123/us-west-2/glacier/aws4_request,SignedHeaders=host;x-amz-date;x-amz-glacier-version,Signature=9257c16da6b25a715ce900a5b45b03da0447acf430195dcb540091b12966f2a2
Content-Length: length
x-amz-glacier-version: 2012-06-01
{
  "TagsKeys": [
    "examplekey1",
    "examplekey2"
  ]
}
```

Example Response

If the request was successful Amazon S3 Glacier (Glacier) returns a HTTP 204 No Content as shown in the following example.

```
HTTP/1.1 204 No Content
x-amzn-RequestId: AAABZpJrTyioDC_HsOmHae8EZp_uBSJr6cnGOLKp_XJCl-Q
Date: Wed, 10 Feb 2017 12:02:00 GMT
```

Related Sections

- Add Tags To Vault (POST tags add) (p. 172)
- List Tags For Vault (GET tags) (p. 197)
Set Vault Access Policy (PUT access-policy)

Description

This operation configures an access policy for a vault and will overwrite an existing policy. To configure a vault access policy, send a PUT request to the `access-policy` subresource of the vault. You can set one access policy per vault and the policy can be up to 20 KB in size. For more information about vault access policies, see Amazon S3 Glacier Access Control with Vault Access Policies (p. 124).

Requests

Syntax

To set a vault access policy, send an HTTP PUT request to the URI of the vault's `access-policy` subresource as shown in the following syntax example.

```plaintext
PUT /AccountId/vaults/vaultName/access-policy HTTP/1.1
Host: glacier.Region.amazonaws.com
Date: Date
Authorization: SignatureValue
Content-Length: Length
x-amz-glacier-version: 2012-06-01

{
  "Policy": "string"
}
```

Note

The `AccountId` value is the AWS account ID of the account that owns the vault. You can either specify an AWS account ID or optionally a single '-' (hyphen), in which case Amazon S3 Glacier uses the AWS account ID associated with the credentials used to sign the request. If you use an account ID, do not include any hyphens ('-') in the ID.

Request Parameters

This operation does not use request parameters.

Request Headers

This operation uses only request headers that are common to all operations. For information about common request headers, see Common Request Headers (p. 150).

Request Body

The request body contains the following JSON fields.

Policy

The vault access policy as a JSON string, which uses "\" as an escape character.

Type: String
Required: Yes

Responses

In response, Glacier returns 204 `No Content` if the policy is accepted.
Set Vault Access Policy

Syntax

```
HTTP/1.1 204 No Content
x-amzn-Request-Id: x-amzn-Request-Id
Date: Date
```

Response Headers

This operation uses only response headers that are common to most responses. For information about common response headers, see Common Response Headers (p. 152).

Response Body

This operation does not return a response body.

Errors

For information about Amazon S3 Glacier exceptions and error messages, see Error Responses (p. 166).

Examples

Example Request

The following example sends an HTTP PUT request to the URI of the vault's access-policy subresource. The Policy JSON string uses "\" as an escape character.

```
PUT /-/ vaults/examplevault/access-policy HTTP/1.1
Host: glacier.us-west-2.amazonaws.com
x-amz-Date: 20170210T120000Z
Authorization: AWS4-HMAC-SHA256 Credential=AKIAIOSFODNN7EXAMPLE/20141123/
us-west-2/glacier/aws4_request,SignedHeaders=host;x-amz-date;x-amz-glacier-
version,SignedHeadersContent-Length,x-amz-glacier-version,Signature=9257c16da6b25a715ce900a5b45b03da0447acf430195dcb540091b12966f2a2
Content-Length: length
x-amz-glacier-version: 2012-06-01

{"Policy":"{"Version":"2012-10-17","Statement":
exampelvault\"}}"
```

Example Response

If the request was successful, Amazon S3 Glacier (Glacier) returns a HTTP 204 No Content as shown in the following example.

```
HTTP/1.1 204 No Content
x-amzn-Request-Id: AAABZpJrTyioDC_HsOmHae8EZp_uBSJr6cnGOLKp_XJCl-Q
Date: Wed, 10 Feb 2017 12:02:00 GMT
```

Related Sections

- Delete Vault Access Policy (DELETE access-policy) (p. 180)

- Get Vault Access Policy (GET access-policy) (p. 186)
Set Vault Notification Configuration (PUT notification-configuration)

Description

Retrieving an archive and a vault inventory are asynchronous operations in Amazon S3 Glacier (Glacier) for which you must first initiate a job and wait for the job to complete before you can download the job output. You can configure a vault to post a message to an Amazon Simple Notification Service (Amazon SNS) topic when these jobs complete. You can use this operation to set notification configuration on the vault. For more information, see Configuring Vault Notifications in Amazon S3 Glacier (p. 45).

To configure vault notifications, send a PUT request to the notification-configuration subresource of the vault. A notification configuration is specific to a vault; therefore, it is also referred to as a vault subresource. The request should include a JSON document that provides an Amazon Simple Notification Service (Amazon SNS) topic and the events for which you want Glacier to send notifications to the topic.

You can configure a vault to publish a notification for the following vault events:

- **ArchiveRetrievalCompleted**— This event occurs when a job that was initiated for an archive retrieval is completed (Initiate Job (POST jobs) (p. 251)). The status of the completed job can be Succeeded or Failed. The notification sent to the SNS topic is the same output as returned from Describe Job (GET JobID) (p. 238).

- **InventoryRetrievalCompleted**— This event occurs when a job that was initiated for an inventory retrieval is completed (Initiate Job (POST jobs) (p. 251)). The status of the completed job can be Succeeded or Failed. The notification sent to the SNS topic is the same output as returned from Describe Job (GET JobID) (p. 238).

Amazon SNS topics must grant permission to the vault to be allowed to publish notifications to the topic.

Requests

To set notification configuration on your vault, send a PUT request to the URI of the vault's notification-configuration subresource. You specify the configuration in the request body. The configuration includes the Amazon SNS topic name and an array of events that trigger notification to each topic.

Syntax

```
PUT /AccountId/vaults/VaultName/notification-configuration HTTP/1.1
Host: glacier.Region.amazonaws.com
Date: Date
Authorization: SignatureValue
x-amz-glacier-version: 2012-06-01

{
  "SNSTopic": String,
  "Events":[String, ...]
}
```

**Note**
The `AccountId` value is the AWS account ID of the account that owns the vault. You can either specify an AWS account ID or optionally a single '-' (hyphen), in which case Amazon S3 Glacier
uses the AWS account ID associated with the credentials used to sign the request. If you use an account ID, do not include any hyphens ('-') in the ID.

**Request Parameters**

This operation does not use request parameters.

**Request Headers**

This operation uses only request headers that are common to all operations. For information about common request headers, see Common Request Headers (p. 150).

**Request Body**

The JSON in the request body contains the following fields.

**Events**

An array of one or more events for which you want Glacier to send notification.

*Valid Values:* ArchiveRetrievalCompleted | InventoryRetrievalCompleted

*Required:* yes

*Type:* Array

**SNSTopic**

The Amazon SNS topic ARN. For more information, go to Getting Started with Amazon SNS in the Amazon Simple Notification Service Getting Started Guide.

*Required:* yes

*Type:* String

**Responses**

In response, Amazon S3 Glacier (Glacier) returns 204 No Content if the notification configuration is accepted.

**Syntax**

```plaintext
HTTP/1.1 204 No Content
x-amzn-RequestId: x-amzn-RequestId
Date: Date
```

**Response Headers**

This operation uses only request headers that are common to all operations. For information about common request headers, see Common Request Headers (p. 150).

**Response Body**

This operation does not return a response body.

**Errors**

For information about Amazon S3 Glacier exceptions and error messages, see Error Responses (p. 166).
Examples

The following example demonstrates how to configure vault notification.

Example Request

The following request sets the examplevault notification configuration so that notifications for two events (ArchiveRetrievalCompleted and InventoryRetrievalCompleted) are sent to the Amazon SNS topic arn:aws:sns:us-west-2:012345678901:mytopic.

```
PUT /-/vaults/examplevault/notification-policy HTTP/1.1
Host: glacier.us-west-2.amazonaws.com
x-amz-Date: 20170210T120000Z
x-amz-glacier-version: 2012-06-01
Authorization: AWS4-HMAC-SHA256 Credential=AKIAIOSFODNN7EXAMPLE/20141123/
us-west-2/glacier/aws4_request,SignedHeaders=host;x-amz-date;x-amz-glacier-
version,Signature=9257c16da6b25a715ce900a5b45b03da0447acf430195dcb540091b12966f2a2
{
  "Events": ["ArchiveRetrievalCompleted", "InventoryRetrievalCompleted"],
}
```

Example Response

A successful response returns a 204 No Content.

```
HTTP/1.1 204 No Content
x-amzn-RequestId: AAABZpJrTyioDC_HsOmHae8EZe_p_uBSJr6cmGOLKp_XJCl-Q
Date: Wed, 10 Feb 2017 12:00:00 GMT
```

Related Sections

- Get Vault Notifications (GET notification-configuration) (p. 192)
- Delete Vault Notifications (DELETE notification-configuration) (p. 182)
- Identity and Access Management in Amazon S3 Glacier (p. 114)

Archive Operations

The following are the archive operations available for use in Glacier.

Topics

- Delete Archive (DELETE archive) (p. 210)
- Upload Archive (POST archive) (p. 212)

Delete Archive (DELETE archive)

Description

This operation deletes an archive from a vault. You can delete one archive at a time from a vault. To delete the archive you must provide its archive ID in the delete request. You can get the archive ID by
downloading the vault inventory for the vault that contains the archive. For more information about downloading the vault inventory, see Downloading a Vault Inventory in Amazon S3 Glacier (p. 33).

After you delete an archive, you might still be able to make a successful request to initiate a job to retrieve the deleted archive, but the archive retrieval job will fail.

Archive retrievals that are in progress for an archive ID when you delete the archive might or might not succeed according to the following scenarios:

- If the archive retrieval job is actively preparing the data for download when Amazon S3 Glacier (Glacier) receives the delete archive request, the archival retrieval operation might fail.
- If the archive retrieval job has successfully prepared the archive for download when Glacier receives the delete archive request, you will be able to download the output.

For more information about archive retrieval, see Downloading an Archive in Amazon S3 Glacier (p. 75).

This operation is idempotent. Attempting to delete an already-deleted archive does not result in an error.

Requests

To delete an archive you send a DELETE request to the archive resource URI.

Syntax

```plaintext
DELETE /AccountId/vaults/VaultName/archives/ArchiveID HTTP/1.1
Host: glacier.Region.amazonaws.com
x-amz-Date: Date
Authorization: SignatureValue
x-amz-glacier-version: 2012-06-01
```

**Note**

The `AccountId` value is the AWS account ID of the account that owns the vault. You can either specify an AWS account ID or optionally a single '-' (hyphen), in which case Amazon S3 Glacier uses the AWS account ID associated with the credentials used to sign the request. If you use an account ID, do not include any hyphens ('-') in the ID.

Request Parameters

This operation does not use request parameters.

Request Headers

This operation uses only request headers that are common to all operations. For information about common request headers, see Common Request Headers (p. 150).

Request Body

This operation does not have a request body.

Responses

Syntax

```plaintext
HTTP/1.1 204 No Content
x-amzn-RequestId: x-amzn-RequestId
Date: Date
```

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Response Headers

This operation uses only response headers that are common to most responses. For information about common response headers, see Common Response Headers (p. 152).

Response Body

This operation does not return a response body.

Errors

For information about Amazon S3 Glacier exceptions and error messages, see Error Responses (p. 166).

Examples

The following example demonstrates how to delete an archive from the vault named examplevault.

Example Request

The ID of the archive to be deleted is specified as a subresource of archives.

```
DELETE /-/vaults/examplevault/archives/NkbByEejwEggmBz2fTHg0XBoDfjP4g6iu87-TjhqGoOY9Z8i1_AUyUsuhPaTgLHy8pTl5nfCFJmDl2yEZONi5L26Omw12vcs01MNGntHEQL8MBfGlqREXAMPLEArchiveId
HTTP/1.1
Host: glacier.us-west-2.amazonaws.com
x-amz-Date: 20170210T120000Z
x-amz-glacier-version: 2012-06-01
Authorization: AWS4-HMAC-SHA256 Credential=AKIAIOSFODNN7EXAMPLE/20141123/us-west-2/glacier/aws4_request,SignedHeaders=host;x-amz-date;x-amz-glacier-version,Signature=9257c16da6b25a715ce900a5b45b03da0447acf430195dcb540091b12966f2a2
```

Example Response

If the request is successful, Glacier responds with 204 No Content to indicate that the archive is deleted.

```
HTTP/1.1 204 No Content
x-amzn-RequestId: AAABZpJrTyioDC_HsOmHae6EZp_uB5Jr6cnGOLKp_XJC1-Q
Date: Wed, 10 Feb 2017 12:00:00 GMT
```

Related Sections

- Initiate Multipart Upload (POST multipart-uploads) (p. 221)
- Upload Archive (POST archive) (p. 212)
- Identity and Access Management in Amazon S3 Glacier (p. 114)

Upload Archive (POST archive)

Description

This operation adds an archive to a vault. For a successful upload, your data is durably persisted. In response, Amazon S3 Glacier (Glacier) returns the archive ID in the x-amz-archive-id header of the response. You should save the archive ID returned so that you can access the archive later.
You must provide a SHA256 tree hash of the data you are uploading. For information about computing a SHA256 tree hash, see Computing Checksums (p. 156).

When uploading an archive, you can optionally specify an archive description of up to 1,024 printable ASCII characters. Glacier returns the archive description when you either retrieve the archive or get the vault inventory. Glacier does not interpret the description in any way. An archive description does not need to be unique. You cannot use the description to retrieve or sort the archive list.

Except for the optional archive description, Glacier does not support any additional metadata for the archives. The archive ID is an opaque sequence of characters from which you cannot infer any meaning about the archive. So you might maintain metadata about the archives on the client-side. For more information, see Working with Archives in Amazon S3 Glacier (p. 59).

Archives are immutable. After you upload an archive, you cannot edit the archive or its description.

Requests

To upload an archive, you use the HTTP POST method and scope the request to the archives subresource of the vault in which you want to save the archive. The request must include the archive payload size, checksum (SHA256 tree hash), and can optionally include a description of the archive.

Syntax

```
POST /AccountId/vaults/VaultName/archives
Host: glacier.Region.amazonaws.com
x-amz-glacier-version: 2012-06-01
Date: Date
Authorization: SignatureValue
x-amz-archive-description: Description
x-amz-sha256-tree-hash: SHA256 tree hash
x-amz-content-sha256: SHA256 linear hash
Content-Length: Length
<Request body.>
```

Note

The AccountId value is the AWS account ID of the account that owns the vault. You can either specify an AWS account ID or optionally a single '-' (hyphen), in which case Amazon S3 Glacier uses the AWS account ID associated with the credentials used to sign the request. If you use an account ID, do not include any hyphens ('-') in the ID.

Request Parameters

This implementation of the operation does not use request parameters.

Request Headers

This operation uses the following request headers, in addition to the request headers that are common to all operations. For more information about the common request headers, see Common Request Headers (p. 150).

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Content-Length</td>
<td>The size of the object, in bytes. For more information, go to <a href="http://www.w3.org/Protocols/rfc2616/rfc2616-sec14.html#sec14.13">http://www.w3.org/Protocols/rfc2616/rfc2616-sec14.html#sec14.13</a>.</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>Type: Number</td>
<td></td>
</tr>
</tbody>
</table>
Upload Archive

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>x-amz-archive-description</td>
<td>The optional description of the archive you are uploading. It can be a plain language description or some identifier you choose to assign. The description need not be unique across archives. When you retrieve a vault inventory (see Initiate Job (POST jobs) (p. 251)), it includes this description for each of the archives it returns in response.</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>Type: String</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Default: None</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Constraints: The description must be less than or equal to 1,024 characters. The allowable characters are 7-bit ASCII without control codes, specifically ASCII values 32—126 decimal or 0x20—0x7E hexadecimal.</td>
<td></td>
</tr>
<tr>
<td>x-amz-content-sha256</td>
<td>The SHA256 checksum (a linear hash) of the payload. This is not the same value as you specify in the x-amz-sha256-tree-hash header.</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>Type: String</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Default: None</td>
<td></td>
</tr>
<tr>
<td>x-amz-sha256-tree-hash</td>
<td>The user-computed checksum, SHA256 tree hash, of the payload. For information on computing the SHA256 tree hash, see Computing Checksums (p. 156). If Glacier computes a different checksum of the payload, it will reject the request.</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>Type: String</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Default: None</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Constraints: None</td>
<td></td>
</tr>
</tbody>
</table>

**Request Body**

The request body contains the data to upload.

**Responses**

In response, Glacier durably stores the archive and returns a URI path to the archive ID.

**Syntax**

HTTP/1.1 201 Created
x-amzn-RequestId: x-amzn-RequestId
Date: Date
x-amz-sha256-tree-hash: ChecksumComputedByAmazonGlacier
Location: Location
x-amz-archive-id: ArchiveId

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Response Headers

A successful response includes the following response headers, in addition to the response headers that are common to all operations. For more information about common response headers, see Common Response Headers (p. 152).

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location</td>
<td>The relative URI path of the newly added archive resource. Type: String</td>
</tr>
<tr>
<td>x-amz-archive-id</td>
<td>The ID of the archive. This value is also included as part of the Location header. Type: String</td>
</tr>
<tr>
<td>x-amz-sha256-tree-hash</td>
<td>The checksum of the archive computed by Glacier. Type: String</td>
</tr>
</tbody>
</table>

Response Body

This operation does not return a response body.

Errors

For information about Amazon S3 Glacier exceptions and error messages, see Error Responses (p. 166).

Examples

Example Request

The following example shows a request to upload an archive.

```
POST /-/vaults/examplevault/archives HTTP/1.1
Host: glacier.us-west-2.amazonaws.com
x-amz-Date: 20170210T120000Z
x-amz-sha256-tree-hash: beb0fe31a1c7ca8c6c04d574ea906e1f97b31fdca7571defb5b44dca89b5af60
x-amz-content-sha256: 7f2fe580ed8f35154041fa3d4b41d6d3adaef0c85d2fe6309f1d4b5200eeedca3
Content-Length: 2097152
x-amz-glacier-version: 2012-06-01
Authorization: Authorization=AWS4-HMAC-SHA256 Credential=AKIAIOSFODNN7EXAMPLE/20141123/us-west-2/glacier/aws4_request,SignedHeaders=host;x-amz-content-sha256;x-amz-date;x-amz-glacier-version,Signature=16b9a9e220a37e32f2e7be196b4ebb87120ca7974038210199ac5982e792cace
<Request body (2097152 bytes).>
```

Example Response

The successful response below has a Location header where you can get the ID that Glacier assigned to the archive.

```
HTTP/1.1 201 Created
x-amzn-RequestId: AAABZp3rTyioDC_HsOmHae8EZp_uBSJr6cnGGLKp_XJCl-Q
Date: Wed, 10 Feb 2017 12:00:00 GMT
x-amz-sha256-tree-hash: beb0fe31a1c7ca8c6c04d574ea906e1f97b31fdca7571defb5b44dca89b5af60
Location: /11112223333/vaults/examplevault/archives/NkbByEewjEggmBZ2fTHq3r0XBodfjP4g6i8u87-Tjhq6eGoOY9Z8i1_AUYUshFAdTqLHy8gF15nFCFJmDl2yEZONi5L26Omw12vcs01MNGntHEQL8MBfGlqrEXAMPLEArchiveId
```

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Multipart Upload Operations

The following are the multipart upload operations available for use in Glacier.

Topics
- Abort Multipart Upload (DELETE uploadID) (p. 216)
- Complete Multipart Upload (POST uploadID) (p. 218)
- Initiate Multipart Upload (POST multipart-uploads) (p. 221)
- List Parts (GET uploadID) (p. 224)
- List Multipart Uploads (GET multipart-uploads) (p. 229)
- Upload Part (PUT uploadID) (p. 234)

Abort Multipart Upload (DELETE uploadID)

Description
This multipart upload operation aborts a multipart upload identified by the upload ID.

After the Abort Multipart Upload request succeeds, you cannot use the upload ID to upload any more parts or perform any other operations. Aborting a completed multipart upload fails. However, aborting an already-aborted upload will succeed, for a short time.

This operation is idempotent.

For information about multipart upload, see Uploading Large Archives in Parts (Multipart Upload) (p. 67).

Requests
To abort a multipart upload, send an HTTP DELETE request to the URI of the multipart-uploads subresource of the vault and identify the specific multipart upload ID as part of the URI.

Syntax

```
DELETE /AccountId/vaults/VaultName/multipart-uploads/uploadID HTTP/1.1
Host: glacier.Region.amazonaws.com
Date: Date
Authorization: SignatureValue
x-amz-glacier-version: 2012-06-01
```

Note
- The AccountId value is the AWS account ID of the account that owns the vault. You can either specify an AWS account ID or optionally a single `-` (hyphen), in which case Amazon S3 Glacier
uses the AWS account ID associated with the credentials used to sign the request. If you use an account ID, do not include any hyphens (‘-’) in the ID.

**Request Parameters**

This operation does not use request parameters.

**Request Headers**

This operation uses only request headers that are common to all operations. For information about common request headers, see Common Request Headers (p. 150).

**Request Body**

This operation does not have a request body.

**Responses**

**Syntax**

HTTP/1.1 204 No Content

<table>
<thead>
<tr>
<th>x-amzn-RequestId: x-amzn-RequestId</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date: Date</td>
</tr>
</tbody>
</table>

**Response Headers**

This operation uses only response headers that are common to most responses. For information about common response headers, see Common Response Headers (p. 152).

**Response Body**

This operation does not return a response body.

**Errors**

For information about Amazon S3 Glacier exceptions and error messages, see Error Responses (p. 166).

**Example**

**Example Request**

In the following example, a DELETE request is sent to the URI of a multipart upload ID resource.

```
DELETE /-/vaults/examplevault/multipart-uploads/
OW2fM5iVylEpFEMM9_HpKowRapC3vn5sSL39_396UW9zLFWVvrnRHaPjUJddQ5OxSHVXjYtrN47NBZ-
khxOjyEXAMPLE  HTTP/1.1
Host: glacier.us-west-2.amazonaws.com
x-amz-Date: 20170210T120000Z
x-amz-glacier-version: 2012-06-01
Authorization: AWS4-HMAC-SHA256 Credential=AKIAIOSFODNN7EXAMPLE/20141123/
us-west-2/glacier/aws4_request,SignedHeaders=host;x-amz-date;x-amz-glacier-
version,Signature=9257c16da6b25a715ce900a564b3d0a447acfa30154dcb540993b12966f2a2
```

**Example Response**

```
HTTP/1.1 204 No Content
x-amzn-RequestId: AAABZpJrTyioDC_HsOmHae6EZp_uBSJr6cnGOLKp_XJCl-Q
Date: Wed, 10 Feb 2017 12:00:00 GMT
```
Complete Multipart Upload (POST uploadID)

Description

You call this multipart upload operation to inform Amazon S3 Glacier (Glacier) that all the archive parts have been uploaded and Glacier can now assemble the archive from the uploaded parts.

For information about multipart upload, see Uploading Large Archives in Parts (Multipart Upload) (p. 67).

After assembling and saving the archive to the vault, Glacier returns the archive ID of the newly created archive resource. After you upload an archive, you should save the archive ID returned to retrieve the archive at a later point.

In the request, you must include the computed SHA256 tree hash of the entire archive you have uploaded. For information about computing a SHA256 tree hash, see Computing Checksums (p. 156). On the server side, Glacier also constructs the SHA256 tree hash of the assembled archive. If the values match, Glacier saves the archive to the vault; otherwise, it returns an error, and the operation fails. The List Parts (GET uploadID) (p. 224) operation returns list of parts uploaded for a specific multipart upload. It includes checksum information for each uploaded part that can be used to debug a bad checksum issue.

Additionally, Glacier also checks for any missing content ranges. When uploading parts, you specify range values identifying where each part fits in the final assembly of the archive. When assembling the final archive Glacier checks for any missing content ranges and if there are any missing content ranges, Glacier returns an error and the Complete Multipart Upload operation fails.

Complete Multipart Upload is an idempotent operation. After your first successful complete multipart upload, if you call the operation again within a short period, the operation will succeed and return the same archive ID. This is useful in the event you experience a network issue that causes an aborted connection or receive a 500 server error, in which case you can repeat your Complete Multipart Upload request and get the same archive ID without creating duplicate archives. Note, however, that after the multipart upload completes, you cannot call the List Parts operation and the multipart upload will not appear in List Multipart Uploads response, even if idempotent complete is possible.

Requests

To complete a multipart upload, you send an HTTP POST request to the URI of the upload ID that Glacier created in response to your Initiate Multipart Upload request. This is the same URI you used when uploading parts. In addition to the common required headers, you must include the result of the SHA256 tree hash of the entire archive and the total size of the archive in bytes.

Syntax

POST /AccountId/vaults/VaultName/multipart-uploads/uploadID
Host: glacier.Region.amazonaws.com
Date: *date*
Authorization: *SignatureValue*
x-amz-sha256-tree-hash: *SHA256 tree hash of the archive*
x-amz-archive-size: *ArchiveSize in bytes*
x-amz-glacier-version: 2012-06-01

**Note**
The AccountId value is the AWS account ID of the account that owns the vault. You can either specify an AWS account ID or optionally a single ‘-’ (hyphen), in which case Amazon S3 Glacier uses the AWS account ID associated with the credentials used to sign the request. If you use an account ID, do not include any hyphens (‘-’) in the ID.

**Request Parameters**

This operation does not use request parameters.

**Request Headers**

This operation uses the following request headers, in addition to the request headers that are common to all operations. For more information about the common request headers, see Common Request Headers (p. 150).

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>x-amz-archive-size</td>
<td>The total size, in bytes, of the entire archive. This value should be the sum of all the sizes of the individual parts that you uploaded.</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>Type: String</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Default: None</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Constraints: None</td>
<td></td>
</tr>
<tr>
<td>x-amz-sha256-tree-hash</td>
<td>The SHA256 tree hash of the entire archive. It is the tree hash of SHA256 tree hash of the individual parts. If the value you specify in the request does not match the SHA256 tree hash of the final assembled archive as computed by Glacier, Glacier returns an error and the request fails.</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>Type: String</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Default: None</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Constraints: None</td>
<td></td>
</tr>
</tbody>
</table>

**Request Elements**

This operation does not use request elements.

**Responses**

Amazon S3 Glacier (Glacier) creates a SHA256 tree hash of the entire archive. If the value matches the SHA256 tree hash of the entire archive you specified in the request, Glacier adds the archive to the vault. In response it returns the HTTP Location header with the URL path of the newly added archive resource. If the archive size or SHA256 that you sent in the request does not match, Glacier will return an error and the upload remains in the incomplete state. It is possible to retry the Complete Multipart Upload operation later with correct values, at which point you can successfully create an archive. If a multipart upload does not complete, then eventually Glacier will reclaim the upload ID.
Syntax

HTTP/1.1 201 Created
x-amzn-RequestId: x-amzn-RequestId
Date: Date
Location: Location
x-amz-archive-id: ArchiveId

Response Headers

A successful response includes the following response headers, in addition to the response headers that are common to all operations. For more information about common response headers, see Common Response Headers (p. 152).

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location</td>
<td>The relative URI path of the newly created archive. This URL includes the archive ID that is generated by Glacier. Type: String</td>
</tr>
<tr>
<td>x-amz-archive-id</td>
<td>The ID of the archive. This value is also included as part of the Location header. Type: String</td>
</tr>
</tbody>
</table>

Response Fields

This operation does not return a response body.

Example

Example Request

In this example, an HTTP POST request is sent to the URI that was returned by an Initiate Multipart Upload request. The request specifies both the SHA256 tree hash of the entire archive and the total archive size.

```
POST /-/vaults/examplevault/multipart-uploads/
OW2zf5iVvYe1pFWMM9HpKowRapC3vn5sSL39_396UWF9zLFWvVrHnHAJdQ0xSHVXjYtrN47NBZ-khzoOjYEXAMPLE HTTP/1.1
Host: glacier.us-west-2.amazonaws.com
x-amz-Date: 20170210T120000Z
x-amz-sha256-tree-hash:1ffc0f54dd5fdd66b62da70d25edac0
x-amz-archive-size:8388608
x-amz-glacier-version:2012-06-01
Authorization: AWS4-HMAC-SHA256 Credential=AKIAIOSFODNN7EXAMPLE/20141123/us-west-2/glacier/aws4_request,SignedHeaders=host;x-amz-date;x-amz-glacier-version,Signature=9257c16da6b25a715ce900a5b45b03da0447acf430195dc540091b12966f2a2
```

Example Response

The following example response shows that Glacier successfully created an archive from the parts you uploaded. The response includes the archive ID with complete path.

```
HTTP/1.1 201 Created
x-amzn-RequestId: AAABzpJrTyioDC_HsOmHae8EZp_uBSJr6cnGOLKp_XJCl-Q
Date: Wed, 10 Feb 2017 12:00:00 GMT
```
Initiate Multipart Upload

Description

This operation initiates a multipart upload (see Uploading Large Archives in Parts (Multipart Upload) (p. 67)). Amazon S3 Glacier (Glacier) creates a multipart upload resource and returns its ID in the response. You use this Upload ID in subsequent multipart upload operations.

When you initiate a multipart upload, you specify the part size in number of bytes. The part size must be a megabyte (1024 KB) multiplied by a power of 2—for example, 1048576 (1 MB), 2097152 (2 MB), 4194304 (4 MB), 8388608 (8 MB), and so on. The minimum allowable part size is 1 MB, and the maximum is 4 GB.

Every part you upload using this upload ID, except the last one, must have the same size. The last one can be the same size or smaller. For example, suppose you want to upload a 16.2 MB file. If you initiate the multipart upload with a part size of 4 MB, you will upload four parts of 4 MB each and one part of 0.2 MB.

Note
You don’t need to know the size of the archive when you start a multipart upload because Glacier does not require you to specify the overall archive size.

After you complete the multipart upload, Glacier removes the multipart upload resource referenced by the ID. Glacier will also remove the multipart upload resource if you cancel the multipart upload or it may be removed if there is no activity for a period of 24 hours. The ID may still be available after 24 hours, but applications should not expect this behavior.

Requests

To initiate a multipart upload, you send an HTTP POST request to the URI of the multipart-uploads subresource of the vault in which you want to save the archive. The request must include the part size and can optionally include a description of the archive.

Syntax

```
POST /AccountID/vaults/VaultName/multipart-uploads
```
Host: glacier.us-west-2.amazonaws.com
Date: Date
Authorization: SignatureValue
x-amz-glacier-version: 2012-06-01
x-amz-archive-description: ArchiveDescription
x-amz-part-size: PartSize

**Note**
The AccountId value is the AWS account ID of the account that owns the vault. You can either specify an AWS account ID or optionally a single ‘-‘ (hyphen), in which case Amazon S3 Glacier uses the AWS account ID associated with the credentials used to sign the request. If you use an account ID, do not include any hyphens (‘-‘) in the ID.

**Request Parameters**
This operation does not use request parameters.

**Request Headers**
This operation uses the following request headers, in addition to the request headers that are common to all operations. For more information about the common request headers, see Common Request Headers (p. 150).

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>x-amz-part-size</td>
<td>The size of each part except the last, in bytes. The last part can be smaller than this part size.</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>Type: String</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Default: None</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Constraints: The part size must be a megabyte (1024 KB) multiplied by a power of 2—for example, 1048576 (1 MB), 2097152 (2 MB), 4194304 (4 MB), 8388608 (8 MB), and so on. The minimum allowable part size is 1 MB, and the maximum is 4 GB (4096 MB).</td>
<td></td>
</tr>
<tr>
<td>x-amz-archive-description</td>
<td>Archive description you are uploading in parts. It can be a plain-language description or some unique identifier you choose to assign. When you retrieve a vault inventory (see Initiate Job (POST jobs) (p. 251) ), the inventory includes this description for each of the archives it returns in response. Leading whitespace in archive descriptions is removed.</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>Type: String</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Default: None</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Constraints: The description must be less than or equal to 1024 bytes. The allowable characters are 7 bit ASCII without control codes, specifically ASCII values 32-126 decimal or 0x20-0x7E hexadecimal.</td>
<td></td>
</tr>
</tbody>
</table>
Request Body

This operation does not have a request body.

Responses

In the response, Glacier creates a multipart upload resource identified by an ID and returns the relative URI path of the multipart upload ID.

Syntax

HTTP/1.1 201 Created
x-amzn-RequestId: x-amzn-RequestId
Date: Date
Location: Location
x-amz-multipart-upload-id: multiPartUploadId

Response Headers

A successful response includes the following response headers, in addition to the response headers that are common to all operations. For more information about common response headers, see Common Response Headers (p. 152).

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location</td>
<td>The relative URI path of the multipart upload ID Glacier created. You use this URI path to scope your requests to upload parts, and to complete the multipart upload.</td>
</tr>
<tr>
<td>x-amz-multipart-upload-id</td>
<td>The ID of the multipart upload. This value is also included as part of the Location header.</td>
</tr>
</tbody>
</table>

Response Body

This operation does not return a response body.

Errors

For information about Amazon S3 Glacier exceptions and error messages, see Error Responses (p. 166).

Example

Example Request

The following example initiates a multipart upload by sending an HTTP POST request to the URI of the multipart-uploads subresource of a vault named examplevault. The request includes headers to specify the part size of 4 MB (4194304 bytes) and the optional archive description.

```
POST /-/vaults/examplevault/multipart-uploads
Host: glacier.us-west-2.amazonaws.com
```
Example Response

Glacier creates a multipart upload resource and adds it to the multipart-uploads subresource of the vault. The Location response header includes the relative URI path to the multipart upload ID.

HTTP/1.1 201 Created
x-amzn-RequestId: AAABZpJrTyioDC_HsOmHae8EZp_uBSJr6cmGOLkp_XJC1-Q
Date: Wed, 10 Feb 2017 12:00:00 GMT
Location: /11112223333/vaults/examplevault/multipart-uploads/OW2fM51Vy1EpFEMM9_HpKowRapC3vn5aSL39_396UW9zLFWrVrnRHaPjUJddQ5oxSHVXyTrN47NZ5-khxOjyEXAMPLE
x-amz-multipart-upload-id: OW2fM51Vy1EpFEMM9_HpKowRapC3vn5aSL39_396UW9zLFWrVrnRHaPjUJddQ5oxSHVXyTrN47NZ5-khxOjyEXAMPLE

For information about uploading individual parts, see Upload Part (PUT uploadID) (p. 234).

Related Sections

- Upload Part (PUT uploadID) (p. 234)
- Complete Multipart Upload (POST uploadID) (p. 218)
- Abort Multipart Upload (DELETE uploadID) (p. 216)
- List Multipart Uploads (GET multipart-uploads) (p. 229)
- List Parts (GET uploadID) (p. 224)
- Delete Archive (DELETE archive) (p. 210)
- Uploading Large Archives in Parts (Multipart Upload) (p. 67)
- Identity and Access Management in Amazon S3 Glacier (p. 114)

List Parts (GET uploadID)

Description

This multipart upload operation lists the parts of an archive that have been uploaded in a specific multipart upload identified by an upload ID. For information about multipart upload, see Uploading Large Archives in Parts (Multipart Upload) (p. 67).

You can make this request at any time during an in-progress multipart upload before you complete the multipart upload. Glacier returns the part list sorted by range you specified in each part upload. If you send a List Parts request after completing the multipart upload, Amazon S3 Glacier (Glacier) returns an error.

The List Parts operation supports pagination. You should always check the Marker field in the response body for a marker at which to continue the list. If there are no more items the marker field is null. If the marker is not null, to fetch the next set of parts you sent another List Parts request with the marker request parameter set to the marker value Glacier returned in response to your previous List Parts request.
You can also limit the number of parts returned in the response by specifying the `limit` parameter in the request.

**Requests**

**Syntax**

To list the parts of an in-progress multipart upload, you send a `GET` request to the URI of the multipart upload ID resource. The multipart upload ID is returned when you initiate a multipart upload ([Initiate Multipart Upload (POST multipart-uploads) (p. 221)]). You may optionally specify `marker` and `limit` parameters.

```
GET /AccountId/vaults/VaultName/multipart-uploads/uploadID HTTP/1.1
Host: glacier.Region.amazonaws.com
Date: Date
Authorization: SignatureValue
x-amz-glacier-version: 2012-06-01
```

**Note**

The `AccountId` value is the AWS account ID of the account that owns the vault. You can either specify an AWS account ID or optionally a single '-' (hyphen), in which case Amazon S3 Glacier uses the AWS account ID associated with the credentials used to sign the request. If you use an account ID, do not include any hyphens ('-') in the ID.

**Request Parameters**

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>limit</td>
<td>The maximum number of parts to be returned. The default limit is 50. The number of parts returned might be fewer than the specified limit, but the number of returned parts never exceeds the limit.</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>Type: String</td>
<td></td>
</tr>
<tr>
<td>marker</td>
<td>An opaque string used for pagination. <code>marker</code> specifies the part at which the listing of parts should begin. Get the <code>marker</code> value from the response of a previous List Parts response. You need only include the <code>marker</code> if you are continuing the pagination of results started in a previous List Parts request.</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>Type: String</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Constraints: None</td>
<td></td>
</tr>
</tbody>
</table>

**Request Headers**

This operation uses only response headers that are common to most responses. For information about common response headers, see [Common Response Headers (p. 152)].

**Request Body**

This operation does not have a request body.
Responses

Syntax

```
HTTP/1.1 200 OK
x-amzn-RequestId: x-amzn-RequestId
Date: Date
Content-Type: application/json
Content-Length: Length

{
  "ArchiveDescription" : String,
  "CreationDate" : String,
  "Marker": String,
  "MultipartUploadId" : String,
  "PartSizeInBytes" : Number,
  "Parts" : [
    { "RangeInBytes" : String,
      "SHA256TreeHash" : String
    },
    ...
  ],
  "VaultARN" : String
}
```

Response Headers

This operation uses only response headers that are common to most responses. For information about common response headers, see Common Response Headers (p. 152).

Response Body

The response body contains the following JSON fields.

**ArchiveDescription**

The description of the archive that was specified in the Initiate Multipart Upload request. This field is `null` if no archive description was specified in the Initiate Multipart Upload operation.

*Type: String*

**CreationDate**

The UTC time that the multipart upload was initiated.

*Type: String. A string representation in the ISO 8601 date format, for example 2013-03-20T17:03:43.221Z.*

**Marker**

An opaque string that represents where to continue pagination of the results. You use the marker in a new List Parts request to obtain more jobs in the list. If there are no more parts, this value is `null`.

*Type: String*

**MultipartUploadId**

The ID of the upload to which the parts are associated.

*Type: String*
**PartSizeInBytes**

The part size in bytes. This is the same value that you specified in the Initiate Multipart Upload request.

*Type: Number*

**Parts**

A list of the part sizes of the multipart upload. Each object in the array contains a `RangeBytes` and `sha256-tree-hash` name/value pair.

*Type: Array*

**RangeInBytes**

The byte range of a part, inclusive of the upper value of the range.

*Type: String*

**SHA256TreeHash**

The SHA256 tree hash value that Glacier calculated for the part. This field is never null.

*Type: String*

**VaultARN**

The Amazon Resource Name (ARN) of the vault to which the multipart upload was initiated.

*Type: String*

**Errors**

For information about Amazon S3 Glacier exceptions and error messages, see [Error Responses](#) (p. 166).

**Examples**

**Example: List Parts of a Multipart Upload**

The following example lists all the parts of an upload. The example sends an HTTP GET request to the URI of the specific multipart upload ID of an in-progress multipart upload and returns up to 1,000 parts.

**Example Request**

```
GET /-/vaults/examplevault/multipart-uploads/
GW2f5v5iVylEpFEMM9_HpRowRapC3vn5sSL39_396UW9zLFWVrnRHaPjUJddQ50xSHVXjYtrN47NBZ-khxOjYEXAMPLE HTTP/1.1
Host: glacier.us-west-2.amazonaws.com
x-amz-Date: 20170210T120000Z
x-amz-glacier-version: 2012-06-01
Authorization: AWS4-HMAC-SHA256 Credential=AKIAIOSFODNN7EXAMPLE/20141123/
us-west-2/glacier/aws4_request,Signature=9257c16da6b25a715ce900a5b45b03da0447acf430195dcb540091b12966f2a2
```

**Example Response**

In the response, Glacier returns a list of uploaded parts associated with the specified multipart upload ID. In this example, there are only two parts. The returned `Marker` field is `null` indicating that there are no more parts of the multipart upload.

```
HTTP/1.1 200 OK
```

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Example: List Parts of a Multipart Upload (Specify the Marker and the Limit Request Parameters)

The following example demonstrates how to use pagination to get a limited number of results. The example sends an HTTP GET request to the URI of the specific multipart upload ID of an in-progress multipart upload to return one part. A starting marker parameter specifies at which part to start the part list. You can get the marker value from the response of a previous request for a part list. Furthermore, in this example, the limit parameter is set to 1 and returns one part. Note that the Marker field is not null, indicating that there is at least one more part to obtain.

Example Request

```
GET /-/vaults/examplevault/multipart-uploads/
OW2fM5iVylEpFEMM9_HpKowRapC3vn5sSLJ39_396UV9zLFUWVrnRHaPjUJddQ50xSHVXjYtrN47NBZ-khxOjyEXAMPLE?marker=1001&limit=1 HTTP/1.1
Host: glacier.us-west-2.amazonaws.com
x-amz-Date: 20170210T120000Z
x-amz-glacier-version: 2012-06-01
Authorization: AWS4-HMAC-SHA256 Credential=AKIAIOSFODNN7EXAMPLE/20141123/us-west-2/glacier/aws4_request,SignedHeaders=host;x-amz-date;x-amz-glacier-version,Signature=9257c16da6b25a715ce900a5b45b03da0447acf430195dcb540091b12966f2a2
```

Example Response

```
HTTP/1.1 200 OK
x-amzn-RequestId: AAABZpJrTyioDC_HsOmHae8EZp_uBSJr6cnGOLKp_XJC1-Q
Date: Wed, 10 Feb 2017 12:00:00 GMT
Content-Type: text/json
Content-Length: 412
```

In the response, Glacier returns a list of uploaded parts that are associated with the specified in-progress multipart upload ID.
List Multipart Uploads

**Description**

This multipart upload operation lists in-progress multipart uploads for the specified vault. An in-progress multipart upload is a multipart upload that has been initiated by an *Initiate Multipart Upload (POST multipart-uploads)* (p. 221) request, but has not yet been completed or aborted. The list returned in the List Multipart Upload response has no guaranteed order.

The List Multipart Uploads operation supports pagination. By default, this operation returns up to 50 multipart uploads in the response. You should always check the `marker` field in the response body for a marker at which to continue the list; if there are no more items the `marker` field is null.

If the `marker` is not null, to fetch the next set of multipart uploads you sent another List Multipart Uploads request with the `marker` request parameter set to the marker value Amazon S3 Glacier (Glacier) returned in response to your previous List Multipart Uploads request.

Note the difference between this operation and the *List Parts (GET uploadID)* (p. 224) operation. The List Multipart Uploads operation lists all multipart uploads for a vault. The List Parts operation returns parts of a specific multipart upload identified by an Upload ID.

For information about multipart upload, see *Uploading Large Archives in Parts (Multipart Upload)* (p. 67).

**Requests**

**Syntax**

To list multipart uploads, send a GET request to the URI of the multipart-uploads subresource of the vault. You may optionally specify `marker` and `limit` parameters.

```
GET /AccountId/vaults/VaultName/multipart-uploads HTTP/1.1
Host: glacier.Region.amazonaws.com
```
Note
The AccountId value is the AWS account ID of the account that owns the vault. You can either specify an AWS account ID or optionally a single '-' (hyphen), in which case Amazon S3 Glacier uses the AWS account ID associated with the credentials used to sign the request. If you use an account ID, do not include any hyphens ('-') in the ID.

Request Parameters

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>limit</td>
<td>Specifies the maximum number of uploads returned in the response body. If not specified, the List Uploads operation returns up to 50 uploads.</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>Type: String</td>
<td></td>
</tr>
<tr>
<td>marker</td>
<td>An opaque string used for pagination. marker specifies the upload at which the listing of uploads should begin. Get the marker value from a previous List Uploads response. You need only include the marker if you are continuing the pagination of results started in a previous List Uploads request.</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>Type: String</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Constraints: None</td>
<td></td>
</tr>
</tbody>
</table>

Request Headers

This operation uses only response headers that are common to most responses. For information about common response headers, see Common Response Headers (p. 152).

Request Body

This operation does not have a request body.

Responses

Syntax

```
HTTP/1.1 200 OK
x-amzn-RequestId: x-amzn-RequestId
Date: Date
Content-Type: application/json
Content-Length: Length

{
  "Marker": String,
  "UploadsList": [
    {
      "ArchiveDescription": String,
      "ArchiveCreationDate": Date,
      "ArchiveSize": Long,
      "UploadId": String
    }
  ]
}
```
Response Headers

This operation uses only response headers that are common to most responses. For information about common response headers, see Common Response Headers (p. 152).

Response Body

The response body contains the following JSON fields.

ArchiveDescription

The description of the archive that was specified in the Initiate Multipart Upload request. This field is null if no archive description was specified in the Initiate Multipart Upload operation.

Type: String

CreationDate

The UTC time that the multipart upload was initiated.

Type: String. A string representation in the ISO 8601 date format, for example 2013-03-20T17:03:43.221Z.

Marker

An opaque string that represents where to continue pagination of the results. You use the marker in a new List Multipart Uploads request to obtain more uploads in the list. If there are no more uploads, this value is null.

Type: String

PartSizeInBytes

The part size specified in the Initiate Multipart Upload (POST multipart-uploads) (p. 221) request. This is the size of all the parts in the upload except the last part, which may be smaller than this size.

Type: Number

MultipartUploadId

The ID of the multipart upload.

Type: String

UploadsList

A list of metadata about multipart upload objects. Each item in the list contains a set of name-value pairs for the corresponding upload, including ArchiveDescription, CreationDate, MultipartUploadId, PartSizeInBytes, and VaultARN.

Type: Array

VaultARN

The Amazon Resource Name (ARN) of the vault that contains the archive.
**Type:** String

**Errors**

For information about Amazon S3 Glacier exceptions and error messages, see Error Responses (p. 166).

**Examples**

**Example: List All Multipart Uploads**

The following example lists all the multipart uploads in progress for the vault. The example shows an HTTP GET request to the URI of the multipart-uploads subresource of a specified vault. Because the marker and limit parameters are not specified in the request, up to 1,000 in-progress multipart uploads are returned.

**Example Request**

```
GET /-/vaults/examplevault/multipart-uploads HTTP/1.1
Host: glacier.us-west-2.amazonaws.com
x-amz-Date: 20170210T120000Z
x-amz-glacier-version: 2012-06-01
Authorization: AWS4-HMAC-SHA256 Credential=AKIAIOSFODNN7EXAMPLE/20141123/us-west-2/glacier/aws4_request,Signature=9257c16da6b25a715ce900a5b45b03da0447acf430195dc540091b12966f2a2
```

**Example Response**

In the response Glacier returns a list of all in-progress multipart uploads for the specified vault. The marker field is null, which indicates that there are no more uploads to list.

```
HTTP/1.1 200 OK
x-amzn-RequestId: AAABZpJrTyioDC_HsOmHae8EZp_uBSJr6cmGOLKp_XJCl-Q
Date: Wed, 10 Feb 2017 12:00:00 GMT
Content-Type: application/json
Content-Length: 1054

{
   "Marker": null,
   "UploadsList": [
      {
         "ArchiveDescription": "archive 1",
         "CreationDate": "2012-03-19T23:20:59.130Z",
         "MultipartUploadId": "xsQdFIRsfJr20CW2uBKpZCpTJSJ1MeL2hYf8mp8dM0m4RU2laqoEYe6g3h3ecqB_zqwB7zLDMeSwho65re4C4Ew",
         "PartSizeInBytes": 4194304,
      },
      {
         "ArchiveDescription": "archive 2",
         "CreationDate": "2012-04-01T15:00:00.000Z",
         "MultipartUploadId": "nPyGOnyFcx67qqX7E-0tSGiRi88hHMOWOxKr--JMyM6K_jVMFV29PqZ35Na5aWbugg6OP92pMtufeHdQN7ClipSF6uJc",
         "PartSizeInBytes": 4194304,
      },
      {
         "ArchiveDescription": "archive 3",
         "CreationDate": "2012-03-20T17:03:43.221Z",
         "MultipartUploadId": "qt-RBst_7yO8gV1onIBaXr2t-db0pB4s8MNeweGjkGdNpuU-cdSAscqG62gwV9r5jh3mLspFPrFEltpNE7IQFHiu1Xov",
         "PartSizeInBytes": 4194304,
      }
   ]
}
```
Example: Partial List of Multipart Uploads

The following example demonstrates how to use pagination to get a limited number of results. The example shows an HTTP GET request to the URI of the multipart-uploads subresource for a specified vault. In this example, the limit parameter is set to 1, which means that only one upload is returned in the list, and the marker parameter indicates the multipart upload ID at which the returned list begins.

Example Request

GET /-/vaults/examplevault/multipart-uploads?
limit=1&marker=xSqdFIRsfJr20CW2AbZBKPzRZAF7ZSJIMtLs2hYf8mvp8dM0m4RUzlaoqEve6g3h3ecqBU_zqwB7zLDMsWw065re45c137
HTTP/1.1
Host: glacier.us-west-2.amazonaws.com
x-amz-Date: 20170210T120000Z
x-amz-glacier-version: 2012-06-01
Authorization: AWS4-HMAC-SHA256 Credential=AKIAIOSFODNN7EXAMPLE/20141123/us-west-2/glacier/aws4_request,SignedHeaders=host;x-amz-date;x-amz-glacier-version,Signature=9257c16da6b25a715ce900a5b45b03da0447acf430195dcb540091b12966f2a2

Example Response

In the response, Amazon S3 Glacier (Glacier) returns a list of no more than two in-progress multipart uploads for the specified vault, starting at the specified marker and returning two results.

```
HTTP/1.1 200 OK
x-amzn-RequestId: AAABZpJrTyioDC_HsOmHae8EZp_uBSJr6cnGOLKp_XJCl-Q
Date: Wed, 10 Feb 2017 12:00:00 GMT
Content-Type: application/json
Content-Length: 470

{
"Marker": "qt-RBst_7yO8gVlOnIBsaWx2tw-db0pE4s8MNeGjKjGdNpuU-cdsAocG62gwV9r5jhsMLeYFpsFEltp7Ne7qfHiu1XoV",
"UploadsList": [
{
"ArchiveDescription": "archive 2",
"CreationDate": "2012-04-01T15:00:00.000Z",
"MultipartUploadId": "nPyGOnyFcx67q7E-0tSGiri88hHMemwOzXr-_jMy6RjVMFIV291PqZ31WsaWBSaBqgg6OP92pRuufeHd7ClpSF6uJC",
"PartSizeInBytes": 4194304,
}
]}
```

Related Sections

- Initiate Multipart Upload (POST multipart-uploads) (p. 221)
- Upload Part (PUT uploadID) (p. 234)
- Complete Multipart Upload (POST uploadID) (p. 218)
- Abort Multipart Upload (DELETE uploadID) (p. 216)
- List Parts (GET uploadID) (p. 224)
- Uploading Large Archives in Parts (Multipart Upload) (p. 67)
Upload Part (PUT uploadID)

Description

This multipart upload operation uploads a part of an archive. You can upload archive parts in any order because in your Upload Part request you specify the range of bytes in the assembled archive that will be uploaded in this part. You can also upload these parts in parallel. You can upload up to 10,000 parts for a multipart upload.

For information about multipart upload, see Uploading Large Archives in Parts (Multipart Upload) (p. 67).

Amazon S3 Glacier (Glacier) rejects your upload part request if any of the following conditions is true:

- **SHA256 tree hash does not match**—To ensure that part data is not corrupted in transmission, you compute a SHA256 tree hash of the part and include it in your request. Upon receiving the part data, Glacier also computes a SHA256 tree hash. If the two hash values don’t match, the operation fails. For information about computing a SHA256 tree hash, see Computing Checksums (p. 156).

- **SHA256 linear hash does not match**—Required for authorization, you compute a SHA256 linear hash of the entire uploaded payload and include it in your request. For information about computing a SHA256 linear hash, see Computing Checksums (p. 156).

- **Part size does not match**—The size of each part except the last must match the size that is specified in the corresponding Initiate Multipart Upload (POST multipart-uploads) (p. 221) request. The size of the last part must be the same size as, or smaller than, the specified size.

  **Note**
  
  If you upload a part whose size is smaller than the part size you specified in your initiate multipart upload request and that part is not the last part, then the upload part request will succeed. However, the subsequent Complete Multipart Upload request will fail.

- **Range does not align**—The byte range value in the request does not align with the part size specified in the corresponding initiate request. For example, if you specify a part size of 4194304 bytes (4 MB), then 0 to 4194303 bytes (4 MB — 1) and 4194304 (4 MB) to 8388607 (8 MB — 1) are valid part ranges. However, if you set a range value of 2 MB to 6 MB, the range does not align with the part size and the upload will fail.

This operation is idempotent. If you upload the same part multiple times, the data included in the most recent request overwrites the previously uploaded data.

Requests

You send this HTTP PUT request to the URI of the upload ID that was returned by your Initiate Multipart Upload request. Glacier uses the upload ID to associate part uploads with a specific multipart upload. The request must include a SHA256 tree hash of the part data (x-amz-SHA256-tree-hash header), a SHA256 linear hash of the entire payload (x-amz-content-sha256 header), the byte range (Content-Range header), and the length of the part in bytes (Content-Length header).

**Syntax**

```plaintext
PUT /AccountId/vaults/VaultName/multipart-uploads/uploadID HTTP/1.1
Host: glacier.Region.amazonaws.com
Date: Date
Authorization: SignatureValue
Content-Range: ContentRange
Content-Length: PayloadSize
```
Note
The AccountId value is the AWS account ID of the account that owns the vault. You can either specify an AWS account ID or optionally a single '-' (hyphen), in which case Amazon S3 Glacier uses the AWS account ID associated with the credentials used to sign the request. If you use an account ID, do not include any hyphens ('-') in the ID.

Request Parameters
This operation does not use request parameters.

Request Headers
This operation uses the following request headers, in addition to the request headers that are common to all operations. For more information about the common request headers, see Common Request Headers (p. 150).

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Content-Length</td>
<td>Identifies the length of the part in bytes.</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>Type: String</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Default: None</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Constraints: None</td>
<td></td>
</tr>
</tbody>
</table>
| Content-Range             | Identifies the range of bytes in the assembled archive that will be uploaded in this part. Glacier uses this information to assemble the archive in the proper sequence. The format of this header follows RFC 2616. An example header is Content-Range:bytes 0-4194303/*.
<p>|                           | Type: String                                                                | Yes      |
|                           | Default: None                                                               |          |
|                           | Constraints: The range cannot be greater than the part size that you specified when you initiated the multipart upload. |          |
| x-amz-content-sha256      | The SHA256 checksum (a linear hash) of the uploaded payload. This is not the same value as you specify in the x-amz-sha256-tree-hash header. | Yes      |
|                           | Type: String                                                                |          |
|                           | Default: None                                                               |          |
|                           | Constraints: None                                                           |          |
| x-amz-sha256-tree-hash    | Specifies a SHA256 tree hash of the data being uploaded. For information about computing a SHA256 tree hash, see Computing Checksums (p. 156). | Yes      |</p>
<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Required</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Type: String</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Default: None</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Constraints: None</td>
<td></td>
</tr>
</tbody>
</table>

**Request Body**

The request body contains the data to upload.

**Responses**

Upon a successful part upload, Glacier returns a **204 No Content** response.

**Syntax**

```
HTTP/1.1 204 No Content
x-amzn-RequestId: x-amzn-RequestId
Date: Date
x-amz-sha256-tree-hash: ChecksumComputedByAmazonGlacier
```

**Response Headers**

A successful response includes the following response headers, in addition to the response headers that are common to all operations. For more information about common response headers, see [Common Response Headers](p. 152).

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>x-amz-sha256-tree-hash</td>
<td>The SHA256 tree hash that Glacier computed for the uploaded part.</td>
</tr>
<tr>
<td></td>
<td>Type: String</td>
</tr>
</tbody>
</table>

**Response Body**

This operation does not return a response body.

**Example**

The following request uploads a 4 MB part. The request sets the byte range to make this the first part in the archive.

**Example Request**

The example sends an HTTP **PUT** request to upload a 4 MB part. The request is sent to the URI of the Upload ID that was returned by the Initiate Multipart Upload request. The **Content-Range** header identifies the part as the first 4 MB data part of the archive.

```
PUT /-/vaults/examplevault/multipart-uploads/
OW2fM5iVylEpFEMM9_HpKowRapC3vn5aSL39_396UW9zLFUWVrnRHaPjUJddQ50xSHVXjYtrN47NBZ-khxOjyEXAMPLE HTTP/1.1
```
To upload the next part, the procedure is the same; however, you must calculate a new SHA256 tree hash of the part you are uploading and also specify a new byte range to indicate where the part will go in the final assembly. The following request uploads another part using the same upload ID. The request specifies the next 4 MB of the archive after the previous request and a part size of 4 MB.

```plaintext
PUT /-/vaults/examplevault/multipart-uploads/OW2fM5iVylEpFEMM9_HpRowRapC3vn5aSL39_396UW9zLFUWVrnRHbPjUddQ50xSHVXjYtrN47NBZ-khxoOjyEXAMPLE HTTP/1.1
Host: glacier.us-west-2.amazonaws.com
Date: Wed, 10 Feb 2017 12:00:00 GMT
Content-Range: bytes 4194304-8388607/*
Content-Length: 4194304
x-amz-sha256-tree-hash: f10e02544d651e2c3ce90a4307427493
x-amz-content-sha256: 726e392cb4d09924dbadb1cc0ba3b00c3643d03d1c4cb4b823e2f041c6f61a628
x-amz-glacier-version: 2012-06-01
Authorization: Authorization=AWS4-HMAC-SHA256 Credential=AKIAIOSFODNN7EXAMPLE/20120525/us-west-2/glacier/aws4_request,SignedHeaders=host;x-amz-content-sha256;x-amz-date;x-amz-glacier-version,Signature=16b9a9e220a37e32f2e7be196b4eb887120ca7974038210199ac5982e792cace
```

The parts can be uploaded in any order; Glacier uses the range specification for each part to determine the order in which to assemble them.

### Example Response

```plaintext
HTTP/1.1 204 No Content
x-amzn-RequestId: AABBSzJr7vioDC_HsOmHae8EZp_uBSJr5cnGOLKp_XJCl-Q
x-amz-sha256-tree-hash: c06f7cd4baac8087002a99a5f48bf953
Date: Wed, 10 Feb 2017 12:00:00 GMT
```

### Related Sections

- Initiate Multipart Upload (POST multipart-uploads) (p. 221)
- Upload Part (PUT uploadID) (p. 234)
- Complete Multipart Upload (POST uploadID) (p. 218)
- Abort Multipart Upload (DELETE uploadID) (p. 216)
- List Multipart Uploads (GET multipart-uploads) (p. 229)
- List Parts (GET uploadID) (p. 224)
- Uploading Large Archives in Parts (Multipart Upload) (p. 67)
- Identity and Access Management in Amazon S3 Glacier (p. 114)

### Job Operations

The following are the job operations available in Glacier.
Describe Job (GET JobID)

Description

This operation returns information about a job you previously initiated, including the job initiation date, the user who initiated the job, the job status code/message, and the Amazon Simple Notification Service (Amazon SNS) topic to notify after Amazon S3 Glacier (Glacier) completes the job. For more information about initiating a job, see Initiate Job (POST jobs) (p. 251).

Note
This operation enables you to check the status of your job. However, we strongly recommend that you set up an Amazon SNS topic and specify it in your initiate job request so that Glacier can notify the topic after it completes the job.

A job ID will not expire for at least 24 hours after Glacier completes the job.

Requests

Syntax

To obtain information about a job, you use the HTTP GET method and scope the request to the specific job. Note that the relative URI path is the same one that Glacier returned to you when you initiated the job.

```
GET /AccountID/vaults/VaultName/jobs/JobID HTTP/1.1
Host: glacier.Region.amazonaws.com
Date: date
Authorization: signatureValue
x-amz-glacier-version: 2012-06-01
```

Note
The AccountId value is the AWS account ID of the account that owns the vault. You can either specify an AWS account ID or optionally a single '-' (hyphen), in which case Amazon S3 Glacier uses the AWS account ID associated with the credentials used to sign the request. If you use an account ID, do not include any hyphens ('-') in the ID.

Note
In the request, if you omit the JobID, the response returns a list of all active jobs on the specified vault. For more information about listing jobs, see List Jobs (GET jobs) (p. 261).

Request Parameters

This operation does not use request parameters.

Request Headers

This operation uses only request headers that are common to all operations. For information about common request headers, see Common Request Headers (p. 150).
Request Body

This operation does not have a request body.

Responses

Syntax

```
HTTP/1.1 201 Created
x-amzn-RequestId: x-amzn-RequestId
Date: Date
Content-Type: application/json
Content-Length: Length

{
  "Action": "string",
  "ArchiveId": "string",
  "ArchiveSHA256TreeHash": "string",
  "ArchiveSizeInBytes": number,
  "Completed": boolean,
  "CompletionDate": "string",
  "CreationDate": "string",
  "InventoryRetrievalParameters": {
    "EndDate": "string",
    "Format": "string",
    "Limit": "string",
    "Marker": "string",
    "StartDate": "string"
  },
  "InventorySizeInBytes": number,
  "JobDescription": "string",
  "JobId": "string",
  "JobOutputPath": "string",
  "OutputLocation": {
    "S3": {
      "AccessControlList": [
        {
          "Grantee": {
            "DisplayName": "string",
            "EmailAddress": "string",
            "ID": "string",
            "Type": "string",
            "URI": "string"
          },
          "Permission": "string"
        }
      ],
      "BucketName": "string",
      "CannedACL": "string",
      "Encryption": {
        "EncryptionType": "string",
        "KMSContext": "string",
        "KMSKeyId": "string"
      },
      "Prefix": "string",
      "StorageClass": "string",
      "Tagging": {
        "string": "string"
      },
      "UserMetadata": {
        "string": "string"
      }
    }
  }
}
```
"RetrievalByteRange": "string",
"SelectParameters": {
    "Expression": "string",
    "ExpressionType": "string",
    "InputSerialization": {
        "csv": {
            "Comments": "string",
            "FieldDelimiter": "string",
            "FileHeaderInfo": "string",
            "QuoteCharacter": "string",
            "QuoteEscapeCharacter": "string",
            "RecordDelimiter": "string"
        }
    },
    "OutputSerialization": {
        "csv": {
            "FieldDelimiter": "string",
            "QuoteCharacter": "string",
            "QuoteEscapeCharacter": "string",
            "QuoteFields": "string",
            "RecordDelimiter": "string"
        }
    }
},
"SHA256TreeHash": "string",
"SNSTopic": "string",
"StatusCode": "string",
"StatusMessage": "string",
"Tier": "string",
"VaultARN": "string"

**Response Headers**

This operation uses only response headers that are common to most responses. For information about common response headers, see Common Response Headers (p. 152).

**Response Body**

The response body contains the following JSON fields.

**Action**

The job type. It is either ArchiveRetrieval, InventoryRetrieval, or Select.

*Type: String*

**ArchivedId**

The archive ID requested for a select or archive retrieval job. Otherwise, this field is null.

*Type: String*

**ArchiveSHA256TreeHash**

The SHA256 tree hash of the entire archive for an archive retrieval job. For inventory retrieval jobs, this field is null.

*Type: String*

**ArchiveSizeInBytes**

For an ArchiveRetrieval job, this is the size in bytes of the archive being requested for download. For the InventoryRetrieval job, the value is null.

---

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Describe Job

**Type**: Number

**Completed**

The job status. When an archive or inventory retrieval job is completed, you get the job's output using the `Get Job Output (GET output)` (p. 245).

**Type**: Boolean

**CompletionDate**

The Universal Coordinated Time (UTC) time that the job request completed. While the job is in progress, the value is null.

**Type**: String

**CreationDate**

The UTC time that the job was created.

**Type**: A string representation in the ISO 8601 date format, for example `2013-03-20T17:03:43.221Z`.

**InventoryRetrievalParameters**

Input parameters used for a range inventory retrieval.

**Type**: `InventoryRetrievalJobInput` (p. 274) object

**InventorySizeInBytes**

For an `InventoryRetrieval` job, this is the size in bytes of the inventory requested for download. For the `ArchiveRetrieval` or `Select` job, the value is null.

**Type**: Number

**JobDescription**

The job description you provided when you initiated the job.

**Type**: String

**JobId**

The ID that identifies the job in Glacier.

**Type**: String

**JobOutputPath**

Contains the job output location.

**Type**: String

**OutputLocation**

An object that contains information about the location where the select job results and errors are stored.

**Type**: `OutputLocation` (p. 277) object

**RetrievalByteRange**

The retrieved byte range for archive retrieval jobs in the form "StartByteValue-EndByteValue." If you don't specify a range in the archive retrieval, then the whole archive is retrieved; also...
"StartByteValue" equals 0, and "EndByteValue" equals the size of the archive minus 1. For inventory retrieval or select jobs, this field is null.

*Type:* String

**SelectParameters**

An object that contains information about the parameters used for a select.

*Type: SelectParameters (p. 279) object*

**SHA256TreeHash**

The SHA256 tree hash value for the requested range of an archive. If the *Initiate Job (POST jobs) (p. 251)* request for an archive specified a tree-hash aligned range, then this field returns a value. For more information about tree-hash alignment for archive range retrievals, see *Receiving Checksums When Downloading Data (p. 165).*

For the specific case when the whole archive is retrieved, this value is the same as the *ArchiveSHA256TreeHash* value.

This field is null in the following situations:

- Archive retrieval jobs that specify a range that is not tree-hash aligned.
- Archival jobs that specify a range that is equal to the whole archive and the job status is *InProgress*.
- Inventory jobs.
- Select jobs.

*Type: String*

**SNSTopic**

An Amazon SNS topic that receives notification.

*Type: String*

**StatusCode**

The code indicating the status of the job.

*Valid Values:* *InProgress* | *Succeeded* | *Succeeded*

*Type: String*

**StatusMessage**

A friendly message that describes the job status.

*Type: String*

**Tier**

The data access tier to use for the select or archive retrieval.

*Valid Values:* *Bulk* | *Expedited* | *Standard*

*Type: String*

**VaultARN**

The Amazon Resource Name (ARN) of the vault of which the job is a subresource.
Describe Job

**Type:** String

**Errors**

For information about Amazon S3 Glacier exceptions and error messages, see Error Responses (p. 166).

**Examples**

The following example shows the request for a job that retrieves an archive.

**Example Request: Get job description**

```
GET /-/vaults/examplevault/jobs/HkF9p6o7yjhFx-K3CGI6fuSm6Vz9T7esGQfo8nUXY1W0jib5gq1JZ55yHgt5vF54ZShjoQxzVVVh7vEXAMPLEjobID HTTP/1.1
Host: glacier.us-west-2.amazonaws.com
x-amz-Date: 20170210T120000Z
x-amz-glacier-version: 2012-06-01
Authorization: AWS4-HMAC-SHA256 Credential=AKIAIOSFODNN7EXAMPLE/20141123/us-west-2/glacier/aws4_request,SignedHeaders=host;x-amz-date;x-amz-glacier-version,Signature=9257c16da6b25a715ce900a5b45b03da0447acf430195dcb540091b12966f2a2
```

**Example Response**

The response body includes JSON that describes the specified job. Note that for both the inventory retrieval and archive retrieval jobs, the JSON fields are the same. However, when a field doesn't apply to the type of job, its value is null. The following is an example response for an archive retrieval job. Note the following:

- The `Action` field value is `ArchiveRetrieval`.
- The `ArchiveSizeInBytes` field shows the size of the archive requested in the archive retrieval job.
- The `ArchiveSHA256TreeHash` field shows the SHA256 tree hash for the entire archive.
- The `RetrievalByteRange` field shows the range requested in the Initiate Job request. In this example, the whole archive is requested.
- The `SHA256TreeHash` field shows the SHA256 tree hash for the range requested in the Initiate Job request. In this example, it is the same as the `ArchiveSHA256TreeHash` field, which means that the whole archive was requested.
- The `InventorySizeInBytes` field value is null because it does not apply to an archive retrieval job.

```
HTTP/1.1 200 OK
x-amzn-RequestId: AAABZpJrTyioDC_HsOmHae8EZp_uBSJr6cnGOLKp_XJCl-Q
Date: Wed, 10 Feb 2017 12:00:00 GMT
Content-Type: application/json
Content-Length: 419

{
  "Action": "ArchiveRetrieval",
  "ArchiveId": "NkbByEejwEggmBz2fTHgJrg0XBoDfjP4q6iu87-Tjhq66eGQ9YZ9s11_AHyUshPAd7Gv8y7pT15gfCFJrzL2yEZW9Sl260Wm12vcs01MNGntHEQL68MBfGlqrEXAMPLEArchiveId",
  "ArchiveSizeInBytes": 16777216,
  "ArchiveSHA256TreeHash": "beb0fe31a1c7ca8c6c04d574ea906e3f97b31fdca7571defb54b44dca7b9af60",
  "Completed": false,
  "CompletionDate": null,
  "InventorySizeInBytes": null,
  "JobDescription": "My ArchiveRetrieval Job",
}
```
The following is an example response for an inventory retrieval job. Note the following:

- The Action field value is InventoryRetrieval.
- The ArchiveSizeInBytes, ArchiveSHA256TreeHash, and RetrievalByteRange field values are null because these fields do not apply to an inventory retrieval job.
- The InventorySizeInBytes field value is null because the job is still in progress, and has not fully prepared the inventory for download. If the job was completed before your describe job request, this field would give you the size of the output.

```json
{
"Action": "InventoryRetrieval",
"ArchiveId": null,
"ArchiveSizeInBytes": null,
"ArchiveSHA256TreeHash": null,
"Completed": false,
"CompletionDate": null,
"InventorySizeInBytes": null,
"JobDescription": "Inventory Description",
"JobId": "HkF9p6o7yjhFx-K3CG16fuSm6VzW9T7esQGfco8nUXYYwS0jlb5gq1JZ55yHgt5vP54ZShjoQzQVVh7vEXAMPLEjobID",
"RetrievalByteRange": null,
"SHA256TreeHash": null,
"SNSTopic": null,
"StatusCode": "InProgress",
"StatusMessage": "Operation in progress.",
"Tier": "Bulk",
}
```

The following is an example response for a completed inventory retrieval job that contains a marker used to continue pagination of the vault inventory retrieval.

```json
{
"Action": "InventoryRetrieval",
"ArchiveId": null,
"ArchiveSHA256TreeHash": null,
"ArchiveSizeInBytes": null,
"Completed": true,
"CompletionDate": "2013-12-05T21:51:13.591Z",
"CreationDate": "2013-12-05T21:51:12.281Z",
"InventorySizeInBytes": 777062,
"JobDescription": null,
"JobId": "sCC2RZNBF2nildYD_roe0J9bHRdPQ0bDRkmTdg-mXi2u3lc49uW67C6hDF2D9pB2phx-BN3oJAbru7PMYoIoxDStzu8",
"NextInventoryRetrievalMarker": null,
"RetrievalByteRange": null,
"SHA256TreeHash": null,
"SNSTopic": null,
"StatusCode": "Succeeded",
"StatusMessage": "Operation completed.",
}
```
"StatusMessage": "Succeeded",
"Tier": "Bulk",
"InventoryRetrievalParameters": {
  "StartDate": "2013-11-12T13:43:12Z",
  "EndDate": "2013-11-20T08:12:45Z",
  "Limit": "120000",
  "Format": "JSON",
  "Marker": "vyS0t2jQe5qbcDgIeD50chS1SXwYMrkVKo0KHlTUjEYxBGCqRLKaiySzdn7QXGVV5XZpNVRG67pCZ_uykQXFMLaxDSu2h0_-5C0"
},

Related Sections

- Get Job Output (GET output) (p. 245)
- Identity and Access Management in Amazon S3 Glacier (p. 114)

Get Job Output (GET output)

Description

This operation downloads the output of the job you initiated using Initiate Job (POST jobs) (p. 251). Depending on the job type you specified when you initiated the job, the output will be either the content of an archive or a vault inventory.

You can download all the job output or download a portion of the output by specifying a byte range. For both archive and inventory retrieval jobs, you should verify the downloaded size against the size returned in the headers from the Get Job Output response.

For archive retrieval jobs, you should also verify that the size is what you expected. If you download a portion of the output, the expected size is based on the range of bytes you specified. For example, if you specify a range of bytes=0-1048575, you should verify your download size is 1,048,576 bytes. If you download an entire archive, the expected size is the size of the archive when you uploaded it to Amazon S3 Glacier (Glacier). The expected size is also returned in the headers from the Get Job Output response.

In the case of an archive retrieval job, depending on the byte range you specify, Glacier returns the checksum for the portion of the data. To ensure the portion you downloaded is the correct data, compute the checksum on the client, verify that the values match, and verify that the size is what you expected.

A job ID does not expire for at least 24 hours after Glacier completes the job. That is, you can download the job output within the 24-hour period after Glacier completes the job.

Requests

Syntax

To retrieve a job output, you send the HTTP GET request to the URI of the output of the specific job.

GET /AccountId/vaults/VaultName/jobs/JobID/output HTTP/1.1
Host: glacier.Region.amazonaws.com
Date: Date
Authorization: SignatureValue
Range: ByteRangeToRetrieve

API Version 2012-06-01
245
Note
The AccountId value is the AWS account ID of the account that owns the vault. You can either specify an AWS account ID or optionally a single '-' (hyphen), in which case Amazon S3 Glacier uses the AWS account ID associated with the credentials used to sign the request. If you use an account ID, do not include any hyphens ('-') in the ID.

Request Parameters
This operation does not use request parameters.

Request Headers
This operation uses the following request headers, in addition to the request headers that are common to all operations. For more information about the common request headers, see Common Request Headers (p. 150).

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Required</th>
</tr>
</thead>
</table>
| Range | The range of bytes to retrieve from the output. For example, if you want to download the first 1,048,576 bytes, specify the range as bytes=0-1048576. For more information, go to Range Header Field Definition. The range is relative to any range specified in the Initiate Job request. By default, this operation downloads the entire output. If the job output is large, then you can use the Range request header to retrieve a portion of the output. This allows you to download the entire output in smaller chunks of bytes. For example, suppose you have 1 GB job output you want to download and you decide to download 128 MB chunks of data at a time, a total of eight Get Job Output requests. You will use the following process to download the job output:

1. Download a 128 MB chunk of output by specifying the appropriate byte range using the Range header. Verify that all 128 MB of data was received.
2. Along with the data, the response will include a checksum of the payload. You compute the checksum of the payload on the client and compare it with the checksum you received in the response to ensure you received all the expected data.
3. Repeat steps 1 and 2 for all the eight 128 MB chunks of output data, each time specifying the appropriate byte range.
4. After downloading all the parts of the job output, you have a list of eight checksum values. Compute the tree hash of these values to find the checksum of the entire output. Using the Describe Job (GET JobID) (p. 238) operation, obtain job information of the job that provided you the output. The response includes the checksum of the entire archive stored in Glacier. You compare this value with the checksum you computed to ensure you have downloaded the entire archive content with no errors. |
| Type: String | No |
### Name | Description | Required
--- | --- | ---
Default: None | Constraints: None | 

**Request Body**

This operation does not have a request body.

### Responses

**Syntax**

For a retrieval request that returns all of the job data, the job output response returns a **200 OK** response code. When partial content is requested, for example, if you specified the `Range` header in the request, then the response code **206 Partial Content** is returned.

```
HTTP/1.1 200 OK
x-amzn-RequestId: x-amzn-RequestId
Date: Date
Content-Type: ContentType
Content-Length: Length
x-amz-sha256-tree-hash: ChecksumComputedByAmazonGlacier

[Body containing job output.]
```

**Response Headers**

<table>
<thead>
<tr>
<th>Header</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Content-Range</td>
<td>The range of bytes returned by Glacier. If only partial output is downloaded, the response provides the range of bytes Glacier returned. For example, bytes <code>0–1048575/8388608</code> returns the first 1 MB from 8 MB. For more information about the <code>Content-Range</code> header, go to <a href="#">Content-Range Header Field Definition</a>. Type: String</td>
</tr>
<tr>
<td>Content-Type</td>
<td>The Content-Type depends on whether the job output is an archive or a vault inventory. For archive data, the Content-Type is <code>application/octet-stream</code>. For vault inventory, if you requested CSV format when you initiated the job, the Content-Type is <code>text/csv</code>. Otherwise, by default, vault inventory is returned as JSON, and the Content-Type is <code>application/json</code>. Type: String</td>
</tr>
</tbody>
</table>
| x-amz-sha256-tree-hash  | The checksum of the data in the response. This header is returned only when retrieving the output for an archive retrieval job. Furthermore, this header appears when the retrieved data range requested in the Initiate Job request is tree hash aligned and the range to download in
<table>
<thead>
<tr>
<th>Header</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>the Get Job Output is also tree hash aligned. For more information about tree hash aligned ranges, see Receiving Checksums When Downloading Data (p. 165).</td>
</tr>
<tr>
<td></td>
<td>For example, if in your Initiate Job request you specified a tree hash aligned range to retrieve (which includes the whole archive), then you will receive the checksum of the data you download under the following conditions:</td>
</tr>
<tr>
<td></td>
<td>• You get the entire range of the retrieved data.</td>
</tr>
<tr>
<td></td>
<td>• You request a byte range of the retrieved data that has a size of a megabyte (1024 KB) multiplied by a power of 2 and that starts and ends on a multiple of the size of the requested range. For example, if you have 3.1 MB of retrieved data and you specify a range to return that starts at 1 MB and ends at 2 MB, then the \texttt{x-amz-sha256-tree-hash} is returned as a response header.</td>
</tr>
<tr>
<td></td>
<td>• You request a range to return of the retrieved data that goes to the end of the data, and the start of the range is a multiple of the size of the range to retrieve rounded up to the next power of two but not smaller than one megabyte (1024 KB). For example, if you have 3.1 MB of retrieved data and you specify a range that starts at 2 MB and ends at 3.1 MB (the end of the data), then the \texttt{x-amz-sha256-tree-hash} is returned as a response header.</td>
</tr>
<tr>
<td>Type</td>
<td>String</td>
</tr>
</tbody>
</table>

**Response Body**

Glacier returns the job output in the response body. Depending on the job type, the output can be the archive contents or the vault inventory. In case of a vault inventory, by default the inventory list is returned as the following JSON body.

```json
{
   "VaultARN": \texttt{String},
   "InventoryDate": \texttt{String},
   "ArchiveList": [
      {
         "ArchiveId": \texttt{String},
         "ArchiveDescription": \texttt{String},
         "CreationDate": \texttt{String},
         "Size": \texttt{Number},
         "SHA256TreeHash": \texttt{String}
      },
      ...
   ]
}
```

If you requested the comma-separated values (CSV) output format when you initiated the vault inventory job, then the vault inventory is returned in CSV format in the body. The CSV format has five columns "ArchiveId", "ArchiveDescription", "CreationDate", "Size", and "SHA256TreeHash" with the same definitions as the corresponding JSON fields.

**Note**

In the returned CSV format, fields may be returned with the whole field enclosed in double-quotes. Fields that contain a comma or double-quotes are always returned enclosed in double-quotes. For example, my archive description,1 is returned as "my archive description,1". Double-quote characters that are within returned double-quote enclosed
fields are *escaped* by preceding them with a backslash character. For example, *my archive description,1"2* is returned as "*my archive description,1\"2* and *my archive description,1\"2* is returned as "*my archive description,1\"2*. The backslash character is not escaped.

The JSON response body contains the following JSON fields.

**ArchiveDescription**

The description of an archive.

*Type:* String

**Archiveld**

The ID of an archive.

*Type:* String

**ArchiveList**

An array of archive metadata. Each object in the array represents metadata for one archive contained in the vault.

*Type:* Array

**CreationDate**

The UTC date and time the archive was created.

*Type:* A string representation in the ISO 8601 date format, for example 2013-03-20T17:03:43.221Z.

**InventoryDate**

The UTC date and time of the last inventory for the vault that was completed after changes to the vault. Even though Glacier prepares a vault inventory once a day, the inventory date is only updated if there have been archive additions or deletions to the vault since the last inventory.

*Type:* A string representation in the ISO 8601 date format, for example 2013-03-20T17:03:43.221Z.

**SHA256TreeHash**

The tree hash of the archive.

*Type:* String

**Size**

The size in bytes of the archive.

*Type:* Number

**VaultARN**

The Amazon Resource Name (ARN) resource from which the archive retrieval was requested.

*Type:* String

**Errors**

For information about Amazon S3 Glacier exceptions and error messages, see Error Responses (p. 166).

**Examples**

The following example shows the request for a job that retrieves an archive.
Example 1: Download output

This example retrieves data prepared by Glacier in response to your initiate archive retrieval job request.

Example Request

GET /-/vaults/examplevault/jobs/HkF9p607yjhFxF-K3C16fSuM6vX977esQfco8nUXYYw0j1bgql1J255yHgt5vP54ZShjoQzQVYh7vEXAMPLEjobID/output
HTTP/1.1
Host: glacier.us-west-2.amazonaws.com
x-amz-Date: 20170210T120000Z
x-amz-glacier-version: 2012-06-01
Authorization: AWS4-HMAC-SHA256 Credential=AKIAIOSFODNN7EXAMPLE/20141123/us-west-2/glacier/aws4_request, SignedHeaders=host;x-amz-date;x-amz-glacier-version, Signature=9257c16da6b25a715ce900a5b45b03da0447acf430195dcb540091b12966f2a2

Example Response

The following is an example response of an archive retrieval job. Note that the Content-Type header is application/octet-stream and that x-amz-sha256-tree-hash header is included in the response, which means that all the job data is returned.

HTTP/1.1 200 OK
x-amzn-RequestId: AAABZpJrTyioDC_HsOmHae8EZp_uBSJr6cnGOLKp_XJC1-Q
x-amz-sha256-tree-hash: beb0fe31a1c7ca8c6c04d574ea906e3f97b31fdca7571defb5b44dca89b5af60
Date: Wed, 10 Feb 2017 12:00:00 GMT
Content-Type: application/octet-stream
Content-Length: 1048576

[Archive data.]

The following is an example response of an inventory retrieval job. Note that the Content-Type header is application/json. Also note that the response does not include the x-amz-sha256-tree-hash header.

HTTP/1.1 200 OK
x-amzn-RequestId: AAABZpJrTyioDC_HsOmHae8EZp_uBSJr6cnGOLKp_XJC1-Q
Date: Wed, 10 Feb 2017 12:00:00 GMT
Content-Type: application/json
Content-Length: 906

{
  "InventoryDate": "2011-12-12T14:19:01Z",
  "ArchiveList": [
    {
      "ArchiveId": "DMTmICA2n5Tdqg5BV2z7og-A20xmpAPKt3UXwXdw4n_FZ_6uATurW6kwy5Qy9xH1ME1mBYvM63LWa8Tym2MaCxB_9V9WbrW4Jw4zsvgSehAPDVKGcppUD1X7b4JJoZoA",
      "ArchiveDescription": "my archive1",
      "CreationDate": "2012-05-15T17:19:46.702Z",
      "Size": 2140123,
      "SHA256TreeHash": "6b9d4cf8697b3d3af6aa1b59a0b27b337da5b18988dbcc619a3e608a554se62"
    },
    {
      "ArchiveId": "2HzwzK9gF2JHyvCS-ZRu0Fq08jQLuyB4s265Hs3AXj9MoAHz7tbXavcFeHusgU_hVi01WeChe0N51sYHHRyZ7rrkRnuYxUs_slj2K8ume_7mKO_017C-uH610HgaW9d37pabXrsa",
      "ArchiveDescription": "my archive2",
      "Size": 2140123,
    }
  ]
}
Example 2: Download only partial output

This example retrieves only a portion of the archive prepared by Glacier in response to your initiate archive retrieval job request. The request uses the optional Range header to retrieve only the first 1,024 bytes.

Example Request

```
GET /-/vaults/examplevault/jobs/HkF9p6o7yjhFx-K3Cg16fuSm6vzW9TpeisQfco8nUXvYwS0jibbqg1JZ55yHgt5vP54ZShjoQsQVh7vEXAMPLEjobID/output
HTTP/1.1
Host: glacier.us-west-2.amazonaws.com
x-amz-Date: 20170210T120000Z
Range: bytes=0-1023
x-amz-glacier-version: 2012-06-01
Authorization: AWS4-HMAC-SHA256 Credential=AKIAIOSFODNN7EXAMPLE/20141123/us-west-2/glacier/aws4_request,SignedHeaders=host;x-amz-date;x-amz-glacier-version,Signature=9257c16da6b25a71ce900a5b45b03da0447acf430195dc540091b12966f2a2
```

Example Response

The following successful response shows the 206 Partial Content response. In this case, the response also includes a Content-Range header that specifies the range of bytes Glacier returns.

```
HTTP/1.1 206 Partial Content
x-amzn-RequestId: AAABZpJrTyioDC_HsOmHae8EZeP_uBSJr6cnGOLKp_XJCl-Q
Date: Wed, 10 Feb 2017 12:00:00 GMT
Content-Range: bytes 0-1023/8388608
Content-Type: application/octet-stream
Content-Length: 1024

[Archive data.]
```

Related Sections

- Describe Job (GET JobID) (p. 238)
- Initiate Job (POST jobs) (p. 251)
- Identity and Access Management in Amazon S3 Glacier (p. 114)

Initiate Job (POST jobs)

This operation initiates the following types of Amazon S3 Glacier (Glacier) jobs:

- select—Perform a select query on an archive
- archive-retrieval—Retrieve an archive
- inventory-retrieval—Inventory a vault

Topics

- Working with Amazon S3 Glacier Select Jobs (p. 252)
Working with Amazon S3 Glacier Select Jobs

You use a Glacier Select job to perform SQL queries on archive objects. The archive objects being queried by the select job must be formatted as uncompressed comma-separated values (CSV) files. For overview information about Glacier Select jobs, see Querying Archives with Glacier Select (p. 138).

When initiating a select job, you do the following:

- Define an output location for the output of your select query. This location must be an Amazon S3 bucket in the same AWS Region as the vault containing the archive object being queried. The AWS account that initiates the job must have permissions to write to the S3 bucket. You can specify the storage class and encryption for the output objects stored in Amazon S3. When setting S3Location (p. 278), it might be helpful to read the following topics in the Amazon S3 documentation:
  - PUT Object in the Amazon Simple Storage Service API Reference
  - Managing Access with ACLs in the Amazon Simple Storage Service Developer Guide
  - Protecting Data Using Server-Side Encryption in the Amazon Simple Storage Service Developer Guide

- Define the SQL expression to use for the SELECT for your query in SelectParameters (p. 279). For example, you can use expressions like the following examples:
  - The following example expression returns all records from the specified object.
    ```sql
    SELECT * FROM archive
    ```
  - Assuming you are not using any headers for data stored in the object, you can specify columns using positional headers.
    ```sql
    SELECT s._1, s._2 FROM archive s WHERE s._3 > 100
    ```
  - If you have headers and you set the fileHeaderInfo in CSVInput (p. 267) to Use, you can specify headers in the query. (If you set the fileHeaderInfo field to Ignore, the first row is skipped for the query.) You cannot mix ordinal positions with header column names.
    ```sql
    SELECT s.Id, s.FirstName, s.SSN FROM archive s
    ```

For more information about using SQL with Glacier Select, see SQL Reference for Amazon S3 Select and Glacier Select (p. 292).

When initiating a select job, you can also do the following:

- Specify the Expedited tier to expedite your queries. For more information, see Expedited, Standard, and Bulk Tiers (p. 254).
- Specify details about the data serialization format of both the input object being queried and the serialization of the CSV-encoded query results.
- Specify an Amazon Simple Notification Service (Amazon SNS) topic to which Glacier can post a notification after the job is completed. You can specify an SNS topic for each job request. The notification is sent only after Glacier completes the job.
You can use `Describe Job (GET JobID)` (p. 238) to obtain job status information while a job is in progress. However, it is more efficient to use an Amazon SNS notification to determine when a job is complete.

When working with a select job, you cannot do the following:

- Call the `GetJobOutput` operation. Job output is written to the output location.
- Use ranged selection.

For an example of initiating a select job, see Example Request: Initiate a select job (p. 259).

**Initializing an Archive or Vault Inventory Retrieval Job**

Retrieving an archive or a vault inventory are asynchronous operations that require you to initiate a job. Retrieval is a two-step process:

1. Initiate a retrieval job by using the `Initiate Job (POST jobs)` (p. 251) operation.
   
   **Important**
   
   A data retrieval policy can cause your initiate retrieval job request to fail with a `PolicyEnforcedException`. For more information about data retrieval policies, see `Amazon S3 Glacier Data Retrieval Policies` (p. 141). For more information about the `PolicyEnforcedException` exception, see `Error Responses` (p. 166).

2. After the job completes, download the bytes using the `Get Job Output (GET output)` (p. 245) operation.

The retrieval request is executed asynchronously. When you initiate a retrieval job, Glacier creates a job and returns a job ID in the response. When Glacier completes the job, you can get the job output (archive or inventory data). For information about getting job output, see the `Get Job Output (GET output)` (p. 245) operation.

The job must complete before you can get its output. To determine when a job is complete, you have the following options:

- **Use an Amazon SNS notification**— You can specify an Amazon SNS topic to which Glacier can post a notification after the job is completed. You can specify an SNS topic per job request. The notification is sent only after Glacier completes the job. In addition to specifying an SNS topic per job request, you can configure vault notifications for a vault so that job notifications are sent for all retrievals. For more information, see `Set Vault Notification Configuration (PUT notification-configuration)` (p. 208).

- **Get job details**— You can make a `Describe Job (GET JobID)` (p. 238) request to obtain job status information while a job is in progress. However, it is more efficient to use an Amazon SNS notification to determine when a job is complete.

  **Note**
  
  The information you get via notification is same that you get by calling `Describe Job (GET JobID)` (p. 238).

If for a specific event, you add both the notification configuration on the vault and also specify an SNS topic in your initiate job request, Glacier sends both notifications. For more information, see `Set Vault Notification Configuration (PUT notification-configuration)` (p. 208).

**The Vault Inventory**

Glacier updates a vault inventory approximately once a day, starting on the day you first upload an archive to the vault. If there have been no archive additions or deletions to the vault since the last
inventory, the inventory date is not updated. When you initiate a job for a vault inventory, Glacier returns the last inventory it generated, which is a point-in-time snapshot and not real-time data.

After Glacier creates the first inventory for the vault, it typically takes half a day and up to a day before that inventory is available for retrieval.

You might not find it useful to retrieve a vault inventory for each archive upload. However, suppose that you maintain a database on the client-side associating metadata about the archives you upload to Glacier. Then, you might find the vault inventory useful to reconcile information, as needed, in your database with the actual vault inventory. For more information about the data fields returned in an inventory job output, see Response Body (p. 248).

**Range Inventory Retrieval**

You can limit the number of inventory items retrieved by filtering on the archive creation date or by setting a limit.

**Filtering by Archive Creation Date**

You can retrieve inventory items for archives created between StartDate and EndDate by specifying values for these parameters in the **Initiate Job** request. Archives created on or after the StartDate and before the EndDate are returned. If you provide only the StartDate without the EndDate, you retrieve the inventory for all archives created on or after the StartDate. If you provide only the EndDate without the StartDate, you get back the inventory for all archives created before the EndDate.

**Limiting Inventory Items per Retrieval**

You can limit the number of inventory items returned by setting the Limit parameter in the **Initiate Job** request. The inventory job output contains inventory items up to the specified Limit. If there are more inventory items available, the result is paginated. After a job is complete, you can use the **Describe Job** (GET JobID) (p. 238) operation to get a marker that you use in a subsequent **Initiate Job** request. The marker indicates the starting point to retrieve the next set of inventory items. You can page through your entire inventory by repeatedly making **Initiate Job** requests with the marker from the previous **Describe Job** output. You do so until you get a marker from **Describe Job** that returns null, indicating that there are no more inventory items available.

You can use the Limit parameter together with the date range parameters.

**Ranged Archive Retrieval**

You can initiate archive retrieval for the whole archive or a range of the archive. In the case of ranged archive retrieval, you specify a byte range to return or the whole archive. The range specified must be megabyte (MB) aligned. In other words, the range start value must be divisible by 1 MB and the range end value plus 1 must be divisible by 1 MB or equal the end of the archive. If the ranged archive retrieval is not megabyte-aligned, this operation returns a 400 response. Furthermore, to ensure that you get checksum values for data you download using **Get Job Output** (Get Job Output (GET output) (p. 245)), the range must be tree-hash aligned. For more information about tree-hash aligned ranges, see Receiving Checksums When Downloading Data (p. 165).

**Expedited, Standard, and Bulk Tiers**

When initiating a select or an archive retrieval job, you can specify one of the following options in the Tier field of the request body:

- **Expedited** – Expedited allows you to quickly access your data when occasional urgent requests for a subset of archives are required. For all but the largest archives (250 MB+), data accessed using the Expedited tier is typically made available within 1–5 minutes.
• **Standard** – Standard allows you to access any of your archives within several hours. Data accessed using the Standard tier typically made available within 3–5 hours. This option is the default one for job requests that don't specify the tier option.

• **Bulk** – Bulk is Glacier's lowest-cost tier, enabling you to retrieve large amounts, even petabytes, of data inexpensively in a day. Data accessed using the Bulk tier is typically made available within 5–12 hours.

For more information about expedited and bulk retrievals, see Retrieving Glacier Archives (p. 75).

**Requests**

To initiate a job, you use the HTTP `POST` method and scope the request to the vault's `jobs` subresource. You specify details of the job request in the JSON document of your request. The job type is specified with the `Type` field. Optionally, you can specify an `SNS` field to indicate an Amazon SNS topic to which Glacier can post notification after it completes the job.

**Note**

To post a notification to Amazon SNS, you must create the topic yourself if it doesn't already exist. Glacier doesn't create the topic for you. The topic must have permissions to receive publications from a Glacier vault. Glacier doesn't verify if the vault has permission to publish to the topic. If the permissions are not configured appropriately, you might not receive notification even after the job completes.

**Syntax**

The following is the request syntax for initiating a job.

```json
POST /AccountId/vaults/VaultName/jobs HTTP/1.1
Host: glacier.Region.amazonaws.com
Date: Date
Authorization: SignatureValue
x-amz-glacier-version: 2012-06-01

{
    "jobParameters": {
        "ArchiveId": "string",
        "Description": "string",
        "Format": "string",
        "InventoryRetrievalParameters": {
            "EndDate": "string",
            "Limit": "string",
            "Marker": "string",
            "StartDate": "string"
        },
        "OutputLocation": {
            "S3": {
                "AccessControlList": [
                    {
                        "Grantee": {
                            "DisplayName": "string",
                            "EmailAddress": "string",
                            "ID": "string",
                            "Type": "string",
                            "URI": "string"
                        },
                        "Permission": "string"
                    }
                ],
                "BucketName": "string",
                "CannedACL": "string"
            }
        }
    }
}
```

API Version 2012-06-01
"Encryption": {
  "EncryptionType": "string",
  "KMSContext": "string",
  "KMSKeyId": "string"
},
"Prefix": "string",
"StorageClass": "string",
"Tagging": {
  "string": "string"
},
"UserMetadata": {
  "string": "string"
}
},
"RetrievalByteRange": "string",
"SelectParameters": {
  "Expression": "string",
  "ExpressionType": "string",
  "InputSerialization": {
    "csv": {
      "Comments": "string",
      "FieldDelimiter": "string",
      "FileHeaderInfo": "string",
      "QuoteCharacter": "string",
      "QuoteEscapeCharacter": "string",
      "RecordDelimiter": "string"
    }
  },
  "OutputSerialization": {
    "csv": {
      "FieldDelimiter": "string",
      "QuoteCharacter": "string",
      "QuoteEscapeCharacter": "string",
      "QuoteFields": "string",
      "RecordDelimiter": "string"
    }
  }
},
"SNSTopic": "string",
"Tier": "string",
"Type": "string"
}

Note
The AccountId value is the AWS account ID of the account that owns the vault. You can either specify an AWS account ID or optionally a single '-' (hyphen), in which case Amazon S3 Glacier uses the AWS account ID associated with the credentials used to sign the request. If you use an account ID, do not include any hyphens ('-') in the ID.

Request Body
The request accepts the following data in JSON format in the body of the request.

jobParameters
Provides options for specifying job information.

Type: jobParameters (p. 275) object

Required: Yes
Responses

Glacier creates the job. In the response, it returns the URI of the job.

Syntax

```
HTTP/1.1 202 Accepted
x-amzn-RequestId: x-amzn-RequestId
Date: Date
Location: location
x-amz-job-id: jobId
x-amz-job-output-path: jobOutputPath
```

Response Headers

<table>
<thead>
<tr>
<th>Header</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location</td>
<td>The relative URI path of the job. You can use this URI path to find the job status. For more information, see Describe Job (GET JobID) (p. 238).</td>
</tr>
<tr>
<td></td>
<td>Type: String</td>
</tr>
<tr>
<td></td>
<td>Default: None</td>
</tr>
<tr>
<td>x-amz-job-id</td>
<td>The ID of the job. This value is also included as part of the Location header.</td>
</tr>
<tr>
<td></td>
<td>Type: String</td>
</tr>
<tr>
<td></td>
<td>Default: None</td>
</tr>
<tr>
<td>x-amz-job-output-path</td>
<td>This header is only returned for select job types. The path to the location of where the select results are stored.</td>
</tr>
<tr>
<td></td>
<td>Type: String</td>
</tr>
<tr>
<td></td>
<td>Default: None</td>
</tr>
</tbody>
</table>

Response Body

This operation does not return a response body.

Errors

This operation includes the following error or errors, in addition to the possible errors common to all Amazon S3 Glacier operations. For information about Amazon S3 Glacier errors and a list of error codes, see Error Responses (p. 166).

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>HTTP Status Code</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>InsufficientCapacityException</td>
<td>Returned if there is insufficient capacity to process this expedited request. This error only applies to expedited retrievals and not to standard or bulk retrievals.</td>
<td>503 Service Unavailable</td>
<td>Server</td>
</tr>
</tbody>
</table>
Examples

Example Request: Initiate an archive retrieval job

```json
POST /-/vaults/examplevault/jobs HTTP/1.1
Host: glacier.us-west-2.amazonaws.com
x-amz-date: 20170210T120000Z
x-amz-glacier-version: 2012-06-01
Authorization: AWS4-HMAC-SHA256 Credential=AKIAIOSFODNN7EXAMPLE/20141123/us-west-2/glacier/aws4_request,SignedHeaders=host;x-amz-date;x-amz-glacier-version,Signature=9257c16a6b25a715ce900a5b45b03da0447acf430195dcb540091b12966f2a2

{
    "Type": "archive-retrieval",
    "ArchiveId": "NkbByEejwEggmBz2fTHgJrg0XBoDfjP4q6iu87-TjhqG6eGooY9Z8i1_AUyUshPaTqLHy8p7l5nfcFJmB2yEZNi5L26Omw12vcs01MNGntHEQL8MBfGlqrEXAMPLEArchiveId"
    "Description": "My archive description",
    "Tier" : "Bulk"
}
```

The following is an example of the body of a request that specifies a range of the archive to retrieve using the `RetrievalByteRange` field.

```json
{
    "Type": "archive-retrieval",
    "ArchiveId": "NkbByEejwEggmBz2fTHgJrg0XBoDfjP4q6iu87-TjhqG6eGooY9Z8i1_AUyUshPaTqLHy8p7l5nfcFJmB2yEZNi5L26Omw12vcs01MNGntHEQL8MBfGlqrEXAMPLEArchiveId"
    "Description": "My archive description",
    "RetrievalByteRange": "2097152-4194303",
    "Tier" : "Bulk"
}
```

Example Response

HTTP/1.1 202 Accepted
x-amzn-RequestId: AAAABzpoJrTyioDC_HsOmHae8EZp_uBSJr6cnGOLKp_XJc1-Q
Date: Wed, 10 Feb 2017 12:00:00 GMT
Location: /11112223333/vaults/examplevault/jobs/HkF9p6o7yjhFx-K3CG16fuSm6v9t77e6Gfc08nUXXYwS0jib5qg61JZ55yHgt5vP54ZshjoQzVhV7eVPMLjobID
x-amz-job-id: HkF9p6o7yjhFx-K3CG16fuSm6v9t77e6Gfc08nUXXYwS0jib5qg61JZ55yHgt5vP54ZshjoQzVhV7eVPMLjobID

Example Request: Initiate an inventory retrieval job

The following request initiates an inventory retrieval job to get a list of archives from the examplevault vault. The Format set to CSV in the body of the request indicates that the inventory is returned in CSV format.

```json
POST /-/vaults/examplevault/jobs HTTP/1.1
Host: glacier.us-west-2.amazonaws.com
x-amz-date: 20170210T120000Z
Content-Type: application/x-www-form-urlencoded
x-amz-glacier-version: 2012-06-01
Authorization: AWS4-HMAC-SHA256 Credential=AKIAIOSFODNN7EXAMPLE/20141123/us-west-2/glacier/aws4_request,SignedHeaders=host;x-amz-date;x-amz-glacier-version,Signature=9257c16a6b25a715ce900a5b45b03da0447acf430195dcb540091b12966f2a2

{
}
```
"Type": "inventory-retrieval",
"Description": "My inventory job",
"Format": "CSV",
"SNSTopic": "arn:aws:sns:us-west-2:111111111111:Glacier-InventoryRetrieval-topic-Example"
}

Example Response

HTTP/1.1 202 Accepted
x-amzn-RequestId: AAABZpJrTyioDC_HsOmHae8EZp_uBSJr6cnGOLKp_XJCl-Q
Date: Wed, 10 Feb 2017 12:00:00 GMT
Location: /11122223333/vaults/examplevault/jobs/HkF9p6o7yjhFx-
K3G16fuSm6Vw9T7esQfco8nUXXYwS0jib5gq1JZ55yHgt5vP54ZshjoQsQVh7vEXAMPLEjobID
x-amz-job-id: HkF9p6o7yjhFx-
K3G16fuSm6Vw9T7esQfco8nUXXYwS0jib5gq1JZ55yHgt5vP54ZshjoQsQVh7vEXAMPLEjobID

Example Requests: Initiate an inventory retrieval job by using date filtering with a set limit, and a subsequent request to retrieve the next page of inventory items.

The following request initiates a vault inventory retrieval job by using date filtering and setting a limit.

{  
  "ArchiveId": null,  
  "Description": null,  
  "Format": "CSV",  
  "RetrievalByteRange": null,  
  "SNSTopic": null,  
  "Type": "inventory-retrieval",  
  "InventoryRetrievalParameters": {  
    "StartDate": "2013-12-04T21:25:42Z",  
    "EndDate": "2013-12-05T21:25:42Z",  
    "Limit": "10000"
  },
}

The following request is an example of a subsequent request to retrieve the next page of inventory items using a marker obtained from Describe Job (GET JobID) (p. 238).

{  
  "ArchiveId": null,  
  "Description": null,  
  "Format": "CSV",  
  "RetrievalByteRange": null,  
  "SNSTopic": null,  
  "Type": "inventory-retrieval",  
  "InventoryRetrievalParameters": {  
    "StartDate": "2013-12-04T21:25:42Z",  
    "EndDate": "2013-12-05T21:25:42Z",  
    "Limit": "10000",
    "Marker": "vyS0t2jHqe5gbcDgg1e50chS1SXwymrkVKo0KHlTJyXbGCqRLKaiySzdn7QXGVV5XZpNVG67pCZ_uykQXFMLaxoDzSu2ho0__5C0",
  },
}

Example Request: Initiate a select job

The following request initiates a select job.

API Version 2012-06-01
259
POST /-/vaults/examplevault/jobs HTTP/1.1
Host: glacier.us-west-2.amazonaws.com
x-amz-Date: 20170210T120000Z
Content-Type: application/x-www-form-urlencoded
Authorization: AWS4-HMAC-SHA256 Credential=AKIAIOSFODNN7EXAMPLE/20141123/us-west-2/glacier/aws4_request,SignedHeaders=host;x-amz-date;x-amz-glacier-version,Signature=9257c16da6b25a715ce900a5b45b03da0447acf430195dcb540091b12966f2a2

{
    "Type": "select",
    "ArchiveId": "NkbByeEejwEggmB2fTGHgJrg0XBoDfjP4q6iu87-Tjhq6eGeOY9Z8ii1_nUyUsuhPAdTqLHY8pT15nfcFPJmD12yEZWONl5L26mwl2vcs01MNGntHEQL8MBfGlqREXAMPLEArchiveId",
    "Description": null,
    "SNSTopic": null,
    "Tier": "Bulk",
    "SelectParameters": {
        "Expression": "select * from archive",
        "ExpressionType": "SQL",
        "InputSerialization": {
            "csv": {
                "Comments": null,
                "FileHeaderInfo": "None",
                "QuoteEscapeCharacter": "\"",
                "RecordDelimiter": "\n",
                "FieldDelimiter": "\",
                "QuoteCharacter": "\"
            }
        },
        "OutputSerialization": {
            "csv": {
                "QuoteFields": "AsNeeded",
                "QuoteEscapeCharacter": null,
                "RecordDelimiter": "\n",
                "FieldDelimiter": "\",
                "QuoteCharacter": "\"
            }
        }
    },
    "OutputLocation": {
        "S3": {
            "BucketName": "bucket-name",
            "Prefix": "test",
            "Encryption": {
                "EncryptionType": "AES256"
            },
            "CannedACL": "private",
            "StorageClass": "STANDARD"
        }
    }
}

Example Response

HTTP/1.1 202 Accepted
x-amzn-RequestId: AAAABzp3rTyioDC_HSOnHae6EZp_uBSJr6cmGQLKp_XJCl-Q
Date: Wed, 10 Feb 2017 12:00:00 GMT
Location: /11112223333/vaults/examplevault/jobs/HkF9p60yjhFx-K3CGl6fuSm6Vz978eGQfco8nUXVYwS0jlb5gq1JZ55yHgt5vP54ZShjoQzQVh7vEXAMPLEjobID
x-amz-job-id: HkF9p60yjhFx-K3CGl6fuSm6Vz978eGQfco8nUXVYwS0jlb5gq1JZ55yHgt5vP54ZShjoQzQVh7vEXAMPLEjobID

API Version 2012-06-01
260
x-amz-job-output-path: test/HkF9p6o7yjhFx-K3CGl6fuSm6VzW9T7esGQe8o8nUXVWwSojlb5gq1JZ55yHgt5vP54ZShjoQzQVVh7vEXAMPLEjobID/

**Related Sections**

- Describe Job (GET JobID) (p. 238)
- Get Job Output (GET output) (p. 245)
- SQL Reference for Amazon S3 Select and Glacier Select (p. 292)
- Identity and Access Management in Amazon S3 Glacier (p. 114)

**List Jobs (GET jobs)**

**Description**

This operation lists jobs for a vault, including jobs that are in-progress and jobs that have recently finished.

**Note**

Amazon S3 Glacier (Glacier) retains recently completed jobs for a period before deleting them; however, it eventually removes completed jobs. The output of completed jobs can be retrieved. Retaining completed jobs for a period of time after they have completed enables you to get a job output in the event you miss the job completion notification, or your first attempt to download it fails. For example, suppose that you start an archive retrieval job to download an archive. After the job completes, you start to download the archive but encounter a network error. In this scenario, you can retry and download the archive while the job exists.

The `List Jobs` operation supports pagination. You should always check the response `Marker` field. If there are no more jobs to list, the `Marker` field is set to `null`. If there are more jobs to list, the `Marker` field is set to a non-null value, which you can use to continue the pagination of the list. To return a list of jobs that begins at a specific job, set the `marker` request parameter to the `Marker` value for that job that you obtained from a previous `List Jobs` request.

You can set a maximum limit for the number of jobs returned in the response by specifying the `limit` parameter in the request. The default limit is 50. The number of jobs returned might be fewer than the limit, but the number of returned jobs never exceeds the limit.

Additionally, you can filter the jobs list returned by specifying the optional `statuscode` parameter or `completed` parameter, or both. Using the `statuscode` parameter, you can specify to return only jobs that match either the `InProgress`, `Succeeded`, or `Failed` status. Using the `completed` parameter, you can specify to return only jobs that were completed (`true`) or jobs that were not completed (`false`).

**Requests**

**Syntax**

To return a list of jobs of all types, send a GET request to the URI of the vault's `jobs` subresource.

```
GET /AccountId/vaults/VaultName/jobs HTTP/1.1
Host: glacier.Region.amazonaws.com
Date: Date
Authorization: SignatureValue
x-amz-glacier-version: 2012-06-01
```

**Note**

The `AccountId` value is the AWS account ID of the account that owns the vault. You can either specify an AWS account ID or optionally a single `-` (hyphen), in which case Amazon S3 Glacier
uses the AWS account ID associated with the credentials used to sign the request. If you use an account ID, do not include any hyphens ('-') in the ID.

**Request Parameters**

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>completed</td>
<td>The state of the jobs to return. You can specify true or false.</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>Type: Boolean</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Constraints: None</td>
<td></td>
</tr>
<tr>
<td>limit</td>
<td>The maximum number of jobs to be returned. The default limit is 50. The number of jobs returned might be fewer than the specified limit, but the number of returned jobs never exceeds the limit.</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>Type: String</td>
<td></td>
</tr>
<tr>
<td>marker</td>
<td>An opaque string used for pagination that specifies the job at which the listing of jobs should begin. You get the marker value from a previous List Jobs response. You only need to include the marker if you are continuing the pagination of the results started in a previous List Jobs request.</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>Type: String</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Constraints: None</td>
<td></td>
</tr>
<tr>
<td>statuscode</td>
<td>The type of job status to return.</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>Type: String</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Constraints: One of the values InProgress, Succeeded, or Failed.</td>
<td></td>
</tr>
</tbody>
</table>

**Request Headers**

This operation uses only response headers that are common to most responses. For information about common response headers, see Common Response Headers (p. 152).

**Request Body**

This operation does not have a request body.

**Responses**

**Syntax**

HTTP/1.1 200 OK
x-amzn-RequestId: x-amzn-RequestId
Date: Date
Location: Location
Content-Type: application/json
Content-Length: Length
{ "JobList": [ {
"Action": "string",
"ArchiveId": "string",
"ArchiveSHA256TreeHash": "string",
"ArchiveSizeInBytes": number,
"Completed": boolean,
"CompletionDate": "string",
"CreationDate": "string",
"InventoryRetrievalParameters": { 
"EndDate": "string",
"Format": "string",
"Limit": "string",
"Marker": "string",
"StartDate": "string"
},
"InventorySizeInBytes": number,
"JobDescription": "string",
"JobId": "string",
"JobOutputPath": "string",
"OutputLocation": { 
"S3": { 
"AccessControlList": [ 
{ 
"Grantee": { 
"DisplayName": "string",
"EmailAddress": "string",
"ID": "string",
"Type": "string",
"URI": "string"
},
"Permission": "string"
} 
],
"BucketName": "string",
"CannedACL": "string",
"Encryption": { 
"EncryptionType": "string",
"KMSContext": "string",
"KMSKeyId": "string"
},
"Prefix": "string",
"StorageClass": "string",
"Tagging": { 
"string": "string"
},
"UserMetadata": { 
"string": "string"
} 
}
},
"RetrievalByteRange": "string",
"SelectParameters": { 
"Expression": "string",
"ExpressionType": "string",
"InputSerialization": { 
"csv": { 
"Comments": "string",
"FieldDelimiter": "string",
"FileHeaderInfo": "string",
"QuoteCharacter": "string",
"QuoteEscapeCharacter": "string",
"RecordDelimiter": "string"
} 
} 
} 
} 
}
Response Headers

This operation uses only response headers that are common to most responses. For information about common response headers, see Common Response Headers (p. 152).

Response Body

The response body contains the following JSON fields.

**JobList**

A list of job objects. Each job object contains metadata describing the job.

*Type: Array of GlacierJobDescription (p. 270) objects*

**Marker**

An opaque string that represents where to continue pagination of the results. You use the `marker` value in a new List Jobs request to obtain more jobs in the list. If there are no more jobs to list, this value is `null`.

*Type: String*

Errors

For information about Amazon S3 Glacier exceptions and error messages, see Error Responses (p. 166).

Examples

The following examples demonstrate how to return information about vault jobs. The first example returns a list of two jobs, and the second example returns a subset of jobs.

**Example: Return All Jobs**

**Example Request**

The following GET request returns the jobs for a vault.

```bash
GET /-/vaults/examplevault/jobs HTTP/1.1
Host: glacier.us-west-2.amazonaws.com
```

**Response**

---

### Example Response

```
{
  "Marker": null,
  "JobList": [
    {
      "OutputSerialization": {
        "csv": {
          "FieldDelimiter": "string",
          "QuoteCharacter": "string",
          "QuoteEscapeCharacter": "string",
          "QuoteFields": "string",
          "RecordDelimiter": "string"
        }
      },
      "SHA256TreeHash": "string",
      "SNSTopic": "string",
      "StatusCode": "string",
      "StatusMessage": "string",
      "Tier": "string",
      "VaultARN": "string"
    }
  ],
  "Marker": "string"
}
```
Example Response

The following response includes an archive retrieval job and an inventory retrieval job that contains a marker used to continue pagination of the vault inventory retrieval. The response also shows the Marker field set to null, which indicates there are no more jobs to list.

```
HTTP/1.1 200 OK
x-amzn-RequestId: AAABZpJrTyioDC_HsOmHae8EZp_uBSJr6cnGOLKp_XJC1-Q
Date: Wed, 10 Feb 2017 12:00:00 GMT
Content-Type: application/json
Content-Length: 1444
{
    "JobList": [
        {
            "Action": "ArchiveRetrieval",
            "ArchiveId": "BDfaUQul0dVzYwAMr8YSa_6_8abbhZq-i1oT69g8BYCljzyBgAgbkW1qZObF5os851PY7Do1HJ1n4rzh1ZHaYD3MgFk_goDdPeS3uHQoVGwOqubf6BgUZjQm_wrU4fJm",
            "ArchiveSizeInBytes": 1048576,
            "ArchiveSHA256TreeHash": "25499381569ab2f85e1ffdeeb93c5406a178ab77c5933056ebd56d6e74adda609b",
            "Completed": true,
            "CompletionDate": "2012-05-01T00:00:09.304Z",
            "CreationDate": "2012-05-01T00:00:06.663Z",
            "InventorySizeInBytes": null,
            "JobDescription": null,
            "JobId": "hDe9t9DTHxGw88bBGLQOomimo0-JrGt10_YFklnzQ64548je667bRWTWBL2C6Ygy1jHYruqXkdcAhRsh0hYv4eVRU",
            "RetrievalByteRange": "0-1048575",
            "SHA256TreeHash": "25499381569ab2f85e1ffdeeb93c5406a178ab77c5933056ebd56d6e74adda609b",
            "SNSTopic": null,
            "StatusCode": "Succeeded",
            "StatusMessage": "Succeeded",
            "Tier": "Bulk",
        },
        {
            "Action": "InventoryRetrieval",
            "ArchiveId": null,
            "ArchiveSizeInBytes": null,
            "ArchiveSHA256TreeHash": null,
            "Completed": true,
            "CompletionDate": "2013-05-11T00:25:18.831Z",
            "CreationDate": "2013-05-11T00:25:15.981Z",
            "InventorySizeInBytes": 1988,
            "JobDescription": null,
            "JobId": "2vC0nB1tj6b7zyP3pobW1ceiaJehM1bx9vZOOGvniNARc0KaVZ4WkVj1PldJ73VU7imJn0pnZri8VBebnqaAcirZq_C5",
            "RetrievalByteRange": null,
            "SHA256TreeHash": null,
            "SNSTopic": null,
            "StatusCode": "Succeeded",
            "StatusMessage": "Succeeded",
        }
    ]
}
```
Example: Return a Partial List of Jobs

Example Request

The following GET request returns the job specified by the marker parameter. Setting the limit parameter as 2 specifies that up to two jobs are returned.

```
GET /-/vaults/examplevault/jobs?marker=HkF9p6o7yjhFx-K3CG16fuSm6VzW9T7eszQfco8nUXXYwS0jib5gq1JZ55yHgt5vP54ZShjoQzQVVh7vEXAMPLEjobID&limit=2
```

Example Response

The following response shows two jobs returned and the Marker field set to a non-null value that can be used to continue pagination of the job list.

```
HTTP/1.1 200 OK
x-amzn-RequestId: AAABZpJrTyioDC_HsOmHae8EZP_uBJSjr6cnGQKp_XJC1-Q
Date: Wed, 10 Feb 2017 12:00:00 GMT
Content-Type: application/json
Content-Length: 1744

{
    "JobList": ["Action": "ArchiveRetrieval",
    "ArchiveId": "58-3KpZfcMFUzuWzMNPaKyJx9wODCsWTnqjt5z2CjKZb-xGxEuA8yZOTpF0d7qWR4GzMrzCXOR8gcnWbLV4VPV_kDKZtJJK0TPhK9KsZwrZnA4-FXu1BFyYUQVeVe18551F04vg",
    "ArchiveSizeInBytes": 8388608,
    "ArchiveSHA256TreeHash": "106086b256dd0f0fedf3d9e72f461d5983a2566247ebe7e1949246bc61359b4f4",
    "Completed": true,
    "CompletionDate": "2012-05-01T00:25:20.043Z",
    "CreationDate": "2012-05-01T00:25:16.344Z",
    "InventorySizeInBytes": null,
    "JobDescription": "aaabbbccc",
    "JobId": "s4MvaNHIh6mOa1f8iY4ioG291SDPIhXxh3KvORBx-JbNpctpRv8c2_BfuhdGqLqBGN9eB6Ub-JkNnR9JoVa8yi1hQ",
    "RetrievalByteRange": "0-8388607",
    "SHA256TreeHash": "106086b256dd0f0fedf3d9e72f461d5983a2566247ebe7e1949246bc61359b4f4",
    "SNSTopic": null,
    "StatusCode": "Succeeded",
    "StatusMessage": "Succeeded",
    "Tier": "Bulk",
]
```

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Related Sections

- Describe Job (GET JobID) (p. 238)
- Identity and Access Management in Amazon S3 Glacier (p. 114)

Data Types Used in Job Operations

The following are data types used with the job operations in Glacier.

Topics

- CSVInput (p. 267)
- CSVOutput (p. 268)
- Encryption (p. 269)
- GlacierJobDescription (p. 270)
- Grant (p. 273)
- Grantee (p. 273)
- InputSerialization (p. 274)
- InventoryRetrievalJobInput (p. 274)
- jobParameters (p. 275)
- OutputLocation (p. 277)
- OutputSerialization (p. 278)
- S3Location (p. 278)
- SelectParameters (p. 279)

CSVInput

Contains information about the comma-separated values (CSV) file.
Comments
A single character used to indicate that a row should be ignored when the character is present at the start of that row.

Type: String
Required: no

FieldDelimiter
A single character used to separate individual fields from each other within a record. The character must be a \n, \r, or an ASCII character in the range 32–126. The default is a comma (,).

Type: String
Default: ,
Required: no

FileHeaderInfo
A value that describes what to do with the first line of the input.

Type: String
Valid Values: Use | Ignore | None
Required: no

QuoteCharacter
A single character used as an escape character where the field delimiter is part of the value.

Type: String
Required: no

QuoteEscapeCharacter
A single character used for escaping the quotation-mark character inside an already escaped value.

Type: String
Required: no

RecordDelimiter
A single character used to separate individual records from each other.

Type: String
Required: no

More Info
- Initiate Job (POST jobs) (p. 251)

CSVOutput
Contains information about the comma-separated values (CSV) format that the job results are stored in.
Contents

FieldDelimiter

A single character used to separate individual fields from each other within a record.

_Type_: String

_Required_: no

QuoteCharacter

A single character used as an escape character where the field delimiter is part of the value.

_Type_: String

_Required_: no

QuoteEscapeCharacter

A single character used for escaping the quotation-mark character inside an already escaped value.

_Type_: String

_Required_: no

QuoteFields

A value that indicates whether all output fields should be contained within quotation marks.

_Valid Values_: ALWAYS | ASNEEDED

_Type_: String

_Required_: no

RecordDelimiter

A single character used to separate individual records from each other.

_Type_: String

_Required_: no

More Info

- Initiate Job (POST jobs) (p. 251)

Encryption

Contains information about the encryption used to store the job results in Amazon S3.

Contents

Encryption

The server-side encryption algorithm used when storing job results in Amazon S3. The default is no encryption.

_Type_: String
GlacierJobDescription

Contains the description of an Amazon S3 Glacier (Glacier) job.

Contents

Action

The job type. It is either ArchiveRetrieval, InventoryRetrieval, or Select.

Type: String

ArchiveId

The archive ID requested for a select or archive retrieval job. Otherwise, this field is null.

Type: String

ArchiveSHA256TreeHash

The SHA256 tree hash of the entire archive for an archive retrieval. For inventory retrieval jobs, this field is null.

Type: String

ArchiveSizeInBytes

For an ArchiveRetrieval job, this is the size in bytes of the archive being requested for download. For the InventoryRetrieval job, the value is null.

Type: Number

Completed

true if the job is completed; false otherwise.
Type: Boolean

**CompletionDate**

The date when the job completed.

The Universal Coordinated Time (UTC) time that the job request completed. While the job is in progress, the value is null.

*Type: A string representation in the ISO 8601 date format, for example 2013-03-20T17:03:43.221Z.*

**CreationDate**

The Universal Coordinated Time (UTC) date the job started.

*Type: A string representation in the ISO 8601 date format, for example 2013-03-20T17:03:43.221Z.*

**InventoryRetrievalParameters**

Input parameters used for a range inventory retrieval.

*Type: InventoryRetrievalJobInput (p. 274) object*

**InventorySizeInBytes**

For an InventoryRetrieval job, this is the size in bytes of the inventory requested for download. For the ArchiveRetrieval or Select job, the value is null.

*Type: Number*

**JobDescription**

The job description that you provided when you initiated the job.

*Type: String*

**JobId**

The ID that identifies the job in Glacier.

*Type: String*

**JobOutputPath**

Contains the job output location.

*Type: String*

**OutputLocation**

An object that contains information about the location where the select job results and errors are stored.

*Type: OutputLocation (p. 277) object*

**RetrievalByteRange**

The retrieved byte range for archive retrieval jobs in the form "StartByteValue-EndByteValue." If no range was specified in the archive retrieval, then the whole archive is retrieved and StartByteValue equals 0 and EndByteValue equals the size of the archive minus 1. For inventory retrieval jobs, this field is null.

*Type: String*
SelectParameters

An object that contains information about the parameters used for a select.

Type: SelectParameters (p. 279) object

SHA256TreeHash

The SHA256 tree hash value for the requested range of an archive. If the Initiate Job (POST jobs) (p. 251) request for an archive specified a tree-hash aligned range, then this field returns a value. For more information about tree-hash alignment for archive range retrievals, see Receiving Checksums When Downloading Data (p. 165).

For the specific case in which the whole archive is retrieved, this value is the same as the ArchiveSHA256TreeHash value.

This field is null in the following situations:

- Archive retrieval jobs that specify a range that is not tree-hash aligned.
- Archival jobs that specify a range that is equal to the whole archive and the job status is InProgress.
- Inventory jobs.
- Select jobs.

Type: String

SNSTopic

The Amazon Resource Name (ARN) that represents an Amazon SNS topic where notification of job completion or failure is sent, if notification was configured in the job initiation (Initiate Job (POST jobs) (p. 251)).

Type: String

StatusCode

The code indicating the status of the job.

Valid Values: InProgress | Succeeded | Succeeded

Type: String

StatusMessage

The job status message.

Type: String

Tier

The data access tier to use for the select or archive retrieval.

Valid Values: Expedited | Standard | Bulk

Type: String

VaultARN

The ARN of the vault of which the job is a subresource.

Type: String

More Info

- Initiate Job (POST jobs) (p. 251)
Grant

Contains information about a grant.

Contents

Grantee

The grantee.

Type: Grantee (p. 273) object

Required: no

Permission

The permission given to the grantee.

Type: String

Valid Values: FULL_CONTROL | WRITE | WRITE_ACP | READ | READ_ACP

Required: no

More Info

- Initiate Job (POST jobs) (p. 251)

Grantee

Contains information about a grantee.

Contents

DisplayName

The screen name of the grantee.

Type: String

Required: no

EmailAddress

The email address of the grantee.

Type: String

Required: no

ID

The canonical user ID of the grantee.

Type: String

Required: no

Type

The type of the grantee.
InputSerialization

Describes how the archive is serialized.

Contents

CSV

An object that describes the serialization of a CSV-encoded object.

Type: CSVInput (p. 267) object

Required: no

More Info

• Initiate Job (POST jobs) (p. 251)

InventoryRetrievalJobInput

Provides options for specifying a range inventory retrieval job.

Contents

EndDate

The end of the date range, in UTC time, for a vault inventory retrieval that includes archives created before this date.

Valid Values: A string representation in the ISO 8601 date format (YYYY-MM-DDTh:mm:ssZ) in seconds, for example 2013-03-20T17:03:43Z.

Type: String. A string representation in the ISO 8601 date format (YYYY-MM-DDTh:mm:ssZ) in seconds, for example 2013-03-20T17:03:43Z.

Required: no
Format

The output format for the vault inventory list, which is set by the Initiate Job (POST jobs) (p. 251) request when initiating a job to retrieve a vault inventory.

*Valid Values*: CSV | JSON

*Required*: no

*Type*: String

Limit

The maximum number of inventory items that can be returned for each vault inventory retrieval request.

*Valid Values*: An integer value greater than or equal to 1.

*Type*: String

*Required*: no

Marker

An opaque string that represents where to continue pagination of the vault inventory retrieval results. You use this marker in a new Initiate Job request to obtain additional inventory items. If there are no more inventory items, this value is null.

*Type*: String

*Required*: no

StartDate

The start of the date range, in UTC time, for a vault inventory retrieval that includes archives created on or after this date.

*Valid Values*: A string representation in the ISO 8601 date format (`YYYY-MM-DDThh:mm:ssTZD`) in seconds, for example `2013-03-20T17:03:43Z`.

*Type*: String. A string representation in the ISO 8601 date format (`YYYY-MM-DDThh:mm:ssTZD`) in seconds, for example `2013-03-20T17:03:43Z`.

*Required*: no

More Info

- Initiate Job (POST jobs) (p. 251)

jobParameters

Provides options for defining a job.

Contents

Archiveld

The ID of the archive that you want. This field is required if the Type field is set to select or archive-retrieval. An error occurs if you specify this field for an inventory retrieval job request.
jobParameters

Valid Values: Must be a valid archive ID that you obtained from a previous request to Amazon S3 Glacier (Glacier).

Type: String

Required: Yes when Type is set to select or archive-retrieval.

Description

The optional description for the job.

Valid Values: The description must be less than or equal to 1,024 bytes. The allowable characters are 7-bit ASCII without control codes—specifically, ASCII values 32–126 decimal or 0x20–0x7E hexadecimal.

Type: String

Required: no

Format

(Optional) The output format, when initiating a job to retrieve a vault inventory. If you are initiating an inventory job and don't specify a Format field, JSON is the default format.

Valid Values: CSV | JSON

Type: String

Required: no

InventoryRetrievalParameters

Input parameters used for a range inventory retrieval.

Type: InventoryRetrievalJobInput (p. 274) object

Required: no

OutputLocation

An object that contains information about the location where the select job results are stored.

Type: OutputLocation (p. 277) object

Required: Yes, for select jobs.

RetrievalByteRange

The byte range to retrieve for an archive-retrieval, in the form "StartByteValue-EndByteValue". If this field isn't specified, the whole archive is retrieved. If this field is specified, the byte range must be megabyte (1024*1024) aligned. Megabyte-aligned means that StartByteValue must be divisible by 1 MB, and EndByteValue plus 1 must be divisible by 1 MB or be the end of the archive specified as the archive byte size value minus 1. If RetrievalByteRange is not megabyte-aligned, this operation returns a 400 response.

An error occurs if you specify this field for an inventory-retrieval or select job request.

Type: String

Required: no

SelectParameters

An object that contains information about the parameters used for a select.

Type: SelectParameters (p. 279) object
**Required**: no

**SNSTopic**

The Amazon Resource Name (ARN) of the Amazon SNS topic where Glacier sends a notification when the job is completed and output is ready for you to download. The specified topic publishes the notification to its subscribers.

The SNS topic must exist. If it doesn't, Glacier doesn't create it for you. Additionally, the SNS topic must have a policy that allows the account that created the job to publish messages to the topic. For information about SNS topic names, see CreateTopic in the Amazon Simple Notification Service API Reference.

*Type: String*

*Required*: no

**Tier**

The tier to use for a select or an archive retrieval job. Standard is the default value used.

*Valid Values*: Expedited | Standard | Bulk

*Type: String*

*Required*: no

**Type**

The job type. You can initiate a job to perform a select query on an archive, retrieve an archive, or get an inventory of a vault.

*Valid Values*: select | archive-retrieval | inventory-retrieval

*Type: String*

*Required*: yes

**More Info**

- [Initiate Job (POST jobs)](p. 251)

---

**OutputLocation**

Contains information about the location where the job results and errors are stored.

**Contents**

**S3**

An object that describes an Amazon S3 location to receive the results of the restore request.

*Type: S3Location* (p. 278)

*Required*: yes

**More Info**

- [Initiate Job (POST jobs)](p. 251)
OutputSerialization

Describes how the output is serialized.

Contents

**CSV**

An object that describes the serialization of the comma-separated values (CSV)-encoded query results.

*Type: CSVOutput (p. 268) object*

*Required: no*

More Info

- Initiate Job (POST jobs) (p. 251)

S3Location

Contains information about the location in Amazon S3 where the job results are stored.

Contents

**AccessControlList**

A list of grants that control access to the stored results.

*Type: Array of Grant (p. 273) objects*

*Required: no*

**BucketName**

The name of the Amazon S3 bucket where the job results are stored. The bucket must be in the same AWS Region as the vault that contains the input archive object.

*Type: String*

*Required: yes*

**CannedACL**

The canned access control list (ACL) to apply to the job results.

*Type: String*

*Valid Values: private | public-read | public-read-write | aws-exec-read | authenticated-read | bucket-owner-read | bucket-owner-full-control*

*Required: no*

**Encryption**

An object that contains information about the encryption used to store the job results in Amazon S3.

*Type: Encryption (p. 269) object*
SelectParameters

Contains information about the parameters used for the select.

Contents

Expression

The expression that is used to select the object. The expression must not exceed the limit of 128,000 characters.

Type: String

Required: yes

ExpressionType

The type of the provided expression, for example SQL.

Valid Values: SQL
**Data Retrieval Operations**

The following are the data retrieval–related operations available in Glacier.

**Topics**
- Get Data Retrieval Policy (GET policy) (p. 280)
- List Provisioned Capacity (GET provisioned-capacity) (p. 283)
- Purchase Provisioned Capacity (POST provisioned-capacity) (p. 285)
- Set Data Retrieval Policy (PUT policy) (p. 287)

### Get Data Retrieval Policy (GET policy)

**Description**

This operation returns the current data retrieval policy for the account and region specified in the GET request. For more information about data retrieval policies, see Amazon S3 Glacier Data Retrieval Policies (p. 141).

**Requests**

To return the current data retrieval policy, send an HTTP GET request to the data retrieval policy URI as shown in the following syntax example.

**Syntax**

```
GET /AccountID/policies/data-retrieval HTTP/1.1
Host: glacier.Region.amazonaws.com
Date: Date
Authorization: SignatureValue
```
**Get Data Retrieval Policy**

**Note**
The AccountId value is the AWS account ID. This value must match the AWS account ID associated with the credentials used to sign the request. You can either specify an AWS account ID or optionally a single '-' (hyphen), in which case Amazon S3 Glacier uses the AWS account ID associated with the credentials used to sign the request. If you specify your account ID, do not include any hyphens ('-') in the ID.

**Request Parameters**
This operation does not use request parameters.

**Request Headers**
This operation uses only request headers that are common to all operations. For information about common request headers, see [Common Request Headers](p. 150).

**Request Body**
This operation does not have a request body.

**Responses**

**Syntax**

```plaintext
HTTP/1.1 200 OK
x-amzn-RequestId: x-amzn-RequestId
Date: Date
Content-Type: application/json
Content-Length: length

{
  "Policy":
  {
    "Rules":[
      {
        "BytesPerHour": Number,
        "Strategy": String
      }
    ]
  }
}
```

**Response Headers**
This operation uses only response headers that are common to most responses. For information about common response headers, see [Common Response Headers](p. 152).

**Response Body**
The response body contains the following JSON fields.

**BytesPerHour**
The maximum number of bytes that can be retrieved in an hour.

This field will be present only if the value of the **Strategy** field is **BytesPerHour**.

*Type: Number*
Rules

The policy rule. Although this is a list type, currently there will be only one rule, which contains a Strategy field and optionally a BytesPerHour field.

Type: Array

Strategy

The type of data retrieval policy.

Type: String

Valid values: BytesPerHour|FreeTier|None. BytesPerHour is equivalent to selecting Max Retrieval Rate in the console. FreeTier is equivalent to selecting Free Tier Only in the console. None is equivalent to selecting No Retrieval Policy in the console. For more information about selecting data retrieval policies in the console, see Amazon S3 Glacier Data Retrieval Policies (p. 141).

Errors

For information about Amazon S3 Glacier exceptions and error messages, see Error Responses (p. 166).

Examples

The following example demonstrates how to get a data retrieval policy.

Example Request

In this example, a GET request is sent to the URI of a policy's location.

```
GET /-/policies/data-retrieval HTTP/1.1
Host: glacier.us-west-2.amazonaws.com
x-amz-date: 20170210T120000Z
x-amz-glacier-version: 2012-06-01
Authorization: AWS4-HMAC-SHA256 Credential=AKIAIOSFODNN7EXAMPLE/20141123/us-west-2/glacier/aws4_request,SignedHeaders=host;x-amz-date;x-amz-glacier-version,Signature=9257c16da6b25a715ce900a5b45b03da0447acf430195dcb540091b12966f2a2
```

Example Response

A successful response shows the data retrieval policy in the body of the response in JSON format.

```
HTTP/1.1 200 OK
x-amzn-RequestId: AAABZpJrTyioDC_HsOmHae8EZp_uBSJr6cnGOLkP_XJCl-Q
Date: Wed, 10 Feb 2017 12:00:00 GMT
Content-Type: application/json
Content-Length: 85

{
    "Policy":
    {
        "Rules":[
            {
                "BytesPerHour":10737418240,
                "Strategy":"BytesPerHour"
            }
        ]
    }
}
```
List Provisioned Capacity (GET provisioned-capacity)

This operation lists the provisioned capacity units for the specified AWS account. For more information about provisioned capacity, see Archive Retrieval Options (p. 76).

A provisioned capacity unit lasts for one month starting at the date and time of purchase, which is the start date. The unit expires on the expiration date, which is exactly one month after the start date to the nearest second.

If the start date is on the 31st day of a month, the expiration date is the last day of the next month. For example, if the start date is August 31, the expiration date is September 30. If the start date is January 31, the expiration date is February 28. You can see this functionality in the Example Response (p. 285).

Request Syntax

To list the provisioned retrieval capacity for an account, send an HTTP GET request to the provisioned-capacity URI as shown in the following syntax example.

```
GET /AccountId/provisioned-capacity HTTP/1.1
Host: glacier.Region.amazonaws.com
Date: Date
Authorization: SignatureValue
x-amz-glacier-version: 2012-06-01
```

Note

The AccountId value is the AWS account ID. This value must match the AWS account ID associated with the credentials used to sign the request. You can either specify an AWS account ID or optionally a single '-' (hyphen), in which case Amazon S3 Glacier uses the AWS account ID associated with the credentials used to sign the request. If you specify your account ID, do not include any hyphens ('-') in the ID.

Request Parameters

This operation does not use request parameters.

Request Headers

This operation uses only request headers that are common to all operations. For information about common request headers, see Common Request Headers (p. 150).

Request Body

This operation does not have a request body.

Responses

If the operation is successful, the service sends back an HTTP 200 OK response.
Response Syntax

<table>
<thead>
<tr>
<th>HTTP/1.1 200 OK</th>
</tr>
</thead>
<tbody>
<tr>
<td>x-amzn-Request-Id: x-amzn-RequestId</td>
</tr>
<tr>
<td>Date: Date</td>
</tr>
<tr>
<td>Content-Type: application/json</td>
</tr>
<tr>
<td>Content-Length: Length</td>
</tr>
<tr>
<td>{</td>
</tr>
<tr>
<td>&quot;ProvisionedCapacityList&quot;:</td>
</tr>
<tr>
<td>{</td>
</tr>
<tr>
<td>&quot;CapacityId&quot;: &quot;string&quot;,</td>
</tr>
<tr>
<td>&quot;StartDate&quot;: &quot;string&quot;</td>
</tr>
<tr>
<td>&quot;ExpirationDate&quot;: &quot;string&quot;</td>
</tr>
<tr>
<td>}</td>
</tr>
<tr>
<td>}</td>
</tr>
</tbody>
</table>

Response Headers

This operation uses only response headers that are common to most responses. For information about common response headers, see Common Response Headers (p. 152).

Response Body

The response body contains the following JSON fields.

CapacityId

The ID that identifies the provisioned capacity unit.

Type: String.

StartDate

The date that the provisioned capacity unit was purchased, in Coordinated Universal Time (UTC).

Type: String. A string representation in the ISO 8601 date format, for example 2013-03-20T17:03:43.221Z.

ExpirationDate

The date that the provisioned capacity unit expires, in Coordinated Universal Time (UTC).

Type: String. A string representation in the ISO 8601 date format, for example 2013-03-20T17:03:43.221Z.

Errors

For information about Amazon S3 Glacier exceptions and error messages, see Error Responses (p. 166).

Examples

The following example lists the provisioned capacity units for an account.

Example Request

In this example, a GET request is sent to retrieve a list of the provisioned capacity units for the specified account.

```
GET /123456789012/priority-capacity HTTP/1.1
Host: glacier.us-west-2.amazonaws.com
```
Example Response

If the request was successful, Amazon S3 Glacier (Glacier) returns a HTTP 200 OK with a list of provisioned capacity units for the account as shown in the following example.

The provisioned capacity unit listed first is an example of a unit with a start date of January 31, 2017 and expiration date of February 28, 2017. As stated earlier, if the start date is on the 31st day of a month, the expiration date is the last day of the next month.

```
HTTP/1.1 200 OK
x-amzn-RequestId: AAABZpJrTyioDC_HsOmHae8EZp_uBSJr6cnGOLKp_XJCl-Q
Date: Wed, 10 Feb 2017 12:02:00 GMT
Content-Type: application/json
Content-Length: length

{
    "ProvisionedCapacityList",
    {
        "CapacityId": "zSaq7NzHFQDANTfQkDen4V7z",
        "StartDate": "2017-01-31T14:26:33.031Z",
        "ExpirationDate": "2017-02-28T14:26:33.000Z",
    },
    {
        "CapacityId": "yXaq7NzHFQMDfQkDen4V7z",
        "StartDate": "2016-12-13T20:11:51.095Z",
        "ExpirationDate": "2017-01-13T20:11:51.000Z",
    },
    ...
}
```

Related Sections

- Purchase Provisioned Capacity (POST provisioned-capacity) (p. 285)

Purchase Provisioned Capacity (POST provisioned-capacity)

This operation purchases a provisioned capacity unit for an AWS account.

A provisioned capacity unit lasts for one month starting at the date and time of purchase, which is the start date. The unit expires on the expiration date, which is exactly one month after the start date to the nearest second.

If the start date is on the 31st day of a month, the expiration date is the last day of the next month. For example, if the start date is August 31, the expiration date is September 30. If the start date is January 31, the expiration date is February 28.

Provisioned capacity guarantees that your retrieval capacity for expedited retrievals is available when you need it. Each unit of capacity ensures that at least three expedited retrievals can be performed every five minutes and provides up to 150 MB/s of retrieval throughput. For more information about provisioned capacity, see Archive Retrieval Options (p. 76).
Requests

To purchase provisioned capacity unit for an AWS account send an HTTP POST request to the provisioned-capacity URI.

Syntax

```
POST /AccountId/provisioned-capacity HTTP/1.1
Host: glacier.Region.amazonaws.com
Date: Date
Authorization: SignatureValue
Content-Length: Length
x-amz-glacier-version: 2012-06-01
```

Note

The AccountId value is the AWS account ID. This value must match the AWS account ID associated with the credentials used to sign the request. You can either specify an AWS account ID or optionally a single '-' (hyphen), in which case Amazon S3 Glacier uses the AWS account ID associated with the credentials used to sign the request. If you specify your account ID, do not include any hyphens ('-') in the ID.

Request Parameters

Request Headers

This operation uses only request headers that are common to all operations. For information about common request headers, see Common Request Headers (p. 150).

Request Body

This operation does not have a request body.

Responses

If the operation request is successful, the service returns an HTTP 201 Created response.

Syntax

```
HTTP/1.1 201 Created
x-amzn-RequestId: x-amzn-RequestId
Date: Date
x-amz-capacity-id: CapacityId
```

Response Headers

A successful response includes the following response headers, in addition to the response headers that are common to all operations. For more information about common response headers, see Common Response Headers (p. 152).

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>x-amz-capacity-id</td>
<td>The ID that identifies the provisioned capacity unit.</td>
</tr>
<tr>
<td></td>
<td>Type: String</td>
</tr>
</tbody>
</table>
Response Body

This operation does not return a response body.

Errors

This operation includes the following error or errors, in addition to the possible errors common to all Amazon S3 Glacier operations. For information about Amazon S3 Glacier errors and a list of error codes, see Error Responses (p. 166).

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>HTTP Status Code</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>LimitExceededException</td>
<td>Returned if the given request would exceed the account's limit of provisioned capacity units.</td>
<td>400 Bad Request</td>
<td>Client</td>
</tr>
</tbody>
</table>

Examples

The following example purchases provisioned capacity for an account.

Example Request

The following example sends an HTTP POST request to purchase a provisioned capacity unit.

```
POST /123456789012/provisioned-capacity HTTP/1.1
Host: glacier.us-west-2.amazonaws.com
x-amz-Date: 20170210T120000Z
Authorization: AWS4-HMAC-SHA256 Credential=AKIAIOSFODNN7EXAMPLE/20141123/us-west-2/glacier/aws4_request,SignedHeaders=host;x-amz-date;x-amz-glacier-version,Signature=9257c16da6b25a715ce900a5b45b03da0447acf430195dc8540091b12966f2a2
Content-Length: length
x-amz-glacier-version: 2012-06-01
```

Example Response

If the request was successful, Amazon S3 Glacier (Glacier) returns an HTTP 201 Created response, as shown in the following example.

```
HTTP/1.1 201 Created
x-amzn-RequestId: AAABZpJrTyioDC_HsOmHae8EZp_uBSJr6cnGOLKp_XJCl-Q
Date: Wed, 10 Feb 2017 12:02:00 GMT
x-amz-capacity-id: zSaq7NzHPQDANTf0kDen4V7z
```

Related Sections

- List Provisioned Capacity (GET provisioned-capacity) (p. 283)

Set Data Retrieval Policy (PUT policy)

Description

This operation sets and then enacts a data retrieval policy in the region specified in the PUT request. You can set one policy per region for an AWS account. The policy is enacted within a few minutes of a successful PUT operation.
The set policy operation does not affect retrieval jobs that were in progress before the policy was enacted. For more information about data retrieval policies, see Amazon S3 Glacier Data Retrieval Policies (p. 141).

Requests

Syntax

To set a data retrieval policy, send an HTTP PUT request to the data retrieval policy URI as shown in the following syntax example.

```
PUT /AccountId/policies/data-retrieval HTTP/1.1
Host: glacier.Region.amazonaws.com
Date: Date
Authorization: SignatureValue
Content-Length: Length
x-amz-glacier-version: 2012-06-01
{
  "Policy":
    {
      "Rules":[
        {
          "Strategy": String,
          "BytesPerHour": Number
        }
      ]
    }
}
```

**Note**
The `AccountId` value is the AWS account ID. This value must match the AWS account ID associated with the credentials used to sign the request. You can either specify an AWS account ID or optionally a single '-' (hyphen), in which case Amazon S3 Glacier uses the AWS account ID associated with the credentials used to sign the request. If you specify your account ID, do not include any hyphens ('-') in the ID.

Request Parameters

This operation does not use request parameters.

Request Headers

This operation uses only request headers that are common to all operations. For information about common request headers, see Common Request Headers (p. 150).

Request Body

The request body contains the following JSON fields.

**BytesPerHour**

The maximum number of bytes that can be retrieved in an hour.

This field is required only if the value of the Strategy field is `BytesPerHour`. Your PUT operation will be rejected if the Strategy field is not set to `BytesPerHour` and you set this field.

*Type: Number*

*Required: Yes, if the Strategy field is set to `BytesPerHour`. Otherwise, no.*
Set Data Retrieval Policy

Valid Values: Minimum integer value of 1. Maximum integer value of 2^63 - 1 inclusive.

Rules

The policy rule. Although this is a list type, currently there must be only one rule, which contains a Strategy field and optionally a BytesPerHour field.

Type: Array

Required: Yes

Strategy

The type of data retrieval policy to set.

Type: String

Required: Yes

Valid values: BytesPerHour|FreeTier|None. BytesPerHour is equivalent to selecting Max Retrieval Rate in the console. FreeTier is equivalent to selecting Free Tier Only in the console. None is equivalent to selecting No Retrieval Policy in the console. For more information about selecting data retrieval policies in the console, see Amazon S3 Glacier Data Retrieval Policies (p. 141).

Responses

Syntax

```
HTTP/1.1 204 No Content
x-amzn-RequestId: x-amzn-RequestId
Date: Date
```

Response Headers

This operation uses only response headers that are common to most responses. For information about common response headers, see Common Response Headers (p. 152).

Response Body

This operation does not return a response body.

Errors

For information about Amazon S3 Glacier exceptions and error messages, see Error Responses (p. 166).

Examples

Example Request

The following example sends an HTTP PUT request with the Strategy field set to BytesPerHour.

```
PUT /-/policies/data-retrieval HTTP/1.1
Host: glacier.us-west-2.amazonaws.com
x-amz-Date: 20170210T120000Z
x-amz-glacier-version: 2012-06-01
Authorization: AWS4-HMAC-SHA256 Credential=AKIAIOSFODNN7EXAMPLE/20141123/us-west-2/glacier/aws4_request,SignedHeaders=host;x-amz-date;x-amz-glacier-version,Signature=9257c16da6b25a715ce900a5b45b03da0447acfb430195dcb540091b12966f2a2
```

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Set Data Retrieval Policy

```
{
    "Policy": {
        "Rules": [
            {
                "Strategy": "BytesPerHour",
                "BytesPerHour": 10737418240
            }
        ]
    }
}
```

The following example sends an HTTP PUT request with the Strategy field set to `FreeTier`.

```
PUT /-/policies/data-retrieval HTTP/1.1
Host: glacier.us-west-2.amazonaws.com
x-amz-Date: 20170210T120000Z
x-amz-glacier-version: 2012-06-01
Authorization: AWS4-HMAC-SHA256 Credential=AKIAIOSFODNN7EXAMPLE/20141123/us-west-2/glacier/aws4_request,SignedHeaders=host;x-amz-date;x-amz-glacier-version,Signature=9257c16da6b25a715ce900a5b45b03da0447acf430195dcb540091b12966f2a2

{
    "Policy": {
        "Rules": [
            {
                "Strategy": "FreeTier"
            }
        ]
    }
}
```

The following example sends an HTTP PUT request with the Strategy field set to `None`.

```
PUT /-/policies/data-retrieval HTTP/1.1
Host: glacier.us-west-2.amazonaws.com
x-amz-Date: 20170210T120000Z
x-amz-glacier-version: 2012-06-01
Authorization: AWS4-HMAC-SHA256 Credential=AKIAIOSFODNN7EXAMPLE/20141123/us-west-2/glacier/aws4_request,SignedHeaders=host;x-amz-date;x-amz-glacier-version,Signature=9257c16da6b25a715ce900a5b45b03da0447acf430195dcb540091b12966f2a2

{
    "Policy": {
        "Rules": [
            {
                "Strategy": "None"
            }
        ]
    }
}
```

Example Response

If the request was successful Amazon S3 Glacier (Glacier) sets the policy and returns a HTTP 204 No Content as shown in the following example.

```
HTTP/1.1 204 No Content
x-amzn-RequestId: AAABZpJrTyioDC_HsOmHae8EZp_uBSJr6cnGOLKp_XJCl-Q
```

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Related Sections

- Get Data Retrieval Policy (GET policy) (p. 280)
- Initiate Job (POST jobs) (p. 251)
SQL Reference for Amazon S3 Select and Glacier Select

This reference contains a description of the structured query language (SQL) elements that are supported by Amazon S3 Select and Glacier Select.

Topics
- SELECT Command (p. 292)
- Data Types (p. 299)
- Operators (p. 299)
- Reserved Keywords (p. 301)
- SQL Functions (p. 305)

SELECT Command

Amazon S3 Select and Glacier Select support only the SELECT SQL command. The following ANSI standard clauses are supported for SELECT:

- SELECT list
- FROM clause
- WHERE clause
- LIMIT clause (Amazon S3 Select only)

Note
Amazon S3 Select and Glacier Select queries currently do not support subqueries or joins.

SELECT List

The SELECT list names the columns, functions, and expressions that you want the query to return. The list represents the output of the query.

```
SELECT *
SELECT projection [ AS column_alias | column_alias ] [, ...]
```

The first form with * (asterisk) returns every row that passed the WHERE clause, as-is. The second form creates a row with user-defined output scalar expressions projection for each column.

FROM Clause

Amazon S3 Select and Glacier Select support the following forms of the FROM clause:

```
FROM table_name
FROM table_name alias
FROM table_name AS alias
```
Where `table_name` is one of `S3Object` (for Amazon S3 Select) or `ARCHIVE` or `OBJECT` (for Glacier Select) referring to the archive being queried over. Users coming from traditional relational databases can think of this as a database schema that contains multiple views over a table.

Following standard SQL, the `FROM` clause creates rows that are filtered in the `WHERE` clause and projected in the `SELECT` list.

For JSON objects that are stored in Amazon S3 Select, you can also use the following forms of the `FROM` clause:

```
FROM S3Object[*].path
FROM S3Object[*].path alias
FROM S3Object[*].path AS alias
```

Using this form of the `FROM` clause, you can select from arrays or objects within a JSON object. You can specify `path` using one of the following forms:

- By name (in an object): `.name` or `['name']`
- By index (in an array): `[index]`
- By wildcard (in an object): `.*`
- By wildcard (in an array): `[*]`

**Note**

- This form of the `FROM` clause works only with JSON objects.
- Wildcards always emit at least one record. If no record matches, then Amazon S3 Select emits the value `MISSING`. During output serialization (after the query is complete), Amazon S3 Select replaces `MISSING` values with empty records.
- Aggregate functions (AVG, COUNT, MAX, MIN, and SUM) skip `MISSING` values.
- If you don't provide an alias when using a wildcard, you can refer to the row using the last element in the path. For example, you could select all prices from a list of books using the query `SELECT price FROM S3Object[*].books[*].price`. If the path ends in a wildcard rather than a name, then you can use the value `_1` to refer to the row. For example, instead of `SELECT price FROM S3Object[*].books[*].price`, you could use the query `SELECT _1.price FROM S3Object[*].books[*].price`.
- Amazon S3 Select always treats a JSON document as an array of root-level values. Thus, even if the JSON object that you are querying has only one root element, the `FROM` clause must begin with `S3Object[*]`. However, for compatibility reasons, Amazon S3 Select allows you to omit the wildcard if you don't include a path. Thus, the complete clause `FROM S3Object[*]` is equivalent to `FROM S3Object[*] as S3Object`. If you include a path, you must also use the wildcard. So `FROM S3Object[*]` and `FROM S3Object[*].path` are both valid clauses, but `FROM S3Object.path` is not.

**Example**

**Examples:**

**Example #1**

This example shows results using the following dataset and query:

```json
{
    "Rules": [
        {"id": "id-1", "condition": "x < 20"},
        {"condition": "y > x"},
        {"id": "id-2", "condition": "z = DEBUG"}
    ]
}```
FROM Clause

Amazon S3 Select produces each result for the following reasons:

• `{"id":"id-1"}` — S3Object[0].Rules[0].id produced a match.
• `{}` — S3Object[0].Rules[1].id did not match a record, so Amazon S3 Select emitted MISSING, which was then changed to an empty record during output serialization and returned.
• `{"id":"id-2"}` — S3Object[0].Rules[2].id produced a match.
• `{}` — S3Object[1] did not match on Rules, so Amazon S3 Select emitted MISSING, which was then changed to an empty record during output serialization and returned.

If you don’t want Amazon S3 Select to return empty records when it doesn’t find a match, you can test for the value MISSING. The following query returns the same results as the previous query, but with the empty values omitted:

```
SELECT id FROM S3Object[*].Rules[*].id WHERE id IS NOT MISSING
```

Example #2

This example shows results using the following dataset and queries:

```
{
    "created": "936864000",
    "dir_name": "important_docs",
    "files": [
        {
            "name": ".",
        },
        {
            "name": "..",
        },
        {
            "name": ".aws",
        },
        {
            "name": "downloads"
        }
    ],
    "owner": "AWS S3"
},
{
    "created": "936864000",
```
"dir_name": "other_docs",
"files": [
  {
    "name": ".",
  },
  {
    "name": "..",
  },
  {
    "name": "my stuff"
  },
  {
    "name": "backup"
  }
],
"owner": "User"
}

SELECT d.dir_name, d.files FROM S3Object[*] d

{
  "dir_name": "important_docs",
  "files": [
    {
      "name": ".",
    },
    {
      "name": "..",
    },
    {
      "name": ".aws"
    },
    {
      "name": "downloads"
    }
  ]
},
{
  "dir_name": "other_docs",
  "files": [
    {
      "name": ".",
    },
    {
      "name": "..",
    },
    {
      "name": "my stuff"
    },
    {
      "name": "backup"
    }
  ]
}

SELECT _1.dir_name, _1.owner FROM S3Object[*]

{
  "dir_name": "important_docs",
  "owner": "AWS S3"
},

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WHERE Clause

The WHERE clause follows this syntax:

```
WHERE condition
```

The WHERE clause filters rows based on the condition. A condition is an expression that has a Boolean result. Only rows for which the condition evaluates to TRUE are returned in the result.

LIMIT Clause (Amazon S3 Select only)

The LIMIT clause follows this syntax:

```
LIMIT number
```

The LIMIT clause limits the number of records that you want the query to return based on number.

Note
Glacier Select does not support the LIMIT clause.

Attribute Access

The SELECT and WHERE clauses can refer to record data using one of the methods in the following sections, depending on whether the file that is being queried is in CSV or JSON format.

CSV

- **Column Numbers** – You can refer to the Nth column of a row with the column name _N, where N is the column position. The position count starts at 1. For example, the first column is named _1 and the second column is named _2.

  You can refer to a column as _N or alias._N. For example, _2 and myAlias._2 are both valid ways to refer to a column in the SELECT list and WHERE clause.

- **Column Headers** – For objects in CSV format that have a header row, the headers are available to the SELECT list and WHERE clause. In particular, as in traditional SQL, within SELECT and WHERE clause expressions, you can refer to the columns by alias.column_name or column_name.

JSON (Amazon S3 Select only)

- **Document** – You can access JSON document fields as alias.name. Nested fields can also be accessed; for example, alias.name1.name2.name3.

- **List** – You can access elements in a JSON list using zero-based indexes with the [ ] operator. For example, you can access the second element of a list as alias[1]. Accessing list elements can be combined with fields as alias.name1.name2[1].name3.

Examples: Consider this JSON object as a sample dataset:

```
{
  "dir_name": "other_docs",
  "owner": "User"
}
```

```
"name": "Susan Smith",
"org": "engineering",
"projects":
```
Case Sensitivity of Header/Attribute Names

With Amazon S3 Select and Glacier Select, you can use double quotation marks to indicate that column headers (for CSV objects) and attributes (for JSON objects) are case sensitive. Without double quotation marks, object headers/attributes are case insensitive. An error is thrown in cases of ambiguity.

The following examples are either 1) Amazon S3 or Glacier objects in CSV format with the specified column header(s), and with FileHeaderInfo set to "Use" for the query request; or 2) Amazon S3 objects in JSON format with the specified attributes.

Example #1: The object being queried has header/attribute "NAME".
- The following expression successfully returns values from the object (no quotation marks: case insensitive):

```
SELECT s.name from S3Object s
```
- The following expression results in a 400 error MissingHeaderName (quotation marks: case sensitive):

```
SELECT s."name" from S3Object s
```

Example #2: The Amazon S3 object being queried has one header/attribute with "NAME" and another header/attribute with "name".
- The following expression results in a 400 error AmbiguousFieldName (no quotation marks: case insensitive, but there are two matches):

```
SELECT s.name from S3Object s
```
- The following expression successfully returns values from the object (quotation marks: case sensitive, so it resolves the ambiguity).
Using Reserved Keywords as User-Defined Terms

Amazon S3 Select and Glacier Select have a set of reserved keywords that are needed to execute the SQL expressions used to query object content. Reserved keywords include function names, data types, operators, and so on. In some cases, user-defined terms like the column headers (for CSV files) or attributes (for JSON object) may clash with a reserved keyword. When this happens, you must use double quotation marks to indicate that you are intentionally using a user-defined term that clashes with a reserved keyword. Otherwise a 400 parse error will result.

For the full list of reserved keywords see Reserved Keywords (p. 301).

The following example is either 1) an Amazon S3 or Glacier object in CSV format with the specified column headers, with FileHeaderInfo set to "Use" for the query request, or 2) an Amazon S3 object in JSON format with the specified attributes.

Example: The object being queried has header/attribute named "CAST", which is a reserved keyword.

- The following expression successfully returns values from the object (quotation marks: use user-defined header/attribute):

  ```sql
  SELECT s."CAST" from S3Object s
  ```

- The following expression results in a 400 parse error (no quotation marks: clash with reserved keyword):

  ```sql
  SELECT s.CAST from S3Object s
  ```

Scalar Expressions

Within the WHERE clause and the SELECT list, you can have SQL *scalar expressions*, which are expressions that return scalar values. They have the following form:

- **literal**

  An SQL literal.

- **column_reference**

  A reference to a column in the form `column_name` or `alias.column_name`.

- **unary_op expression**

  Where `unary_op` unary is an SQL unary operator.

- **expression binary_op expression**

  Where `binary_op` is an SQL binary operator.

- **func_name**

  Where `func_name` is the name of a scalar function to invoke.

- **expression [ NOT ] BETWEEN expression AND expression**

- **expression LIKE expression [ ESCAPE expression ]**
Data Types

Amazon S3 Select and Glacier Select support several primitive data types.

Data Type Conversions

The general rule is to follow the `CAST` function if defined. If `CAST` is not defined, then all input data is treated as a string. It must be cast into the relevant data types when necessary.

For more information about the `CAST` function, see CAST (p. 307).

Supported Data Types

Amazon S3 Select and Glacier Select support the following set of primitive data types.

<table>
<thead>
<tr>
<th>Name</th>
<th>Description</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>bool</td>
<td>TRUE or FALSE</td>
<td>FALSE</td>
</tr>
<tr>
<td>int, integer</td>
<td>8-byte signed integer in the range -9,223,372,036,854,775,808 to 9,223,372,036,854,775,807.</td>
<td>100000</td>
</tr>
<tr>
<td>string</td>
<td>UTF8-encoded variable-length string. The default limit is one character. The maximum character limit is 2,147,483,647.</td>
<td>'xyz'</td>
</tr>
<tr>
<td>float</td>
<td>8-byte floating point number.</td>
<td>CAST(0.456 AS FLOAT)</td>
</tr>
<tr>
<td>decimal, numeric</td>
<td>Base-10 number, with maximum precision of 38 (that is, the maximum number of significant digits), and with scale within the range of $-2^{31}$ to $2^{31}-1$ (that is, the base-10 exponent).</td>
<td>123.456</td>
</tr>
<tr>
<td>timestamp</td>
<td>Time stamps represent a specific moment in time, always include a local offset, and are capable of arbitrary precision. In the text format, time stamps follow the W3C note on date and time formats, but they must end with the literal &quot;T&quot; if not at least whole-day precision. Fractional seconds are allowed, with at least one digit of precision, and an unlimited maximum. Local-time offsets can be represented as either hour:minute offsets from UTC, or as the literal &quot;Z&quot; to denote a local time of UTC. They are required on time stamps with time and are not allowed on date values.</td>
<td>CAST('2007-04-05T14:30Z' AS TIMESTAMP)</td>
</tr>
</tbody>
</table>

Operators

Amazon S3 Select and Glacier Select support the following operators.

Logical Operators

• **AND**
• **NOT**
• **OR**
Comparison Operators

- <
- >
- <=
- >=
- =
- <>
- !=
- BETWEEN
- IN – For example: IN ('a', 'b', 'c')

Pattern Matching Operators

- LIKE

Math Operators

Addition, subtraction, multiplication, division, and modulo are supported.

- +
- -
- *
- %

Operator Precedence

The following table shows the operators' precedence in decreasing order.

<table>
<thead>
<tr>
<th>Operator/Element</th>
<th>Associativity</th>
<th>Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>-</td>
<td>right</td>
<td>unary minus</td>
</tr>
<tr>
<td>*, /, %</td>
<td>left</td>
<td>multiplication, division, modulo</td>
</tr>
<tr>
<td>+, -</td>
<td>left</td>
<td>addition, subtraction</td>
</tr>
<tr>
<td>IN</td>
<td></td>
<td>set membership</td>
</tr>
<tr>
<td>BETWEEN</td>
<td></td>
<td>range containment</td>
</tr>
<tr>
<td>LIKE</td>
<td></td>
<td>string pattern matching</td>
</tr>
<tr>
<td>&lt;&gt;</td>
<td></td>
<td>less than, greater than</td>
</tr>
</tbody>
</table>
Reserved Keywords

Below is the list of reserved keywords for Amazon S3 Select and Glacier Select. These include function names, data types, operators, etc., that needed to execute the SQL expressions used to query object content.

<table>
<thead>
<tr>
<th>Operator/Element</th>
<th>Associativity</th>
<th>Required</th>
</tr>
</thead>
<tbody>
<tr>
<td>=</td>
<td>right</td>
<td>equality, assignment</td>
</tr>
<tr>
<td>NOT</td>
<td>right</td>
<td>logical negation</td>
</tr>
<tr>
<td>AND</td>
<td>left</td>
<td>logical conjunction</td>
</tr>
<tr>
<td>OR</td>
<td>left</td>
<td>logical disjunction</td>
</tr>
</tbody>
</table>

absolute
action
add
all
allocate
alter
and
any
are
as
asc
assertion
at
authorization
avg
bag
begin
between
bit
bit_length
blob
bool
boolean
both
by
cascade
cascaded
case
cast
catalog
char
char_length
character
character_length
check
clob
close
coalesce
collate
collation
Reserved Keywords

- column
- commit
- connect
- connection
- constraint
- constraints
- continue
- convert
- corresponding
- count
- create
- cross
- current
- current_date
- current_time
- current_timestamp
- current_user
- cursor
- date
- day
- deallocate
- dec
- decimal
- declare
- default
- deferrable
- deferred
- delete
- desc
- describe
- descriptor
- diagnostics
- disconnect
- distinct
- domain
- double
- drop
- else
- end
- end-exec
- escape
- except
- exception
- exec
- execute
- exists
- external
- extract
- false
- fetch
- first
- float
- for
- foreign
- found
- from
- full
- get
- global
- go
- goto
- grant
- group
- having
- hour
- identity
immediate
in
indicator
initially
inner
input
insensitive
insert
int
integer
intersect
interval
into
is
isolation
join
key
language
last
leading
left
level
like
limit
list
local
lower
match
max
min
minute
missing
module
month
names
national
natural
nchar
next
no
not
null
nullif
numeric
octet_length
of
on
only
open
option
or
order
outer
output
overlaps
pad
partial
pivot
position
precision
prepare
preserve
primary
prior
privileges
procedure
Reserved Keywords

public
read
real
references
relative
restrict
revoke
right
rollback
rows
schema
scroll
second
section
select
session
session_user
set
sexp
size
smallint
some
space
sql
sqlcode
sqlerror
sqlstate
string
struct
substring
sum
symbol
system_user
table
temporary
then
time
timestamp
timezone_hour
timezone_minute
to
trailing
transaction
translate
translation
trim
true
tuple
union
unique
unknown
 unpivot
update
upper
usage
user
using
value
values
varchar
varying
view
when
whenever
where
with
SQL Functions

Amazon S3 Select and Glacier Select support several SQL functions.

Topics
- Aggregate Functions (Amazon S3 Select only) (p. 305)
- Conditional Functions (p. 306)
- Conversion Functions (p. 307)
- Date Functions (p. 307)
- String Functions (p. 313)

Aggregate Functions (Amazon S3 Select only)

Amazon S3 Select supports the following aggregate functions.

Note
Glacier Select does not support aggregate functions.

<table>
<thead>
<tr>
<th>Function</th>
<th>Argument Type</th>
<th>Return Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>AVG(expression)</td>
<td>INT, FLOAT, DECIMAL</td>
<td>DECIMAL for an INT argument, FLOAT for a floating-point argument; otherwise the same as the argument data type.</td>
</tr>
<tr>
<td>COUNT</td>
<td>-</td>
<td>INT</td>
</tr>
<tr>
<td>MAX(expression)</td>
<td>INT, DECIMAL</td>
<td>Same as the argument type.</td>
</tr>
<tr>
<td>MIN(expression)</td>
<td>INT, DECIMAL</td>
<td>Same as the argument type.</td>
</tr>
<tr>
<td>SUM(expression)</td>
<td>INT, FLOAT, DOUBLE, DECIMAL</td>
<td>INT for INT argument, FLOAT for a floating-point argument; otherwise, the same as the argument data type.</td>
</tr>
</tbody>
</table>
Conditional Functions

Amazon S3 Select and Glacier Select support the following conditional functions.

Topics
- COALESCE (p. 306)
- NULLIF (p. 306)

COALESCE

Evaluates the arguments in order and returns the first non-unknown, that is, the first non-null or non-missing. This function does not propagate null and missing.

Syntax

\[
\text{COALESCE}( \text{expression}, \text{expression}, \ldots )
\]

Parameters

expression

The target expression that the function operates on.

Examples

<table>
<thead>
<tr>
<th>Example</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>\text{COALESCE}(1)</td>
<td>1</td>
</tr>
<tr>
<td>\text{COALESCE}(\text{null})</td>
<td>\text{null}</td>
</tr>
<tr>
<td>\text{COALESCE}(\text{null}, \text{null})</td>
<td>\text{null}</td>
</tr>
<tr>
<td>\text{COALESCE}(\text{missing}, \text{missing})</td>
<td>\text{null}</td>
</tr>
<tr>
<td>\text{COALESCE}(1, \text{null})</td>
<td>1</td>
</tr>
<tr>
<td>\text{COALESCE}(\text{null}, \text{null}, 1)</td>
<td>1</td>
</tr>
<tr>
<td>\text{COALESCE}(\text{null}, '\text{string}')</td>
<td>'\text{string}'</td>
</tr>
<tr>
<td>\text{COALESCE}(\text{missing}, 1)</td>
<td>1</td>
</tr>
</tbody>
</table>

NULLIF

Given two expressions, returns NULL if the two expressions evaluate to the same value; otherwise, returns the result of evaluating the first expression.

Syntax

\[
\text{NULLIF}( \text{expression1}, \text{expression2} )
\]

Parameters

expression1, expression2

The target expressions that the function operates on.

Examples

<table>
<thead>
<tr>
<th>Example</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>\text{NULLIF}(1, 1)</td>
<td>\text{null}</td>
</tr>
</tbody>
</table>
Conversion Functions

Amazon S3 Select and Glacier Select support the following conversion functions.

Topics

• CAST (p. 307)

CAST

The CAST function converts an entity, such as an expression that evaluates to a single value, from one type to another.

Syntax

CAST ( expression AS data_type )

Parameters

expression

A combination of one or more values, operators, and SQL functions that evaluate to a value.

data_type

The target data type, such as INT, to cast the expression to. For a list of supported data types, see Data Types (p. 299).

Examples

| CAST('2007-04-05T14:30Z' AS TIMESTAMP) |
| CAST(0.456 AS FLOAT) |

Date Functions

Amazon S3 Select and Glacier Select support the following date functions.

Topics

• DATE_ADD (p. 308)
• DATE_DIFF (p. 308)
• EXTRACT (p. 309)
• TO_STRING (p. 310)
• TO_TIMESTAMP (p. 312)
DATE_ADD

Given a date part, a quantity, and a time stamp, returns an updated time stamp by altering the date part by the quantity.

Syntax

```
DATE_ADD( date_part, quantity, timestamp )
```

Parameters

date_part

Specifies which part of the date to modify. This can be one of the following:

- year
- month
- day
- hour
- minute
- second

quantity

The value to apply to the updated time stamp. Positive values for quantity add to the time stamp's date_part, and negative values subtract.

timestamp

The target time stamp that the function operates on.

Examples

```
DATE_ADD(year, 5, `2010-01-01T`)                -- 2015-01-01 (equivalent to 2015-01-01T)
DATE_ADD(month, 1, `2010T`)                     -- 2010-02T (result will add precision as necessary)
DATE_ADD(month, 13, `2010T`)                    -- 2011-02T
DATE_ADD(day, -1, `2017-01-10T`)                -- 2017-01-09 (equivalent to 2017-01-09T)
DATE_ADD(hour, 1, `2017T`)                      -- 2017-01-01T01:00-00:00
DATE_ADD(hour, 1, `2017-01-02T03:04Z`)          -- 2017-01-02T04:04Z
DATE_ADD(minute, 1, `2017-01-02T03:04:05.006Z`) -- 2017-01-02T03:05:05.006Z
DATE_ADD(second, 1, `2017-01-02T03:04:05.006Z`) -- 2017-01-02T03:04:06.006Z
```

DATE_DIFF

Given a date part and two valid time stamps, returns the difference in date parts. The return value is a negative integer when the date_part value of timestamp1 is greater than the date_part value of timestamp2. The return value is a positive integer when the date_part value of timestamp1 is less than the date_part value of timestamp2.

Syntax

```
DATE_DIFF( date_part, timestamp1, timestamp2 )
```

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308
Parameters

date_part

Specifies which part of the time stamps to compare. For the definition of date_part, see
DATE_ADD (p. 308).

timestamp1

The first time stamp to compare.

timestamp2

The second time stamp to compare.

Examples

<table>
<thead>
<tr>
<th>Example</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>DATE_DIFF(year, <code>2010-01-01T</code>, <code>2011-01-01T</code>)</td>
<td>1</td>
</tr>
<tr>
<td>DATE_DIFF(year, <code>2010T</code>, <code>2010-05T</code>)</td>
<td>4 (2010T is equivalent to 2010-01-01T00:00:00.000Z)</td>
</tr>
<tr>
<td>DATE_DIFF(month, <code>2010T</code>, <code>2011T</code>)</td>
<td>12</td>
</tr>
<tr>
<td>DATE_DIFF(month, <code>2011T</code>, <code>2010T</code>)</td>
<td>-12</td>
</tr>
<tr>
<td>DATE_DIFF(day, <code>2010-01-01T23:00T</code>, <code>2010-01-02T01:00T</code>)</td>
<td>0 (need to be at least 24h apart to be 1 day apart)</td>
</tr>
</tbody>
</table>

EXTRACT

Given a date part and a time stamp, returns the time stamp's date part value.

Syntax

EXTRACT( date_part FROM timestamp )

Parameters

date_part

Specifies which part of the time stamps to extract. This can be one of the following:

- year
- month
- day
- hour
- minute
- second
- timezone_hour
- timezone_minute

timestamp

The target time stamp that the function operates on.

Examples

<table>
<thead>
<tr>
<th>Example</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXTRACT(YEAR FROM <code>2010-01-01T</code>)</td>
<td>2010</td>
</tr>
<tr>
<td>EXTRACT(MONTH FROM <code>2010T</code>)</td>
<td>1 (equivalent to 2010-01-01T00:00:00.000Z)</td>
</tr>
</tbody>
</table>
TO_STRING

Given a time stamp and a format pattern, returns a string representation of the time stamp in the given format.

Syntax

```
TO_STRING ( timestamp time_format_pattern )
```

Parameters

- `timestamp`
  The target time stamp that the function operates on.

- `time_format_pattern`
  A string that has the following special character interpretations.

<table>
<thead>
<tr>
<th>Format</th>
<th>Example</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>yy</td>
<td>69</td>
<td>2-digit year</td>
</tr>
<tr>
<td>y</td>
<td>1969</td>
<td>4-digit year</td>
</tr>
<tr>
<td>yyyy</td>
<td>1969</td>
<td>Zero-padded 4-digit year</td>
</tr>
<tr>
<td>M</td>
<td>1</td>
<td>Month of year</td>
</tr>
<tr>
<td>MM</td>
<td>01</td>
<td>Zero-padded month of year</td>
</tr>
<tr>
<td>MMM</td>
<td>Jan</td>
<td>Abbreviated month year name</td>
</tr>
<tr>
<td>MMMM</td>
<td>January</td>
<td>Full month of year name</td>
</tr>
<tr>
<td>MMMMM</td>
<td>J</td>
<td>Month of year first letter</td>
</tr>
<tr>
<td>d</td>
<td>2</td>
<td>Day of month</td>
</tr>
<tr>
<td>dd</td>
<td>02</td>
<td>Zero-padded day of month</td>
</tr>
</tbody>
</table>

(Note: not valid for use with to_timestamp function)
<table>
<thead>
<tr>
<th>Format</th>
<th>Example</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>AM</td>
<td>AM or PM of day</td>
</tr>
<tr>
<td>h</td>
<td>3</td>
<td>Hour of day (1-12)</td>
</tr>
<tr>
<td>hh</td>
<td>03</td>
<td>Zero-padded hour of day (01-12)</td>
</tr>
<tr>
<td>H</td>
<td>3</td>
<td>Hour of day (0-23)</td>
</tr>
<tr>
<td>HH</td>
<td>03</td>
<td>Zero-padded hour of day (00-23)</td>
</tr>
<tr>
<td>m</td>
<td>4</td>
<td>Minute of hour (0-59)</td>
</tr>
<tr>
<td>mm</td>
<td>04</td>
<td>Zero-padded minute of hour (00-59)</td>
</tr>
<tr>
<td>s</td>
<td>5</td>
<td>Second of minute (0-59)</td>
</tr>
<tr>
<td>ss</td>
<td>05</td>
<td>Zero-padded second of minute (00-59)</td>
</tr>
<tr>
<td>S</td>
<td>0</td>
<td>Fraction of second (precision: 0.1, range: 0.0-0.9)</td>
</tr>
<tr>
<td>SS</td>
<td>6</td>
<td>Fraction of second (precision: 0.01, range: 0.0-0.99)</td>
</tr>
<tr>
<td>SSS</td>
<td>60</td>
<td>Fraction of second (precision: 0.001, range: 0.0-0.999)</td>
</tr>
<tr>
<td>SSSS</td>
<td>...</td>
<td>...</td>
</tr>
<tr>
<td>SSSSSS</td>
<td>60000000</td>
<td>Fraction of second (maximum precision: 1 nanosecond, range: 0.0-0.9999999999)</td>
</tr>
<tr>
<td>n</td>
<td>60000000</td>
<td>Nano of second</td>
</tr>
</tbody>
</table>
### Date Functions

<table>
<thead>
<tr>
<th>Format</th>
<th>Example</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>+07 or Z</td>
<td>Offset in hours or &quot;Z&quot; if the offset is 0</td>
</tr>
<tr>
<td>XX or XXXX</td>
<td>+0700 or Z</td>
<td>Offset in hours and minutes or &quot;Z&quot; if the offset is 0</td>
</tr>
<tr>
<td>XXX or XXXXX</td>
<td>+07:00 or Z</td>
<td>Offset in hours and minutes or &quot;Z&quot; if the offset is 0</td>
</tr>
<tr>
<td>x</td>
<td>7</td>
<td>Offset in hours</td>
</tr>
<tr>
<td>xx or xxxx</td>
<td>700</td>
<td>Offset in hours and minutes</td>
</tr>
<tr>
<td>xxx or xxxxx</td>
<td>+07:00</td>
<td>Offset in hours and minutes</td>
</tr>
</tbody>
</table>

### Examples

```sql
TO_STRING(`1969-07-20T20:18Z`,  'MMMM d, y')                    -- "July 20, 1969"
TO_STRING(`1969-07-20T20:18Z`, 'M-d-yy')                        -- "7-20-69"
TO_STRING(`1969-07-20T20:18+08:00`, 'y-MM-dd''T''H:m:ssXXXX')   -- "1969-07-20T20:18:00+08:00"
```

### TO_TIMESTAMP

Given a string, converts it to a time stamp. This is the inverse operation of TO_STRING.

**Syntax**

```
TO_TIMESTAMP ( string )
```

**Parameters**

*string*

The target string that the function operates on.

### Examples

```sql
TO_TIMESTAMP('2007T')                          -- `2007T`
```
UTCNOW

Returns the current time in UTC as a time stamp.

Syntax

UTCNOW()

Parameters

none

Examples

UTCNOW() -- 2017-10-13T16:02:11.123Z

String Functions

Amazon S3 Select and Glacier Select support the following string functions.

Topics

- CHAR_LENGTH, CHARACTER_LENGTH (p. 313)
- LOWER (p. 314)
- SUBSTRING (p. 314)
- TRIM (p. 315)
- UPPER (p. 315)

CHAR_LENGTH, CHARACTER_LENGTH

Counts the number of characters in the specified string.

Note

CHAR_LENGTH and CHARACTER_LENGTH are synonyms.

Syntax

CHAR_LENGTH ( string )

Parameters

string

The target string that the function operates on.

Examples

CHAR_LENGTH("") -- 0
LOWER

Given a string, converts all uppercase characters to lowercase characters. Any non-uppercase characters remain unchanged.

Syntax

```
LOWER( string )
```

Parameters

- `string`
  The target string that the function operates on.

Examples

```
LOWER('AbCdEfG!@#$')  --  'abcdefg!@#$'
```

SUBSTRING

Given a string, a start index, and optionally a length, returns the substring from the start index up to the end of the string, or up to the length provided.

**Note**

The first character of the input string has index 1. If `start` is < 1, it is set to 1.

Syntax

```
SUBSTRING( string FROM start [ FOR length ] )
```

Parameters

- `string`
  The target string that the function operates on.
- `start`
  The start position of the string.
- `length`
  The length of the substring to return. If not present, proceed to the end of the string.

Examples

```
SUBSTRING("123456789", 0)  --  "123456789"
SUBSTRING("123456789", 1)  --  "123456789"
SUBSTRING("123456789", 2)  --  "23456789"
SUBSTRING("123456789", -4)  --  "123456789"
SUBSTRING("123456789", 0, 999)  --  "123456789"
SUBSTRING("123456789", 1, 5)  --  "12345"
```
TRIM

Trims leading or trailing characters from a string. The default character to remove is ' '.

Syntax

```
TRIM ( [ [LEADING | TRAILING | BOTH remove_chars] FROM ] string )
```

Parameters

- **string**
  The target string that the function operates on.
- **LEADING | TRAILING | BOTH**
  Whether to trim leading or trailing characters, or both leading and trailing characters.
- **remove_chars**
  The set of characters to remove. Note that `remove_chars` can be a string with length > 1. This function returns the string with any character from `remove_chars` found at the beginning or end of the string that was removed.

Examples

```
TRIM( '       foobar         ' )               -- 'foobar'
TRIM( '      	foobar	         ' )            -- '	foobar	'
TRIM(LEADING FROM '       foobar         ' )  -- 'foobar         '
TRIM(TRAILING FROM '       foobar         ' ) -- '       foobar'
TRIM(BOTH FROM '       foobar         ' )     -- 'foobar'
TRIM(BOTH '12' FROM '1112211foobar22211122') -- 'foobar'
```

UPPER

Given a string, converts all lowercase characters to uppercase characters. Any non-lowercased characters remain unchanged.

Syntax

```
UPPER ( string )
```

Parameters

- **string**
  The target string that the function operates on.

Examples

```
UPPER('AbCdEfG@##') -- 'ABCDEFG@##'
```
Document History

- **Latest documentation update:** November 20, 2018
- **Current product version:** 2012-06-01

The following table describes the important changes in each release of the *Amazon S3 Glacier Developer Guide* from July 5, 2018, onward. For notification about updates to this documentation, you can subscribe to an RSS feed.

<table>
<thead>
<tr>
<th>Change</th>
<th>Description</th>
<th>Release Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amazon Glacier name change (p. 316)</td>
<td>Amazon Glacier is now Amazon S3 Glacier to better reflect Glacier's integration with Amazon S3.</td>
<td>November 20, 2018</td>
</tr>
<tr>
<td>Updates now available over RSS (p. 316)</td>
<td>You can now subscribe to an RSS feed to receive notifications about updates to the Amazon S3 Glacier Developer Guide guide.</td>
<td>July 5, 2018</td>
</tr>
</tbody>
</table>

Earlier Updates

The following table describes the important changes in each release of the *Amazon S3 Glacier Developer Guide* before July 5, 2018.

<table>
<thead>
<tr>
<th>Change</th>
<th>Description</th>
<th>Release Date</th>
</tr>
</thead>
</table>
| Querying archives with SQL | Glacier now supports querying data archives with SQL. For more information, see *Querying Archives with Glacier Select* (p. 138). The following APIs are updated accordingly:  
  - Describe Job (GET JobID) (p. 238)  
  - Initiate Job (POST jobs) (p. 251)  
  - List Jobs (GET jobs) (p. 261) | November 29, 2017 |
<p>| Expedited and Bulk Data Retrievals | Glacier now supports Expedited and Bulk data retrievals in addition to Standard retrievals. For more information, see <em>Archive Retrieval Options</em> (p. 76). | November 21, 2016 |
| Vault Lock | Glacier now supports Vault Lock, which allows you to easily deploy and enforce compliance controls on individual Glacier vaults with a Vault Lock policy. For more information, see <em>Amazon S3 Glacier Vault Lock</em> (p. 56) and <em>Amazon S3 Glacier Access Control with Vault Lock Policies</em> (p. 126). | July 8, 2015 |</p>
<table>
<thead>
<tr>
<th>Change</th>
<th>Description</th>
<th>Release Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vault tagging</td>
<td>Glacier now allows you to tag your Glacier vaults for easier resource and cost management. Tags are labels that you can define and associate with your vaults, and using tags adds filtering capabilities to operations such as AWS cost reports. For more information, see Tagging Amazon S3 Glacier Resources (p. 145) and Tagging Your Amazon S3 Glacier Vaults (p. 55).</td>
<td>June 22, 2015</td>
</tr>
<tr>
<td>Vault access policies</td>
<td>Glacier now supports managing access to your individual Glacier vaults by using vault access policies. You can now define an access policy directly on a vault, making it easier to grant vault access to users and business groups internal to your organization, as well as to your external business partners. For more information, see Amazon S3 Glacier Access Control with Vault Access Policies (p. 124).</td>
<td>April 27, 2015</td>
</tr>
<tr>
<td>Data retrieval policies and audit logging</td>
<td>Glacier now supports data retrieval policies and audit logging. Data retrieval policies allow you to easily set data retrieval limits and simplify data retrieval cost management. You can define your own data retrieval limits with a few clicks in the AWS console or by using the Glacier API. For more information, see Amazon S3 Glacier Data Retrieval Policies (p. 141). In addition, Glacier now supports audit logging with AWS CloudTrail, which records Glacier API calls for your account and delivers the log files to an Amazon S3 bucket that you specify. For more information, see Logging Amazon S3 Glacier API Calls with AWS CloudTrail (p. 147).</td>
<td>December 11, 2014</td>
</tr>
<tr>
<td>Updates to Java samples</td>
<td>Updated the Java code samples in this guide that use the AWS SDK for Java.</td>
<td>June 27, 2014</td>
</tr>
<tr>
<td>Limiting vault inventory retrieval</td>
<td>You can now limit the number of vault inventory items retrieved by filtering on the archive creation date or by setting a limit. For more information about limiting inventory retrieval, see Range Inventory Retrieval (p. 254) in the Initiate Job (POST jobs) (p. 251) topic.</td>
<td>December 31, 2013</td>
</tr>
<tr>
<td>Removed outdated URLs</td>
<td>Removed the URLs that pointed to the old security credentials page from code examples.</td>
<td>July 26, 2013</td>
</tr>
<tr>
<td>Support for range retrievals</td>
<td>Glacier now supports retrieval of specific ranges of your archives. You can initiate a job requesting Glacier to prepare an entire archive or a portion of the archive for subsequent download. When an archive is very large, you may find it cost effective to initiate several sequential jobs to prepare your archive. For more information, see Downloading an Archive in Amazon S3 Glacier (p. 75). For pricing information, go to the Glacier detail page.</td>
<td>November 13, 2012</td>
</tr>
<tr>
<td>New Guide</td>
<td>This is the first release of the Amazon S3 Glacier Developer Guide.</td>
<td>August 20, 2012</td>
</tr>
</tbody>
</table>
AWS Glossary

For the latest AWS terminology, see the AWS Glossary in the AWS General Reference.