Considerations for Storage Nodes

StorageGRID 11.8

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Considerations for decommissioning Storage Nodes

Before decommissioning a Storage Node, consider whether you can clone the node instead. Then, if you do decide to decommission the node, review how StorageGRID manages objects and metadata during the decommission procedure.

When to clone a node instead of decommissioning it

If you want to replace an older appliance Storage Node with a newer or larger appliance, consider cloning the appliance node instead of adding a new appliance in an expansion and then decommissioning the old appliance.

Appliance node cloning lets you easily replace an existing appliance node with a compatible appliance at the same StorageGRID site. The cloning process transfers all data to the new appliance, places the new appliance in service, and leaves the old appliance in a pre-install state.

You can clone an appliance node if you need to:

- Replace an appliance that is reaching end-of-life.
- Upgrade an existing node to take advantage of improved appliance technology.
- Increase grid storage capacity without changing the number of Storage Nodes in your StorageGRID system.
- Improve storage efficiency, such as by changing the RAID mode.

See Appliance node cloning: Overview for details.

Considerations for connected Storage Nodes

Review the considerations for decommissioning a connected Storage Node.

- You should not decommission more than 10 Storage Nodes in a single Decommission Node procedure.
- The system must, at all times, include enough Storage Nodes to satisfy operational requirements, including the ADC quorum and the active ILM policy. To satisfy this restriction, you might need to add a new Storage Node in an expansion operation before you can decommission an existing Storage Node.

  Use caution when you decommission Storage Nodes in a grid containing software-based metadata-only nodes. If you decommission all nodes configured to store *both* objects and metadata, the ability to store objects is removed from the grid. See Types of Storage Nodes for more information about metadata-only Storage Nodes.

- When you remove a Storage Node, large volumes of object data are transferred over the network. Although these transfers should not affect normal system operations, they can affect the total amount of network bandwidth consumed by the StorageGRID system.
- Tasks associated with Storage Node decommissioning are given a lower priority than tasks associated with normal system operations. This means that decommissioning does not interfere with normal StorageGRID system operations, and does not need to be scheduled for a period of system inactivity. Because decommissioning is performed in the background, it is difficult to estimate how long the process will take to complete. In general, decommissioning finishes more quickly when the system is quiet, or if only one

Storage Node is being removed at a time.

- It might take days or weeks to decommission a Storage Node. Plan this procedure accordingly. While the decommission process is designed to not impact system operations, it can limit other procedures. In general, you should perform any planned system upgrades or expansions before you remove grid nodes.
- If you need to perform another maintenance procedure while Storage Nodes are being removed, you can pause the decommission procedure and resume it after the other procedure is complete.

> The **Pause** button is enabled only when the ILM evaluation or erasure-coded data decommissioning stages are reached; however, ILM evaluation (data migration) will continue to run in the background.

- You can't run data repair operations on any grid nodes when a decommission task is running.
- You should not make any changes to an ILM policy while a Storage Node is being decommissioned.
- When you decommission a Storage Node, the following alerts and alarms might be triggered and you might receive related email and SNMP notifications:
  - **Unable to communicate with node** alert. This alert is triggered when you decommission a Storage Node that includes the ADC service. The alert is resolved when the decommission operation completes.
  - VSTU (Object Verification Status) alarm. This notice-level alarm indicates that the Storage Node is going into maintenance mode during the decommission process.
  - CASA (Data Store Status) alarm. This major-level alarm indicates that the Cassandra database is going down because services have stopped.
- To permanently and securely remove data, you must wipe the Storage Node's drives after the decommission procedure is complete.

Considerations for disconnected Storage Nodes

Review the considerations for decommissioning a disconnected Storage Node.

- Never decommission a disconnected node unless you are sure it can't be brought online or recovered.

> Don't perform this procedure if you believe it might be possible to recover object data from the node. Instead, contact technical support to determine if node recovery is possible.

- When you decommission a disconnected Storage Node, StorageGRID uses data from other Storage Nodes to reconstruct the object data and metadata that was on the disconnected node.
- Data loss might occur if you decommission more than one disconnected Storage Node. The system might not be able to reconstruct data if not enough object copies, erasure-coded fragments, or object metadata remain available. When decommissioning Storage Nodes in a grid with software-based metadata-only nodes, decommissioning all nodes configured to store both objects and metadata removes all object storage from the grid. See Types of Storage Nodes for more information about metadata-only Storage Nodes.

> If you have more than one disconnected Storage Node that you can't recover, contact technical support to determine the best course of action.

- When you decommission a disconnected Storage Node, StorageGRID starts data repair jobs at the end of the decommissioning process. These jobs attempt to reconstruct the object data and metadata that was stored on the disconnected node.

- When you decommission a disconnected Storage Node, the decommission procedure completes relatively quickly. However, the data repair jobs can take days or weeks to run and aren't monitored by the decommission procedure. You must manually monitor these jobs and restart them as needed. See Check data repair jobs.
- If you decommission a disconnected Storage Node that contains the only copy of an object, the object will be lost. The data repair jobs can only reconstruct and recover objects if at least one replicated copy or enough erasure-coded fragments exist on Storage Nodes that are currently connected.

What is the ADC quorum?

You might not be able to decommission certain Storage Nodes at a site if too few Administrative Domain Controller (ADC) services would remain after the decommissioning.

The ADC service, which is found on some Storage Nodes, maintains grid topology information and provides configuration services to the grid. The StorageGRID system requires a quorum of ADC services to be available at each site and at all times.

You can't decommission a Storage Node if removing the node would cause the ADC quorum to no longer be met. To satisfy the ADC quorum during a decommissioning, a minimum of three Storage Nodes at each site must have the ADC service. If a site has more than three Storage Nodes with the ADC service, a simple majority of those nodes must remain available after the decommissioning: `((0.5 * Storage Nodes with ADC) + 1)`

> Use caution when you decommission Storage Nodes in a grid containing software-based metadata-only nodes. If you decommission all nodes configured to store *both* objects and metadata, the ability to store objects is removed from the grid. See Types of Storage Nodes for more information about metadata-only Storage Nodes.

For example, suppose a site currently includes six Storage Nodes with ADC services and you want to decommission three Storage Nodes. Because of the ADC quorum requirement, you must complete two decommission procedures, as follows:

- In the first decommission procedure, you must ensure that four Storage Nodes with ADC services remain available: `((0.5 * 6) + 1)`. This means that you can only decommission two Storage Nodes initially.
- In the second decommission procedure, you can remove the third Storage Node because the ADC quorum now only requires three ADC services to remain available: `((0.5 * 4) + 1)`.

If you need to decommission a Storage Node but are unable to because of the ADC quorum requirement, add a new Storage Node in an expansion and specify that it should have an ADC service. Then, decommission the existing Storage Node.

Review ILM policy and storage configuration

If you plan to decommission a Storage Node, you should review your StorageGRID system's ILM policy before starting the decommissioning process.

During decommissioning, all object data is migrated from the decommissioned Storage Node to other Storage Nodes.

The ILM policy you have *during* the decommission will be the one used *after* the decommission. You must ensure this policy meets your data requirements both before you start the decommission and after the decommission is complete.

You should review the rules in each active ILM policy to ensure that the StorageGRID system will continue to have enough capacity of the correct type and in the correct locations to accommodate the decommissioning of a Storage Node.

Consider the following:

- Will it be possible for ILM evaluation services to copy object data such that ILM rules are satisfied?
- What happens if a site becomes temporarily unavailable while decommissioning is in progress? Can additional copies be made in an alternate location?
- How will the decommissioning process affect the final distribution of content? As described in Consolidate Storage Nodes, you should add new Storage Nodes before decommissioning old ones. If you add a larger replacement Storage Node after decommissioning a smaller Storage Node, the old Storage Nodes could be close to capacity and the new Storage Node could have almost no content. Most write operations for new object data would then be directed at the new Storage Node, reducing the overall efficiency of system operations.
- Will the system, at all times, include enough Storage Nodes to satisfy the active ILM policies?

An ILM policy that can't be satisfied will lead to backlogs and alerts, and might halt operation of the StorageGRID system.

Verify that the proposed topology that will result from the decommissioning process satisfies the ILM policy by assessing the areas listed in the table.

Area to assess	What to consider
Available capacity	Will there be enough storage capacity to accommodate all of the object data stored in the StorageGRID system, including the permanent copies of object data currently stored on the Storage Node to be decommissioned? Will there be enough capacity to handle the anticipated growth in stored object data for a reasonable interval of time after decommissioning is complete?
Location of storage	If enough capacity remains in the StorageGRID system as a whole, is the capacity in the right locations to satisfy the StorageGRID system's business rules?
Storage type	Will there be enough storage of the appropriate type after decommissioning is complete? For example, ILM rules might move content from one type of storage to another as content ages. In this case, you must ensure that enough storage of the appropriate type is available in the final configuration of the StorageGRID system.

Consolidate Storage Nodes

You can consolidate Storage Nodes to reduce the Storage Node count for a site or deployment while increasing storage capacity.

When you consolidate Storage Nodes, you expand the StorageGRID system by adding new, larger capacity Storage Nodes and then decommission the old, smaller capacity Storage Nodes. During the decommission procedure, objects are migrated from the old Storage Nodes to the new Storage Nodes.

> If you are consolidating older and smaller appliances with new models or larger capacity appliances, consider cloning the appliance node (or use appliance node cloning and the decommission procedure if you aren't doing a one-to-one replacement).

For example, you might add two new, larger capacity Storage Nodes to replace three older Storage Nodes. You would first use the expansion procedure to add the two new, larger Storage Nodes, and then use the decommission procedure to remove the three old, smaller capacity Storage Nodes.

By adding new capacity before removing existing Storage Nodes, you ensure a more balanced distribution of data across the StorageGRID system. You also reduce the possibility that an existing Storage Node might be pushed beyond the storage watermark level.

Decommission multiple Storage Nodes

If you need to remove more than one Storage Node, you can decommission them either sequentially or in parallel.

> Use caution when you decommission Storage Nodes in a grid containing software-based metadata-only nodes. If you decommission all nodes configured to store *both* objects and metadata, the ability to store objects is removed from the grid. See Types of Storage Nodes for more information about metadata-only Storage Nodes.

- If you decommission Storage Nodes sequentially, you must wait for the first Storage Node to complete decommissioning before starting to decommission the next Storage Node.
- If you decommission Storage Nodes in parallel, the Storage Nodes simultaneously process decommission tasks for all Storage Nodes being decommissioned. This can result in a situation where all permanent copies of a file are marked as "read-only," temporarily disabling deletion in grids where this functionality is enabled.

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