

Exhibit 1

[AWS News Blog](#)

New Amazon S3 Storage Class – Glacier Deep Archive

by Jeff Barr | on 27 MAR 2019 | in [Amazon Simple Storage Service \(S3\)](#), [Launch](#), [News](#) | [Permalink](#) |  Share

Many AWS customers collect and store large volumes (often a petabyte or more) of important data but seldom access it. In some cases raw data is collected and immediately processed, then stored for years or decades just in case there's a need for further processing or analysis. In other cases, the data is retained for compliance or auditing purposes. Here are some of the industries and use cases that fit this description:

Financial – Transaction archives, activity & audit logs, and communication logs.

Health Care / Life Sciences – Electronic medical records, images (X-Ray, MRI, or CT), genome sequences, records of pharmaceutical development.

Media & Entertainment – Media archives and raw production footage.

Physical Security – Raw camera footage.

Online Advertising – Clickstreams and ad delivery logs.

Transportation – Vehicle telemetry, video, RADAR, and LIDAR data.

Science / Research / Education – Research input and results, including data relevant to seismic tests for [oil & gas](#) exploration.

Today we are introducing a new and even more cost-effective way to store important, infrequently accessed data in Amazon S3.

Amazon S3 Glacier Deep Archive Storage Class

The new Glacier Deep Archive storage class is designed to provide durable and secure long-term storage for large amounts of data at a price that is competitive with off-premises tape archival services. Data is stored across 3 or more AWS Availability Zones and can be retrieved in 12 hours or less. You no longer need to deal with expensive and finicky tape drives, arrange for off-premises storage, or worry about migrating data to newer generations of media.

Your existing S3-compatible applications, tools, code, scripts, and lifecycle rules can all take advantage of Glacier Deep Archive storage. You can specify the new storage class when you upload objects, alter the storage class of existing objects manually or programmatically, or use lifecycle rules to arrange for migration based on object age. You can also make use of other S3 features such as [Storage Class Analysis](#), [Object Tagging](#), [Object Lock](#), and [Cross-Region Replication](#).

The existing S3 Glacier storage class allows you to access your data in minutes (using expedited retrieval) and is a good fit for data that requires faster access. To learn more about the entire range of options, read [Storage Classes](#) in the [S3 Developer Guide](#). If you are already making use of the Glacier storage class and rarely access your data, you can switch to Deep Archive and begin to see cost savings right away.

Using Glacier Deep Archive Storage – Console

I can switch the storage class of an existing S3 object to Glacier Deep Archive using the S3 Console. I locate the file

and click **Properties**:

The screenshot shows the Amazon S3 Properties page for the file FILE0120.MOV. At the top, the navigation path is "Amazon S3 > awsroadtrip-videos-raw > FILE0120.MOV". Below the path, the file name "FILE0120.MOV" is displayed with a link to "Latest version". A horizontal menu bar contains four tabs: "Overview" (white background), "Properties" (dark blue background, selected), "Permissions" (light gray), and "Select from" (light gray). Below the menu are five action buttons: "Open", "Download", "Download as", "Make public", and "Copy path". The main content area displays various metadata fields with their values:

Owner	jbarr-aws
Last modified	May 9, 2013 8:57:48 PM GMT-0700
Etag	e630d371b7dd663af121c9e5890991d2-43
Storage class	Standard
Server-side encryption	None
Size	2.6 GB
Key	FILE0120.MOV
Object URL	https://s3.amazonaws.com/awsroadtrip-videos-raw(FILE0120.MOV

Then I click **Storage class**:

Amazon S3 > awsroadtrip-videos-raw > FILE0120.MOV

FILE0120.MOV Latest version ▾

Overview

Properties

Permissions

Select from

Storage class

Use the most appropriate storage class based on frequency of access.

[Learn more](#)



Standard

Encryption

Use encryption to protect your data while in-transit and at rest.

[Learn more](#)



None

Next, I select **Glacier Deep Archive** and click **Save**:

The screenshot shows a modal dialog box titled "Storage class". It contains a table comparing eight storage classes based on their design, availability, and fees. The "Glacier Deep Archive" row is highlighted with a blue background, indicating it is selected. The table has columns for Storage class, Designed for, Availability Zones, Min storage duration, Min billable object size, Monitoring and automation fees, and Retrieval fees. The "Glacier Deep Archive" row specifies "Archive data that rarely, if ever, needs to be accessed with retrieval times in hours" and "180 days" for min storage duration. At the bottom right of the dialog are "Cancel" and "Save" buttons.

Storage class	Designed for	Availability Zones	Min storage duration	Min billable object size	Monitoring and automation fees	Retrieval fees
<input type="radio"/> Standard	Frequently accessed data	≥ 3	-	-	-	-
<input type="radio"/> Intelligent-Tiering	Long-lived data with changing or unknown access patterns	≥ 3	30 days	-	Per-object fees apply	-
<input type="radio"/> Standard-IA	Long-lived, infrequently accessed data	≥ 3	30 days	128KB	-	Per-GB fees apply
<input type="radio"/> One Zone-IA	Long-lived, infrequently accessed, non-critical data	≥ 1	30 days	128KB	-	Per-GB fees apply
<input type="radio"/> Glacier	Archive data with retrieval times ranging from minutes to hours	≥ 3	90 days	-	-	Per-GB fees apply
<input checked="" type="radio"/> Glacier Deep Archive	Archive data that rarely, if ever, needs to be accessed with retrieval times in hours	≥ 3	180 days	-	-	Per-GB fees apply
<input type="radio"/> Reduced Redundancy (Not recommended)	Frequently accessed, non-critical data	≥ 3	-	-	-	-

I cannot download the object or edit any of its properties or permissions after I make this change:



Warning

This object is in Glacier Deep Archive. You cannot download it or make it public. You cannot edit any property or permission.

In the unlikely event that I need to access this 2013-era video, I select it and choose **Restore** from the **Actions** menu:

Amazon S3 > awsroadtrip-videos-raw

Overview Properties Permissions

Management

Type a prefix and press Enter to search. Press ESC to clear.

Upload Create folder Download Actions ▾

US East (N. Virginia)

Name ▾

FILE0120.MOV

Viewing 1 to 1

Size ▾ Storage class ▾

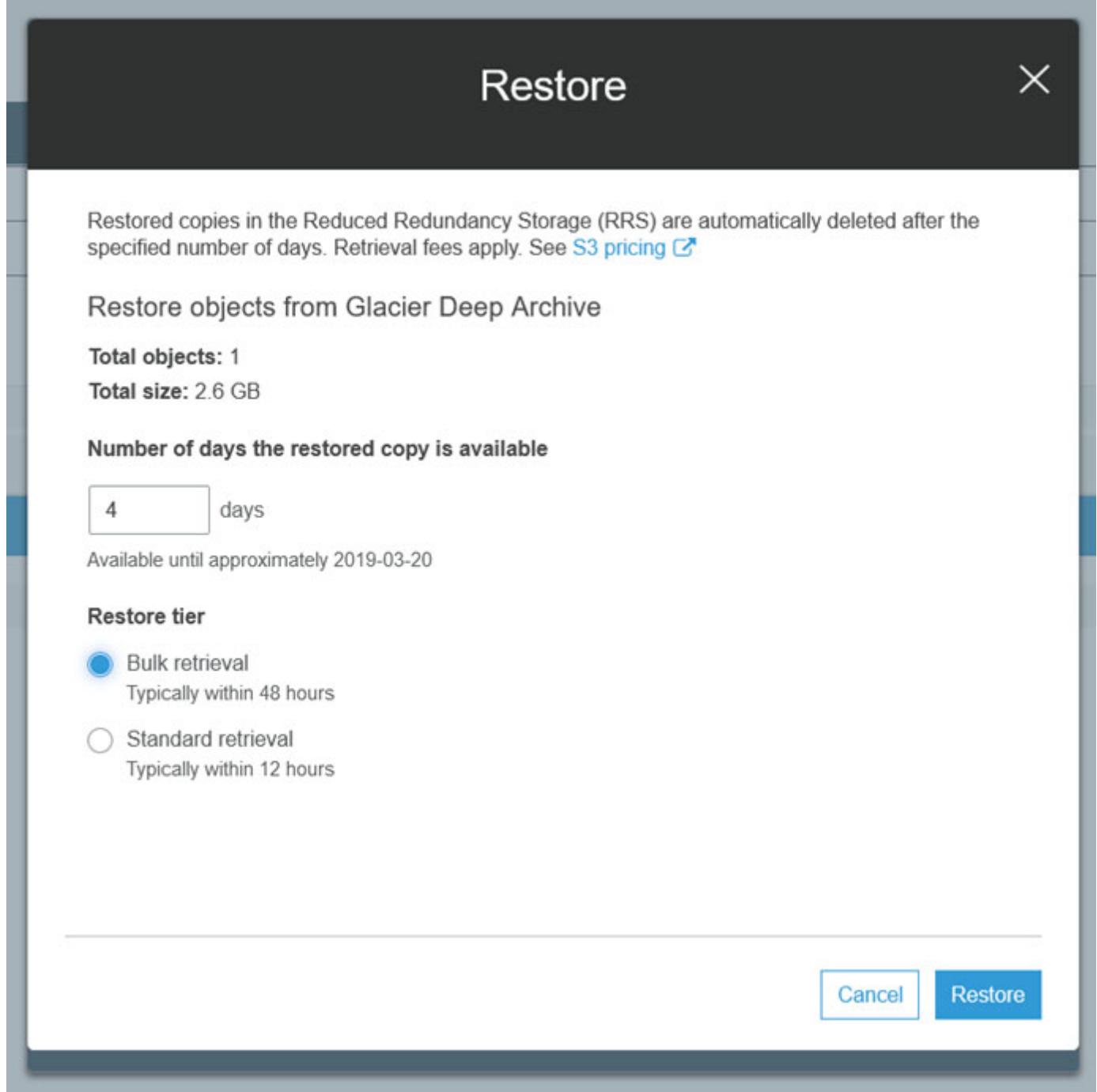
5 2.6 GB Glacier Deep Archive

Viewing 1 to 1

Actions ▾

- Open
- Download as
- Get total size
- Change storage class
- Restore
- Change encryption
- Change metadata
- Add tags
- Make public

Then I specify the number of days to keep the restored copy available, and choose either bulk or standard retrieval:



Using Glacier Deep Archive Storage – Lifecycle Rules

I can also use S3 lifecycle rules. I select the bucket and click **Management**, then select **Lifecycle**:

The screenshot shows the Amazon S3 console with the 'awsroadtrip-videos-raw' bucket selected. The 'Properties' tab is active, and the 'Lifecycle' sub-tab is selected. At the bottom of the lifecycle rules section, there are buttons for '+ Add lifecycle rule', 'Edit', 'Delete', and 'Actions'.

Then I click **Add lifecycle rule** and create my rule. I enter a name (**ArchiveOldMovies**), and can optionally use a path or tag filter to limit the scope of the rule:

The screenshot shows the 'Lifecycle rule' configuration dialog. The first step, 'Name and scope', is selected. The rule name is set to 'ArchiveOldMovies'. There is a field for 'Add filter to limit scope to prefix/tags' and a placeholder 'Type to add prefix/tag filter'.

Next, I indicate that I want the rule to apply to the **Current version** of my objects, and specify that I want my objects to transition to Glacier Deep Archive 30 days after they are created:

NYSCEF DOC. NO. 259

Lifecycle rule

① Name and scope **② Transitions** **③ Expiration** **④ Review**

Storage class transition

You can add rules in a lifecycle configuration to tell Amazon S3 to transition objects to another storage class. [Learn more](#)

Current version Previous versions

For current versions of objects [+ Add transition](#)

Object creation	Days after creation
Transition to Glacier Deep Archive after	30 X

Using Glacier Deep Archive – CLI / Programmatic Access

I can use the CLI to upload a new object and set the storage class:

```
$ aws s3 cp new.mov s3://awsroadtrip-videos-raw/ --storage-class DEEP_ARCHIVE
```

I can also change the storage class of an existing object by copying it over itself:

```
$ aws s3 cp s3://awsroadtrip-videos-raw/new.mov s3://awsroadtrip-videos-raw/new.mov --storage-
```

If I am building a system that manages archiving and restoration, I can opt to receive notifications on an SNS topic, an SQS queue, or a Lambda function when a restore is initiated and/or completed:

Events

+ Add notification Delete Edit

Name	Events	Filter	Type
New event			

Name i
e.g. MyEmailEventForPut

Events i

<input type="checkbox"/> PUT	<input type="checkbox"/> Permanently deleted
<input type="checkbox"/> POST	<input type="checkbox"/> Delete marker created
<input type="checkbox"/> COPY	<input type="checkbox"/> All object delete events
<input type="checkbox"/> Multipart upload completed	<input checked="" type="checkbox"/> Restore initiated
<input type="checkbox"/> All object create events	<input checked="" type="checkbox"/> Restore completed
<input type="checkbox"/> Object in RRS lost	

Prefix i
e.g. images/

Suffix i
e.g. jpg

Send to i

Select notification destination

- SNS Topic
- SQS Queue
- Lambda Function

Cancel Save

Other Access Methods

You can also use Tape Gateway configuration of [AWS Storage Gateway](#) to create a Virtual Tape Library (VTL) and

<https://aws.amazon.com/blogs/aws/new-amazon-s3-storage-class-glacier-deep-archive/>

configure it to use Glacier Deep Archive for storage of archived virtual tapes. This will allow you to move your existing tape-based backups to the AWS Cloud without making any changes to your existing backup workflows. You can retrieve virtual tapes archived in Glacier Deep Archive to S3 within twelve hours. With Tape Gateway and S3 Glacier Deep Archive, you no longer need on-premises physical tape libraries, and you don't need to manage hardware refreshes and rewrite data to new physical tapes as technologies evolve. For more information, visit the [Test Your Gateway Setup with Backup Software](#) page of Storage Gateway User Guide.

Now Available

The S3 Glacier Deep Archive storage class is available today in all commercial regions and in both AWS GovCloud regions. Pricing varies by region, and the storage cost is up to 75% less than for the existing S3 Glacier storage class; visit the [S3 Pricing](#) page for more information.

— [Jeff](#);