



Use S3 Object Lock with ILM

StorageGRID

NetApp
May 03, 2022

Table of Contents

- Use S3 Object Lock with ILM 1
 - Manage objects with S3 Object Lock 1
 - Workflow for S3 Object Lock 3
 - Requirements for S3 Object Lock 5
 - Enable S3 Object Lock globally 9
 - Resolve consistency errors when updating the S3 Object Lock or legacy Compliance configuration 11

Use S3 Object Lock with ILM

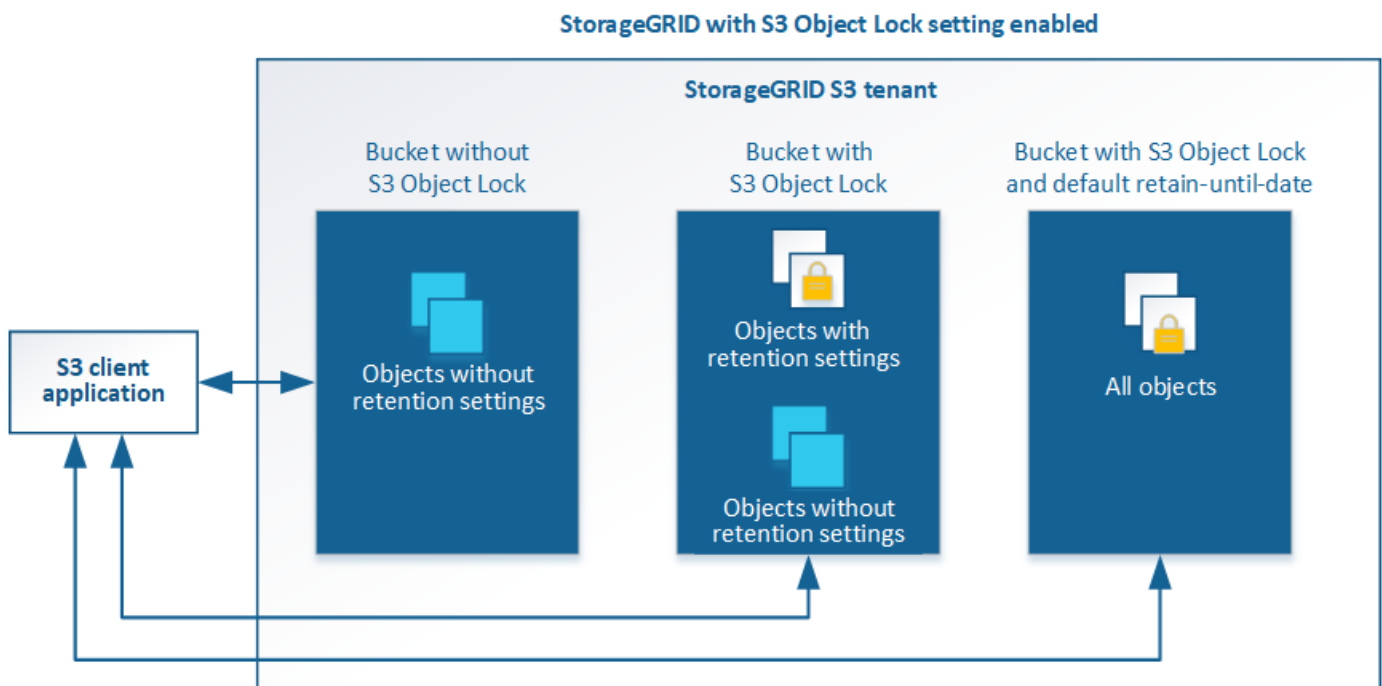
Manage objects with S3 Object Lock

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 are not 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, S3 client applications can optionally specify retention settings for any object version in that bucket. An object version must have retention settings specified to be protected by S3 Object Lock. In addition, each bucket that has S3 Object Lock enabled can optionally have a default retention mode and retention period, which apply if objects are added to the bucket without their own retention settings.



The StorageGRID S3 Object Lock feature provides a single retention mode that is equivalent to the Amazon S3 compliance mode. By default, a protected object version cannot be overwritten or deleted by any user. The StorageGRID S3 Object Lock feature does not support a governance mode, and it does not allow users with special permissions to bypass retention settings or to delete protected objects.

If a bucket has S3 Object Lock enabled, the S3 client application can optionally specify either or both of the following object-level retention settings when creating or updating an object:

- **Retain-until-date:** If an object version's retain-until-date is in the future, the object can be retrieved, but it cannot be modified or deleted. As required, an object's retain-until-date can be increased, but this date cannot be decreased.

- **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.

For details about object retention settings, go to [Use S3 Object Lock](#).

For details about default bucket retention settings, go to [Use S3 Object Lock default bucket 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.”

If you previously enabled the global Compliance setting, the global S3 Object Lock setting was enabled automatically. Tenant users are no longer be able to create new buckets with Compliance enabled; however, as required, tenant users can continue to use and manage any existing legacy Compliant buckets, which includes performing the following tasks:

- Ingesting new objects into an existing bucket that has legacy Compliance enabled.
- Increasing the retention period of an existing bucket that has legacy Compliance enabled.
- Changing the auto-delete setting for an existing bucket that has legacy Compliance enabled.
- Placing a legal hold on an existing bucket that has legacy Compliance enabled.
- Lifting a legal hold.

See [NetApp Knowledge Base: How to manage legacy Compliant buckets in StorageGRID 11.5](#) for instructions.

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.

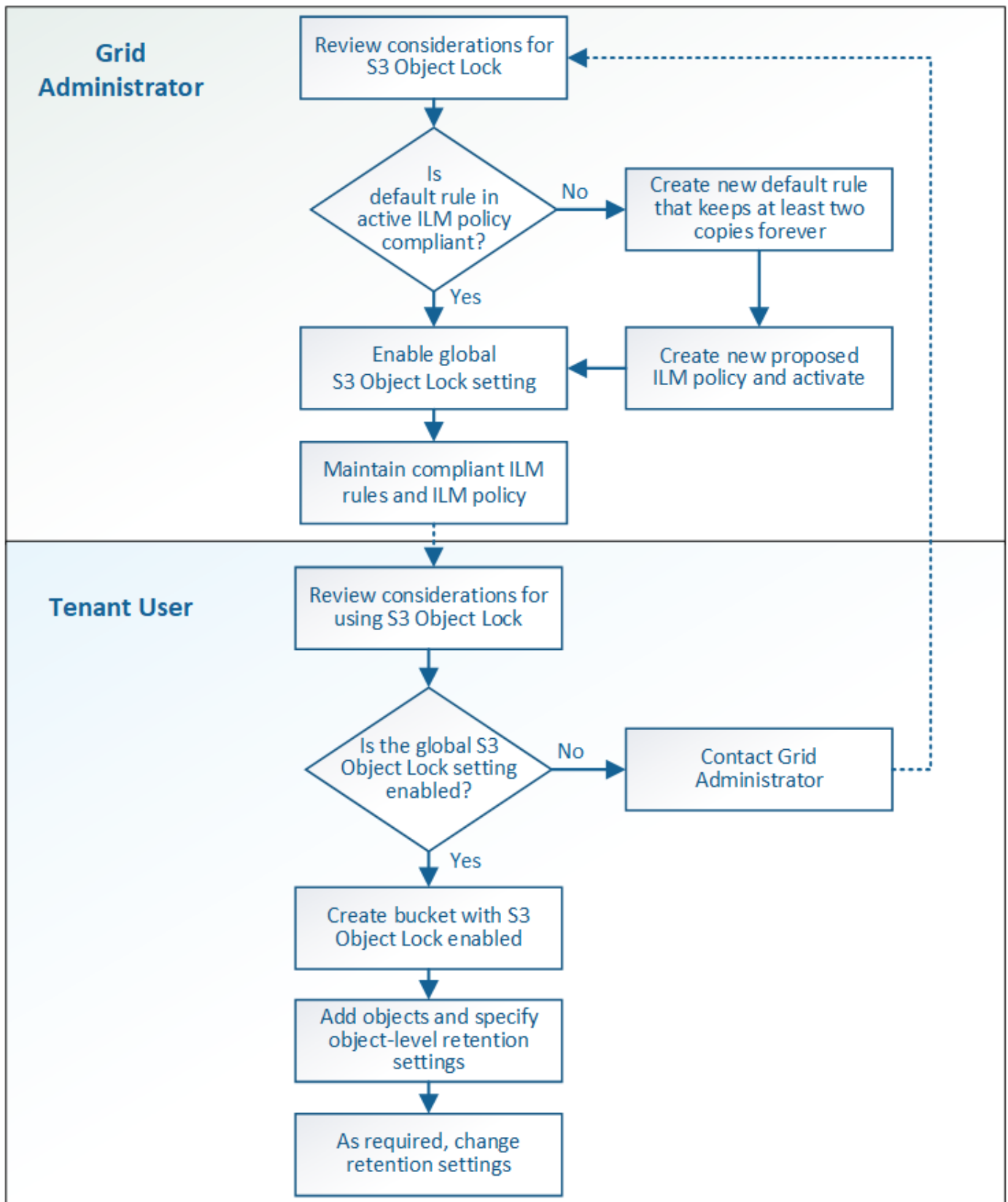
	S3 Object Lock (new)	Compliance (legacy)
How is the feature enabled globally?	From the Grid Manager, select CONFIGURATION > System > S3 Object Lock .	No longer supported. Note: If you enabled the global Compliance setting using a previous version of StorageGRID, the S3 Object Lock setting is enabled in StorageGRID 11.6. You can continue to use StorageGRID to manage the settings of existing compliant buckets; however, you cannot create new compliant buckets.
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.	Users can no longer create new buckets with Compliance enabled; however, they can continue to add new objects to existing Compliant buckets.

	S3 Object Lock (new)	Compliance (legacy)
Is bucket versioning supported?	Yes. Bucket versioning is required and is enabled automatically when S3 Object Lock is enabled for the bucket.	No. The legacy Compliance feature does not allow bucket versioning.
How is object retention set?	Users can set a retain-until-date for each object version.	Users must set a retention period for the entire bucket. The retention period applies to all objects in the bucket.
Can a bucket have default settings for retention and legal hold?	Yes. StorageGRID buckets that have S3 Object Lock enabled can have a default retention period that is applied to object versions that do not have their own retention settings specified during ingest.	Yes
Can the retention period be changed?	The retain-until-date for an object version can be increased but never decreased.	The 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.
When can objects be deleted?	An object version can be deleted after the 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 admin 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 the 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. Specify default retention settings for the bucket, which are applied to objects added to the bucket that do not specify their own retention settings.
3. Add objects to those buckets and specify object-level retention periods and legal hold settings.
4. As required, update a retention period or change the legal hold setting for an individual object.

Related information

- [Use a tenant account](#)
- [Use S3](#)
- [Use S3 Object Lock default bucket retention](#)

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 cannot disable the setting.
- You cannot enable the global S3 Object Lock unless the default rule in the active ILM policy 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 cannot create a new proposed ILM policy or activate an existing proposed 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.

In the following example, the ILM Rules page lists three rules that are compliant with buckets with S3 Object Lock enabled.

<div> <div>+ Create</div> <div>Clone</div> <div>Edit</div> <div>Remove</div> </div>			
Name	Compliant	Used In Active Policy	Used In Proposed Policy
Make 2 Copies	✓	✓	
Compliant Rule: EC for objects in bank-records bucket	✓		
2 copies 10 years, Archive forever			
2 Copies 2 Data Centers	✓		

Compliant Rule: EC for objects in bank-records bucket

Description:

2+1 EC at one site

Ingest Behavior:

Balanced

Compliant:

Yes

Tenant Accounts:

Bank of ABC (94793396288150002349)

Bucket Name:

equals 'bank-records'

Reference Time:

Ingest Time

Requirements for compliant ILM rules

If you want to enable the global S3 Object Lock setting, you must ensure that the default rule in your active ILM policy 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 cannot be saved in a Cloud Storage Pool.
- Object copies cannot 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.”

For example, this rule satisfies the requirements of buckets with S3 Object Lock enabled. It stores two replicated object copies from Ingest Time (day 0) to “forever.” The objects will be stored on Storage Nodes at two data centers.

Compliant rule: 2 replicated copies at 2 sites

Description:

2 replicated copies on Storage Nodes from Day 0 to Forever

Ingest Behavior:

Balanced

Compliant:

Yes

Tenant Accounts:

Bank of ABC (94793396288150002349)

Reference Time:

Ingest Time

Filtering Criteria:

Matches all objects.

Retention Diagram:

Trigger

Day 0

DC1

DC2

Duration

Forever

Requirements for active and proposed ILM policies

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

- The default rule in the active or any proposed ILM policy must be compliant.
- Non-compliant rules only apply to objects in buckets that do not have S3 Object Lock enabled or that do not 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 do not 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.

This example from the Tenant Manager shows a bucket with S3 Object Lock enabled.

Buckets

Create buckets and manage bucket settings.

1 bucket

Create bucket

Actions ▾

<input type="checkbox"/>	Name ▾	S3 Object Lock ? ▾	Region ▾	Object Count ? ▾	Space Used ? ▾	Date Created ▾
<input type="checkbox"/>	bank-records	✓	us-east-1	0	0 bytes	2021-01-06 16:53:19 MST

← Previous 1 Next →

- If you plan to use S3 Object Lock, you must enable S3 Object Lock when you create the bucket. You cannot enable S3 Object Lock for an existing bucket.
- Bucket versioning is required with S3 Object Lock. When S3 Object Lock is enabled for a bucket, StorageGRID automatically enables versioning for that bucket.
- After you create a bucket with S3 Object Lock enabled, you cannot disable S3 Object Lock or suspend versioning for that bucket.
- Optionally, you can configure default retention for a bucket. When an object version is uploaded, the default retention is applied to the object version. You can override the bucket default by specifying a retention mode and retain-until-date in the request to upload an object version.
- Bucket lifecycle configuration is supported for S3 Object Lifecycle buckets.

- 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, the S3 client application must either configure bucket default retention, or specify retention settings in each upload request.
- You can increase the retain-until-date for an object version, but you can never decrease this value.
- If you are notified of a pending legal action or regulatory investigation, you can preserve relevant information by placing a legal hold on an object version. When an object version is under a legal hold, that object cannot be deleted from StorageGRID, even if it has reached its retain-until-date. As soon as the legal hold is lifted, the object version can be deleted if the retain-until-date has been reached.
- S3 Object Lock requires the use of versioned buckets. 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 three stages:

1. Object ingest

- When adding an object version to a bucket with S3 Object Lock enabled, the S3 client application can use the default bucket retention settings or optionally specify retention settings for the object (retain-until-date, legal hold, or both). StorageGRID then generates metadata for that object, which includes a unique object identifier (UUID) and the ingest date and time.
- After an object version with retention settings is ingested, its data and S3 user-defined metadata cannot be modified.
- StorageGRID stores the object metadata independently of the object data. It maintains three copies of all object metadata at each site.

2. Object retention

- Multiple copies of the object are stored by StorageGRID. The exact number and type of copies and the storage locations are determined by the compliant rules in the active ILM policy.

3. Object deletion

- An object can be deleted when its retain-until-date is reached.
- An object that is under a legal hold cannot be deleted.

Related information

- [Use a tenant account](#)
- [Use S3](#)
- [Comparing S3 Object Lock to legacy Compliance](#)
- [Example 7: Compliant ILM policy for S3 Object Lock](#)
- [Review audit logs](#)
- [Use S3 Object Lock default bucket retention.](#)

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.

What you'll need

- 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 must understand the considerations.
- The default rule in the active ILM policy is compliant.
 - [Create a default ILM rule](#)
 - [Create an ILM policy](#)

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 cannot be disabled.



If you enabled the global Compliance setting using a previous version of StorageGRID, the S3 Object Lock setting is enabled in StorageGRID 11.6. You can continue to use StorageGRID to manage the settings of existing compliant buckets; however, you cannot create new compliant buckets. 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.

S3 Object Lock Settings

Enable S3 Object Lock for your entire StorageGRID system if S3 tenant accounts need to satisfy regulatory compliance requirements when saving object data. After this setting is enabled, it cannot be disabled.

S3 Object Lock

Before enabling S3 Object Lock, you must ensure that the default rule in the active ILM policy is compliant. A compliant rule satisfies the requirements of buckets with S3 Object Lock 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 cannot 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".

☐ Enable S3 Object Lock

Apply

If you had enabled the global Compliance setting using a previous version of StorageGRID, the page includes the following note:

The S3 Object Lock setting replaces the legacy Compliance setting. When this setting is enabled, tenant users can create buckets with S3 Object Lock enabled. Tenants who previously created buckets for the legacy Compliance feature can manage their existing buckets, but can no longer create new buckets with legacy Compliance enabled. See [Managing objects with information lifecycle management](#) for information.

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

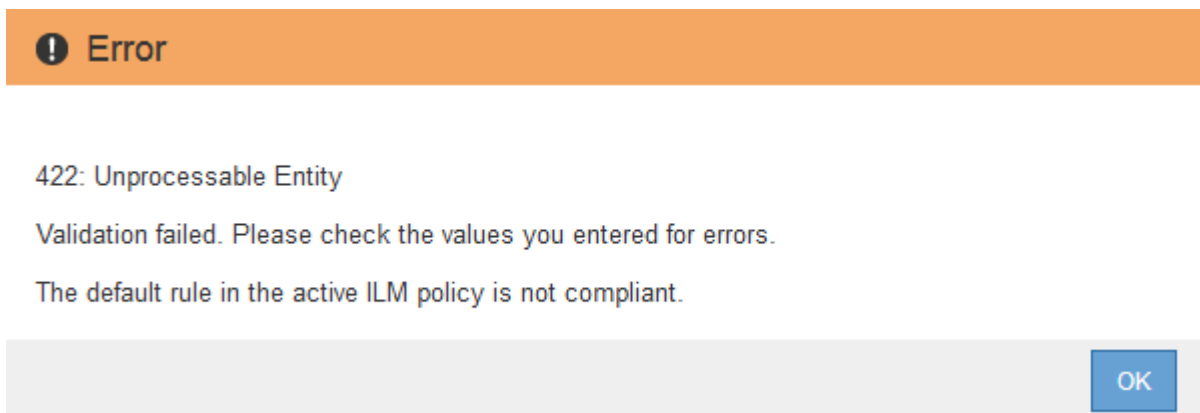
A confirmation dialog box appears and reminds you that you cannot disable S3 Object Lock after it is enabled.



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 cannot be disabled.
- If the default rule is not compliant, an error appears, indicating that you must create and activate a new ILM policy that includes a compliant rule as its default rule. Select **OK**, and create a new proposed policy, simulate it, and activate it.



After you finish

After you enable the global S3 Object Lock setting, you might need to [create a default rule](#) that is compliant and [create an ILM policy](#) that is compliant. After the setting is enabled, the ILM policy can optionally include both a compliant default rule and a non-compliant default rule. For example, you might want to use a non-compliant rule that does not have filters for objects in buckets that do not have S3 Object Lock enabled.

Related information

- [Compare S3 Object Lock to legacy Compliance](#)

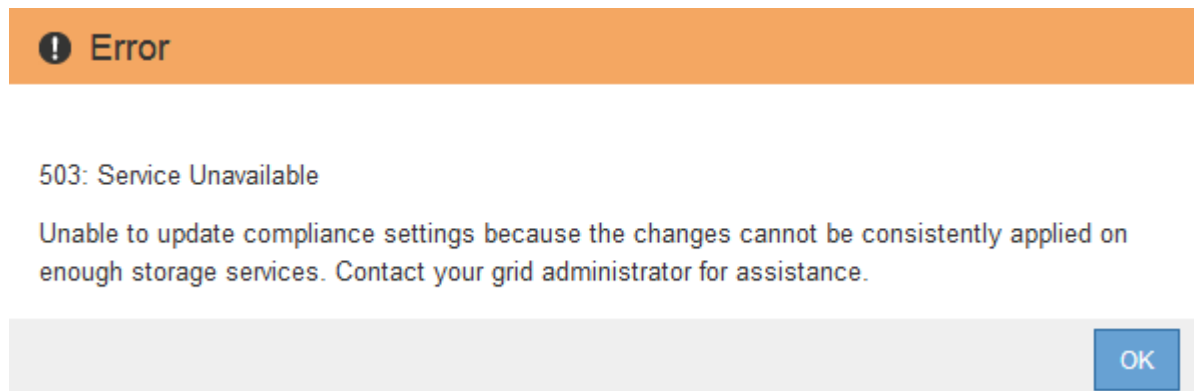
Resolve consistency errors when updating the S3 Object Lock or legacy Compliance configuration

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 displays an error message. Specifically:

- Tenant Manager users see the following error message:



- Tenant Management API users and S3 API users receive a response code of 503 `Service Unavailable` with similar message text.

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](#)
- [Recover and maintain](#)

Copyright Information

Copyright © 2022 NetApp, Inc. All rights reserved. Printed in the U.S. No part of this document covered by copyright may be reproduced in any form or by any means-graphic, electronic, or mechanical, including photocopying, recording, taping, or storage in an electronic retrieval system- without prior written permission of the copyright owner.

Software derived from copyrighted NetApp material is subject to the following license and disclaimer:

THIS SOFTWARE IS PROVIDED BY NETAPP "AS IS" AND WITHOUT ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, WHICH ARE HEREBY DISCLAIMED. IN NO EVENT SHALL NETAPP BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

NetApp reserves the right to change any products described herein at any time, and without notice. NetApp assumes no responsibility or liability arising from the use of products described herein, except as expressly agreed to in writing by NetApp. The use or purchase of this product does not convey a license under any patent rights, trademark rights, or any other intellectual property rights of NetApp.

The product described in this manual may be protected by one or more U.S. patents, foreign patents, or pending applications.

RESTRICTED RIGHTS LEGEND: Use, duplication, or disclosure by the government is subject to restrictions as set forth in subparagraph (c)(1)(ii) of the Rights in Technical Data and Computer Software clause at DFARS 252.277-7103 (October 1988) and FAR 52-227-19 (June 1987).

Trademark Information

NETAPP, the NETAPP logo, and the marks listed at <http://www.netapp.com/TM> are trademarks of NetApp, Inc. Other company and product names may be trademarks of their respective owners.