Use S3 Object Lock

StorageGRID 11.8

NetApp
March 19, 2024

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As a grid administrator, you can enable S3 Object Lock for your StorageGRID system and implement a compliant ILM policy to help ensure that objects in specific S3 buckets aren't deleted or overwritten for a specified amount of time.

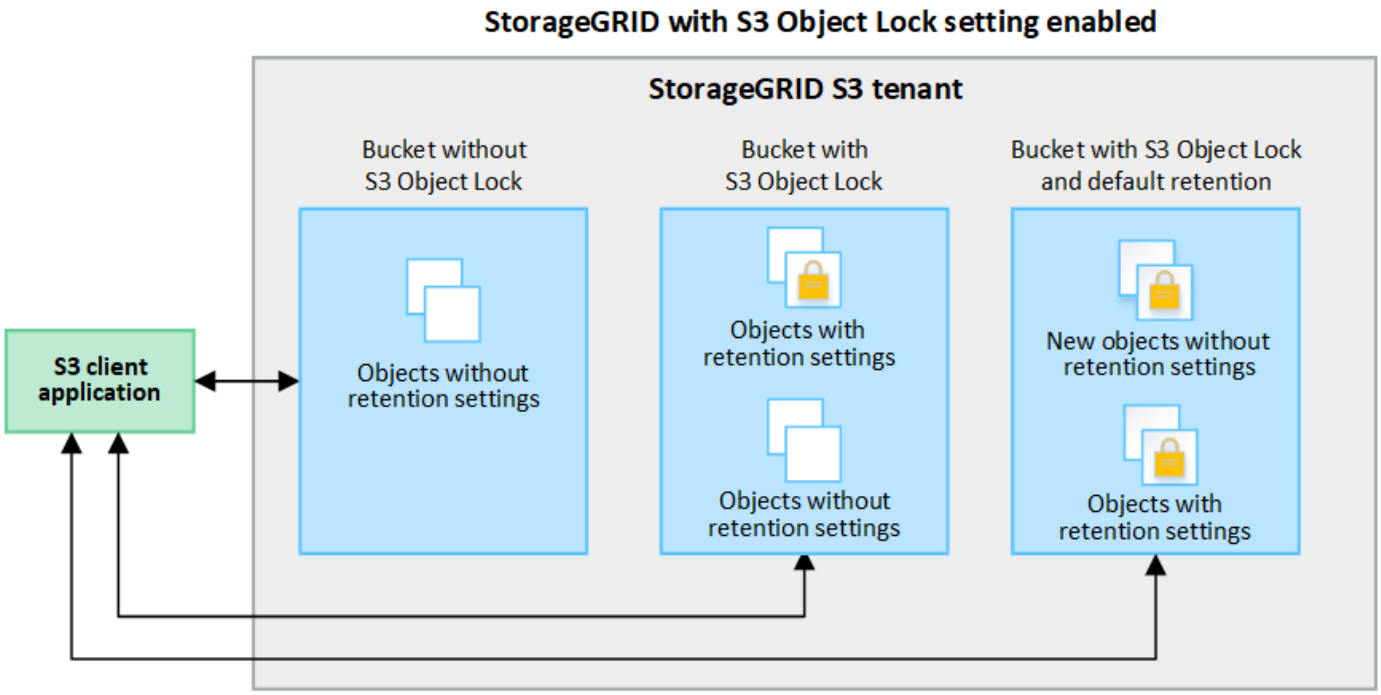
What is S3 Object Lock?

The StorageGRID S3 Object Lock feature is an object-protection solution that is equivalent to S3 Object Lock in Amazon Simple Storage Service (Amazon S3).

As shown in the figure, when the global S3 Object Lock setting is enabled for a StorageGRID system, an S3 tenant account can create buckets with or without S3 Object Lock enabled. If a bucket has S3 Object Lock enabled, bucket versioning is required and is enabled automatically.

If a bucket has S3 Object Lock enabled, S3 client applications can optionally specify retention settings for any object version saved to that bucket.

In addition, a bucket that has S3 Object Lock enabled can optionally have a default retention mode and retention period. The default settings apply only to objects that are added to the bucket without their own retention settings.



Retention modes

The StorageGRID S3 Object Lock feature supports two retention modes to apply different levels of protection to objects. These modes are equivalent to the Amazon S3 retention modes.

- In compliance mode:

    - The object can’t be deleted until its retain-until-date is reached.
    - The object’s retain-until-date can be increased, but it can’t be decreased.
    - The object’s retain-until-date can’t be removed until that date is reached.
- In governance mode:
    - Users with special permission can use a bypass header in requests to modify certain retention settings.
    - These users can delete an object version before its retain-until-date is reached.
    - These users can increase, decrease, or remove an object’s retain-until-date.

Retention settings for object versions

If a bucket is created with S3 Object Lock enabled, users can use the S3 client application to optionally specify the following retention settings for each object that is added to the bucket:

- **Retention mode**: Either compliance or governance.
- **Retain-until-date**: If an object version’s retain-until-date is in the future, the object can be retrieved, but it can’t be deleted.
- **Legal hold**: Applying a legal hold to an object version immediately locks that object. For example, you might need to put a legal hold on an object that is related to an investigation or legal dispute. A legal hold has no expiration date, but remains in place until it is explicitly removed. Legal holds are independent of the retain-until-date.

  > If an object is under a legal hold, no one can delete the object, regardless of its retention mode.

  For details on the object settings, see Use S3 REST API to configure S3 Object Lock.

Default retention setting for buckets

If a bucket is created with S3 Object Lock enabled, users can optionally specify the following default settings for the bucket:

- **Default retention mode**: Either compliance or governance.
- **Default retention period**: How long new object versions added to this bucket should be retained, starting from the day they are added.

The default bucket settings apply only to new objects that don’t have their own retention settings. Existing bucket objects aren’t affected when you add or change these default settings.

See Create an S3 bucket and Update S3 Object Lock default retention.

Comparing S3 Object Lock to legacy Compliance

The S3 Object Lock replaces the Compliance feature that was available in earlier StorageGRID versions. Because the S3 Object Lock feature conforms to Amazon S3 requirements, it deprecates the proprietary StorageGRID Compliance feature, which is now referred to as "legacy Compliance."

The global Compliance setting is deprecated. If you enabled this setting using a previous version of StorageGRID, the S3 Object Lock setting is enabled automatically. You can continue to use StorageGRID to manage the settings of existing compliant buckets; however, you can't create new compliant buckets. For details, see NetApp Knowledge Base: How to manage legacy Compliant buckets in StorageGRID 11.5.

If you used the legacy Compliance feature in a previous version of StorageGRID, refer to the following table to learn how it compares to the S3 Object Lock feature in StorageGRID.

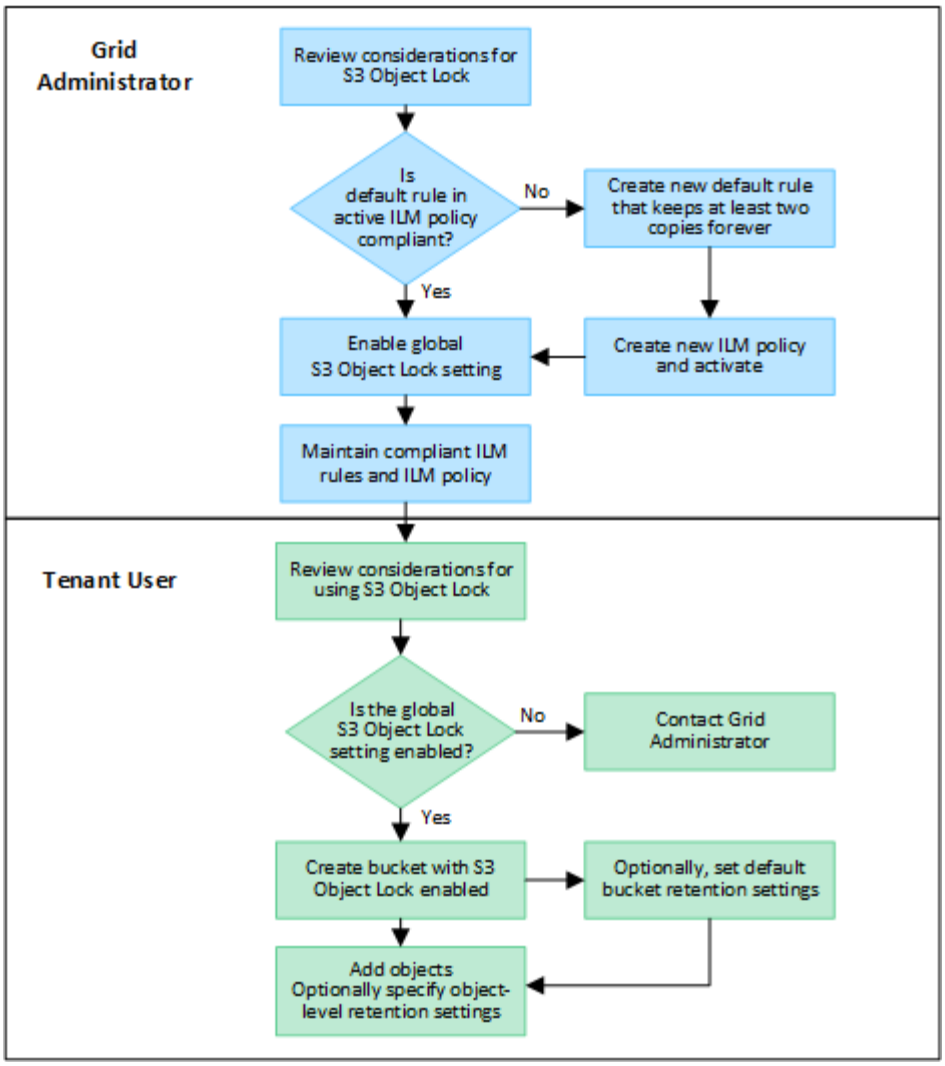
	S3 Object Lock	**Compliance (legacy)**
How is the feature enabled globally?	From the Grid Manager, select **CONFIGURATION** > **System** > **S3 Object Lock**.	No longer supported.
How is the feature enabled for a bucket?	Users must enable S3 Object Lock when creating a new bucket using the Tenant Manager, the Tenant Management API, or the S3 REST API.	No longer supported.
Is bucket versioning supported?	Yes. Bucket versioning is required and is enabled automatically when S3 Object Lock is enabled for the bucket.	No.
How is object retention set?	Users can set a retain-until-date for each object version, or they can set a default retention period for each bucket.	Users must set a retention period for the entire bucket. The retention period applies to all objects in the bucket.
Can the retention period be changed?	• In compliance mode, the retain-until-date for an object version can be increased but never decreased. • In governance mode, users with special permissions can decrease or even remove an object's retention settings.	A bucket's retention period can be increased but never decreased.
Where is legal hold controlled?	Users can place a legal hold or lift a legal hold for any object version in the bucket.	A legal hold is placed on the bucket and affects all objects in the bucket.

	S3 Object Lock	Compliance (legacy)
When can objects be deleted?	• In compliance mode, an object version can be deleted after the retain-until-date is reached, assuming the object is not under legal hold. • In governance mode, users with special permissions can delete an object before its retain-until-date is reached, assuming the object is not under legal hold.	An object can be deleted after the retention period expires, assuming the bucket is not under legal hold. Objects can be deleted automatically or manually.
Is bucket lifecycle configuration supported?	Yes	No

Workflow for S3 Object Lock

As a grid administrator, you must coordinate closely with tenant users to ensure that the objects are protected in a manner that satisfies their retention requirements.

The workflow diagram shows the high-level steps for using S3 Object Lock. These steps are performed by the grid administrator and by tenant users.



Grid administrator tasks

As the workflow diagram shows, a grid administrator must perform two high-level tasks before S3 tenant users can use S3 Object Lock:

1. Create at least one compliant ILM rule and make that rule the default rule in an active ILM policy.
2. Enable the global S3 Object Lock setting for the entire StorageGRID system.

Tenant user tasks

After the global S3 Object Lock setting has been enabled, tenants can perform these tasks:

1. Create buckets that have S3 Object Lock enabled.
2. Optionally, specify default retention settings for the bucket. Any default bucket settings are applied only to new objects that don’t have their own retention settings.
3. Add objects to those buckets and optionally specify object-level retention periods and legal hold settings.
4. As required, update default retention for the bucket or update the retention period or the legal hold setting for an individual object.

Requirements for S3 Object Lock

You must review the requirements for enabling the global S3 Object Lock setting, the requirements for creating compliant ILM rules and ILM policies, and the restrictions StorageGRID places on buckets and objects that use S3 Object Lock.

Requirements for using the global S3 Object Lock setting

- You must enable the global S3 Object Lock setting using the Grid Manager or the Grid Management API before any S3 tenant can create a bucket with S3 Object Lock enabled.
- Enabling the global S3 Object Lock setting allows all S3 tenant accounts to create buckets with S3 Object Lock enabled.
- After you enable the global S3 Object Lock setting, you can't disable the setting.
- You can't enable the global S3 Object Lock unless the default rule in all active ILM policies is *compliant* (that is, the default rule must comply with the requirements of buckets with S3 Object Lock enabled).
- When the global S3 Object Lock setting is enabled, you can't create a new ILM policy or activate an existing ILM policy unless the default rule in the policy is compliant. After the global S3 Object Lock setting has been enabled, the ILM rules and ILM policies pages indicate which ILM rules are compliant.

Requirements for compliant ILM rules

If you want to enable the global S3 Object Lock setting, you must ensure that the default rule in all active ILM policies is compliant. A compliant rule satisfies the requirements of both buckets with S3 Object Lock enabled and any existing buckets that have legacy Compliance enabled:

- It must create at least two replicated object copies or one erasure-coded copy.
- These copies must exist on Storage Nodes for the entire duration of each line in the placement instructions.
- Object copies can't be saved in a Cloud Storage Pool.
- Object copies can't be saved on Archive Nodes.
- At least one line of the placement instructions must start at day 0, using **Ingest time** as the reference time.
- At least one line of the placement instructions must be "forever."

Requirements for ILM policies

When the global S3 Object Lock setting is enabled, active and inactive ILM policies can include both compliant and non-compliant rules.

- The default rule in an active or inactive ILM policy must be compliant.
- Non-compliant rules only apply to objects in buckets that don't have S3 Object Lock enabled or that don't have the legacy Compliance feature enabled.
- Compliant rules can apply to objects in any bucket; S3 Object Lock or legacy Compliance does not need to be enabled for the bucket.

A compliant ILM policy might include these three rules:

1. A compliant rule that creates erasure-coded copies of the objects in a specific bucket with S3 Object Lock enabled. The EC copies are stored on Storage Nodes from day 0 to forever.

2. A non-compliant rule that creates two replicated object copies on Storage Nodes for a year and then moves one object copy to Archive Nodes and stores that copy forever. This rule only applies to buckets that don't have S3 Object Lock or legacy Compliance enabled because it stores only one object copy forever and it uses Archive Nodes.
3. A default, compliant rule that creates two replicated object copies on Storage Nodes from day 0 to forever. This rule applies to any object in any bucket that was not filtered out by the first two rules.

Requirements for buckets with S3 Object Lock enabled

- If the global S3 Object Lock setting is enabled for the StorageGRID system, you can use the Tenant Manager, the Tenant Management API, or the S3 REST API to create buckets with S3 Object Lock enabled.
- If you plan to use S3 Object Lock, you must enable S3 Object Lock when you create the bucket. You can't enable S3 Object Lock for an existing bucket.
- When S3 Object Lock is enabled for a bucket, StorageGRID automatically enables versioning for that bucket. You can't disable S3 Object Lock or suspend versioning for the bucket.
- Optionally, you can specify a default retention mode and retention period for each bucket using the Tenant Manager, the Tenant Management API, or the S3 REST API. The bucket's default retention settings apply only to new objects added to the bucket that don't have their own retention settings. You can override these default settings by specifying a retention mode and retain-until-date for each object version when it is uploaded.
- Bucket lifecycle configuration is supported for buckets with S3 Object Lock enabled.
- CloudMirror replication is not supported for buckets with S3 Object Lock enabled.

Requirements for objects in buckets with S3 Object Lock enabled

- To protect an object version, you can specify default retention settings for the bucket, or you can specify retention settings for each object version. Object-level retention settings can be specified using the S3 client application or the S3 REST API.
- Retention settings apply to individual object versions. An object version can have both a retain-until-date and a legal hold setting, one but not the other, or neither. Specifying a retain-until-date or a legal hold setting for an object protects only the version specified in the request. You can create new versions of the object, while the previous version of the object remains locked.

Lifecycle of objects in buckets with S3 Object Lock enabled

Each object that is saved in a bucket with S3 Object Lock enabled goes through these stages:

1. **Object ingest**

   When an object version is added to bucket that has S3 Object Lock enabled, retention settings are applied as follows:

   - If retention settings are specified for the object, the object-level settings are applied. Any default bucket settings are ignored.
   - If no retention settings are specified for the object, the default bucket settings are applied, if they exist.
   - If no retention settings are specified for the object or the bucket, the object is not protected by S3 Object Lock.

   If retention settings are applied, both the object and any S3 user-defined metadata are protected.

2. **Object retention and deletion**

   Multiple copies of each protected object are stored by StorageGRID for the specified retention period. The exact number and type of object copies and the storage locations are determined by the compliant rules in the active ILM policies. Whether a protected object can be deleted before its retain-until-date is reached depends on its retention mode.

   - If an object is under a legal hold, no one can delete the object, regardless of its retention mode.

Related information

- Create an S3 bucket
- Update S3 Object Lock default retention
- Use S3 REST API to configure S3 Object Lock
- Example 7: Compliant ILM policy for S3 Object Lock

Enable S3 Object Lock globally

If an S3 tenant account needs to comply with regulatory requirements when saving object data, you must enable S3 Object Lock for your entire StorageGRID system. Enabling the global S3 Object Lock setting allows any S3 tenant user to create and manage buckets and objects with S3 Object Lock.

Before you begin

- You have the Root access permission.
- You are signed in to the Grid Manager using a supported web browser.
- You have reviewed the S3 Object Lock workflow, and you understand the considerations.
- You have confirmed that the default rule in the active ILM policy is compliant. See Create a default ILM rule for details.

About this task

A grid administrator must enable the global S3 Object Lock setting to allow tenant users to create new buckets that have S3 Object Lock enabled. After this setting is enabled, it can't be disabled.

> The global Compliance setting is deprecated. If you enabled this setting using a previous version of StorageGRID, the S3 Object Lock setting is enabled automatically. You can continue to use StorageGRID to manage the settings of existing compliant buckets; however, you can't create new compliant buckets. For details, see NetApp Knowledge Base: How to manage legacy Compliant buckets in StorageGRID 11.5.

Steps

1. Select **CONFIGURATION** > **System** > **S3 Object Lock**.

   The S3 Object Lock Settings page appears.

2. Select **Enable S3 Object Lock**.
3. Select **Apply**.

   A confirmation dialog box appears and reminds you that you can't disable S3 Object Lock after it is enabled.

4. If you are sure you want to permanently enable S3 Object Lock for your entire system, select **OK**.

   When you select **OK**:

   - If the default rule in the active ILM policy is compliant, S3 Object Lock is now enabled for the entire grid and can't be disabled.
   - If the default rule is not compliant, an error appears. You must create and activate a new ILM policy that includes a compliant rule as its default rule. Select **OK**. Then, create a new policy, simulate it, and activate it. See Create ILM policy for instructions.

Resolve consistency errors when updating the S3 Object Lock or legacy Compliance configuration

If a data center site or multiple Storage Nodes at a site become unavailable, you might need to help S3 tenant users apply changes to the S3 Object Lock or legacy Compliance configuration.

Tenant users who have buckets with S3 Object Lock (or legacy Compliance) enabled can change certain settings. For example, a tenant user using S3 Object Lock might need to put an object version under legal hold.

When a tenant user updates the settings for an S3 bucket or an object version, StorageGRID attempts to immediately update the bucket or object metadata across the grid. If the system is unable to update the metadata because a data center site or multiple Storage Nodes are unavailable, it returns an error:

```
503: Service Unavailable
Unable to update compliance settings because the settings can't be
consistently applied on enough storage services. Contact your grid
administrator for assistance.
```

To resolve this error, follow these steps:

1. Attempt to make all Storage Nodes or sites available again as soon as possible.
2. If you are unable to make enough of the Storage Nodes at each site available, contact technical support, who can help you recover nodes and ensure that changes are consistently applied across the grid.
3. Once the underlying issue has been resolved, remind the tenant user to retry their configuration changes.

Related information

- Use a tenant account
- Use S3 REST API
- Recover and maintain

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