



# **Plan and prepare for VMware installation**

## **StorageGRID 11.7**

NetApp  
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# Plan and prepare for VMware installation

## Before you install (VMware)

Before deploying grid nodes and configuring the StorageGRID grid, you must be familiar with the steps and requirements for completing the procedure.

The StorageGRID deployment and configuration procedures assume that you are familiar with the architecture and operational functionality of the StorageGRID system.

You can deploy a single site or multiple sites at one time; however, all sites must meet the minimum requirement of having at least three Storage Nodes.

Before starting the node deployment and grid configuration procedure, you must:

- Plan the StorageGRID deployment.
- Install, connect, and configure all required hardware, including any StorageGRID appliances, to specifications.



If your StorageGRID installation will not use StorageGRID appliance (hardware) Storage Nodes, you must use hardware RAID storage with battery-backed write cache (BBWC). StorageGRID does not support the use of virtual storage area networks (vSANs), software RAID, or no RAID protection.



Hardware-specific installation and integration instructions aren't included in the StorageGRID installation procedure. To learn how to install StorageGRID appliances, see [Install appliance hardware](#).

- Understand the [available network options and how each network option should be implemented on grid nodes](#).
- Gather all networking information in advance. Unless you are using DHCP, gather the IP addresses to assign to each grid node, and the IP addresses of the DNS and NTP servers that will be used.
- Decide which of the available deployment and configuration tools you want to use.

## Required materials

Before you install StorageGRID, you must gather and prepare required materials.

| Item                             | Notes   |
|----------------------------------|---|
| NetApp StorageGRID license       | You must have a valid, digitally signed NetApp license.<br><br><b>Note:</b> The StorageGRID installation archive includes a free license that does not provide any support entitlement for the product. |
| StorageGRID installation archive | You must <a href="#">download the StorageGRID installation archive and extract the files</a> .  |

| Item                              | Notes  |
|-----------------------------------|--|
| VMware software and documentation | During installation, you use VMware vSphere Web Client to deploy virtual grid nodes on virtual machines. For supported versions, see the <a href="#">NetApp Interoperability Matrix Tool</a> .   |
| Service laptop                    | The StorageGRID system is installed through a service laptop. The service laptop must have: <ul style="list-style-type: none"> <li>• Network port</li> <li>• SSH client (for example, PuTTY)</li> <li>• <a href="#">Supported web browser</a></li> </ul> |
| StorageGRID documentation         | <ul style="list-style-type: none"> <li>• <a href="#">Release notes</a></li> <li>• <a href="#">Instructions for administering StorageGRID</a></li> </ul>  |

## Download and extract the StorageGRID installation files

You must download the StorageGRID installation archives and extract the files..

### Steps

1. Go to the [NetApp Downloads page for StorageGRID](#).
2. Select the button for downloading the latest release, or select another version from the drop-down menu and select **Go**.
3. Sign in with the username and password for your NetApp account.
4. If a Caution/MustRead statement appears, read it and select the checkbox.



You must apply any required hotfixes after you install the StorageGRID release. For more information, see the [hotfix procedure in the recovery and maintenance instructions](#)

5. Read the End User License Agreement, select the checkbox, and then select **Accept & Continue**.
6. In the **Install StorageGRID** column, select the .tgz or .zip file for VMware.



Use the .zip file if you are running Windows on the service laptop.

7. Save and extract the archive file.
8. Choose the files you need from the following list.

The files you need depend on your planned grid topology and how you will deploy your StorageGRID system.



The paths listed in the table are relative to the top-level directory installed by the extracted installation archive.

| Path and file name  | Description   |
|---|---|
| <code>./vsphere/README</code>   | A text file that describes all of the files contained in the StorageGRID download file.   |
| <code>./vsphere/NLF000000.txt</code>  | A free license that does not provide any support entitlement for the product.   |
| <code>./vsphere/NetApp-SG-version-SHA.vmdk</code>   | The virtual machine disk file that is used as a template for creating grid node virtual machines.   |
| <code>./vsphere/vsphere-primary-admin.ovf</code><br><code>./vsphere/vsphere-primary-admin.mf</code>         | The Open Virtualization Format template file ( <code>.ovf</code> ) and manifest file ( <code>.mf</code> ) for deploying the primary Admin Node.                       |
| <code>./vsphere/vsphere-non-primary-admin.ovf</code><br><code>./vsphere/vsphere-non-primary-admin.mf</code> | The template file ( <code>.ovf</code> ) and manifest file ( <code>.mf</code> ) for deploying non-primary Admin Nodes.   |
| <code>./vsphere/vsphere-archive.ovf</code><br><code>./vsphere/vsphere-archive.mf</code>                     | The template file ( <code>.ovf</code> ) and manifest file ( <code>.mf</code> ) for deploying Archive Nodes.   |
| <code>./vsphere/vsphere-gateway.ovf</code><br><code>./vsphere/vsphere-gateway.mf</code>                     | The template file ( <code>.ovf</code> ) and manifest file ( <code>.mf</code> ) for deploying Gateway Nodes.   |
| <code>./vsphere/vsphere-storage.ovf</code><br><code>./vsphere/vsphere-storage.mf</code>                     | The template file ( <code>.ovf</code> ) and manifest file ( <code>.mf</code> ) for deploying virtual machine-based Storage Nodes.                                     |
| Deployment scripting tool   | Description   |
| <code>./vsphere/deploy-vsphere-ovftool.sh</code>  | A Bash shell script used to automate the deployment of virtual grid nodes.  |
| <code>./vsphere/deploy-vsphere-ovftool-sample.ini</code>  | An example configuration file for use with the <code>deploy-vsphere-ovftool.sh</code> script.   |
| <code>./vsphere/configure-storagegrid.py</code>   | A Python script used to automate the configuration of a StorageGRID system.   |
| <code>./vsphere/configure-sga.py</code>   | A Python script used to automate the configuration of StorageGRID appliances.   |
| <code>./vsphere/storagegrid-ssoauth.py</code>   | An example Python script that you can use to sign in to the Grid Management API when single sign-on (SSO) is enabled. You can also use this script for Ping Federate. |
| <code>./vsphere/configure-storagegrid.sample.json</code>  | An example configuration file for use with the <code>configure-storagegrid.py</code> script.  |

| Path and file name                                      | Description  |
|---|--|
| <code>./vsphere/configure-storagegrid.blank.json</code> | A blank configuration file for use with the <code>configure-storagegrid.py</code> script.  |
| <code>./vsphere/storagegrid-ssoauth-azure.py</code>     | An example Python script that you can use to sign in to the Grid Management API when single sign-on (SSO) is enabled using Active Directory or Ping Federate.  |
| <code>./vsphere/storagegrid-ssoauth-azure.js</code>     | A helper script called by the companion <code>storagegrid-ssoauth-azure.py</code> Python script to perform SSO interactions with Azure.  |
| <code>./vsphere/extras/api-schemas</code>               | API schemas for StorageGRID.<br><br><b>Note:</b> Before you perform an upgrade, you can use these schemas to confirm that any code you have written to use StorageGRID management APIs will be compatible with the new StorageGRID release if you don't have a non-production StorageGRID environment for upgrade compatibility testing. |

## Software requirements

You can use a virtual machine to host any type of StorageGRID grid node. One virtual machine is required for each grid node installed on the VMware server.

### VMware vSphere Hypervisor

You must install VMware vSphere Hypervisor on a prepared physical server. The hardware must be configured correctly (including firmware versions and BIOS settings) before you install VMware software.

- Configure networking in the hypervisor as required to support networking for the StorageGRID system you are installing.

#### [Networking guidelines](#)

- Ensure that the datastore is large enough for the virtual machines and virtual disks that are required to host the grid nodes.
- If you create more than one datastore, name each datastore so that you can easily identify which datastore to use for each grid node when you create virtual machines.

### ESX host configuration requirements



You must properly configure the network time protocol (NTP) on each ESX host. If the host time is incorrect, negative effects, including data loss, could occur.

## VMware configuration requirements

You must install and configure VMware vSphere and vCenter before deploying StorageGRID grid nodes.

For supported versions of VMware vSphere Hypervisor and VMware vCenter Server software, see the [NetApp Interoperability Matrix Tool](#).

For the steps required to install these VMware products, see the VMware documentation.

## CPU and RAM requirements

Before installing StorageGRID software, verify and configure the hardware so that it is ready to support the StorageGRID system.

For information about supported servers, see the [NetApp Interoperability Matrix Tool](#).

Each StorageGRID node requires the following minimum resources:

- CPU cores: 8 per node
- RAM: At least 24 GB per node, and 2 to 16 GB less than the total system RAM, depending on the total RAM available and the amount of non-StorageGRID software running on the system

Ensure that the number of StorageGRID nodes you plan to run on each physical or virtual host does not exceed the number of CPU cores or the physical RAM available. If the hosts aren't dedicated to running StorageGRID (not recommended), be sure to consider the resource requirements of the other applications.



Monitor your CPU and memory usage regularly to ensure that these resources continue to accommodate your workload. For example, doubling the RAM and CPU allocation for virtual Storage Nodes would provide similar resources to those provided for StorageGRID appliance nodes. Additionally, if the amount of metadata per node exceeds 500 GB, consider increasing the RAM per node to 48 GB or more. For information about managing object metadata storage, increasing the Metadata Reserved Space setting, and monitoring CPU and memory usage, see the instructions for [administering](#), [monitoring](#), and [upgrading](#) StorageGRID.

If hyperthreading is enabled on the underlying physical hosts, you can provide 8 virtual cores (4 physical cores) per node. If hyperthreading is not enabled on the underlying physical hosts, you must provide 8 physical cores per node.

If you are using virtual machines as hosts and have control over the size and number of VMs, you should use a single VM for each StorageGRID node and size the VM accordingly.

For production deployments, you should not run multiple Storage Nodes on the same physical storage hardware or virtual host. Each Storage Node in a single StorageGRID deployment should be in its own isolated failure domain. You can maximize the durability and availability of object data if you ensure that a single hardware failure can only impact a single Storage Node.

See also [Storage and performance requirements](#).

## Storage and performance requirements

You must understand the storage and performance requirements for StorageGRID nodes hosted by virtual machines, so you can provide enough space to support the initial

configuration and future storage expansion.

### Performance requirements

The performance of the OS volume and of the first storage volume significantly impacts the overall performance of the system. Ensure that these provide adequate disk performance in terms of latency, input/output operations per second (IOPS), and throughput.

All StorageGRID nodes require that the OS drive and all storage volumes have write-back caching enabled. The cache must be on a protected or persistent media.

### Requirements for virtual machines that use NetApp ONTAP storage

If you are deploying a StorageGRID node as a virtual machine with storage assigned from a NetApp ONTAP system, you have confirmed that the volume does not have a FabricPool tiering policy enabled. For example, if a StorageGRID node is running as an virtual machine on a VMware host, ensure the volume backing the datastore for the node does not have a FabricPool tiering policy enabled. Disabling FabricPool tiering for volumes used with StorageGRID nodes simplifies troubleshooting and storage operations.



Never use FabricPool to tier any data related to StorageGRID back to StorageGRID itself. Tiering StorageGRID data back to StorageGRID increases troubleshooting and operational complexity.

### Number of virtual machines required

Each StorageGRID site requires a minimum of three Storage Nodes.



In a production deployment, don't run more than one Storage Node on a single virtual machine server. Using a dedicated virtual machine host for each Storage Node provides an isolated failure domain.

Other types of nodes, such as Admin Nodes or Gateway Nodes, can be deployed on the same virtual machine host, or they can be deployed on their own dedicated virtual machine hosts as required. However, if you have multiple nodes of the same type (two Gateway Nodes, for example), don't install all instances on the same virtual machine host.

### Storage requirements by node type

In a production environment, the virtual machines for StorageGRID grid nodes must meet different requirements, depending on the types of nodes.



Disk snapshots can't be used to restore grid nodes. Instead, refer to the [grid node recovery](#) procedures for each type of node.

| Node Type  | Storage                             |
|------------|-------------------------------------|
| Admin Node | 100 GB LUN for OS                   |
|            | 200 GB LUN for Admin Node tables    |
|            | 200 GB LUN for Admin Node audit log |

| Node Type    | Storage   |
|--------------|---|
| Storage Node | <p>100 GB LUN for OS</p> <p>3 LUNs for each Storage Node on this host</p> <p><b>Note:</b> A Storage Node can have 1 to 16 storage LUNs; at least 3 storage LUNs are recommended.</p> <p>Minimum size per LUN: 4 TB</p> <p>Maximum tested LUN size: 39 TB.</p> |
| Gateway Node | 100 GB LUN for OS   |
| Archive Node | 100 GB LUN for OS   |



Depending on the audit level configured, the size of user inputs such as S3 object key name, and how much audit log data you need to preserve, you might need to increase the size of the audit log LUN on each Admin Node. Generally, a grid generates approximately 1 KB of audit data per S3 operation, which would mean that a 200 GB LUN would support 70 million operations per day or 800 operations per second for two to three days.

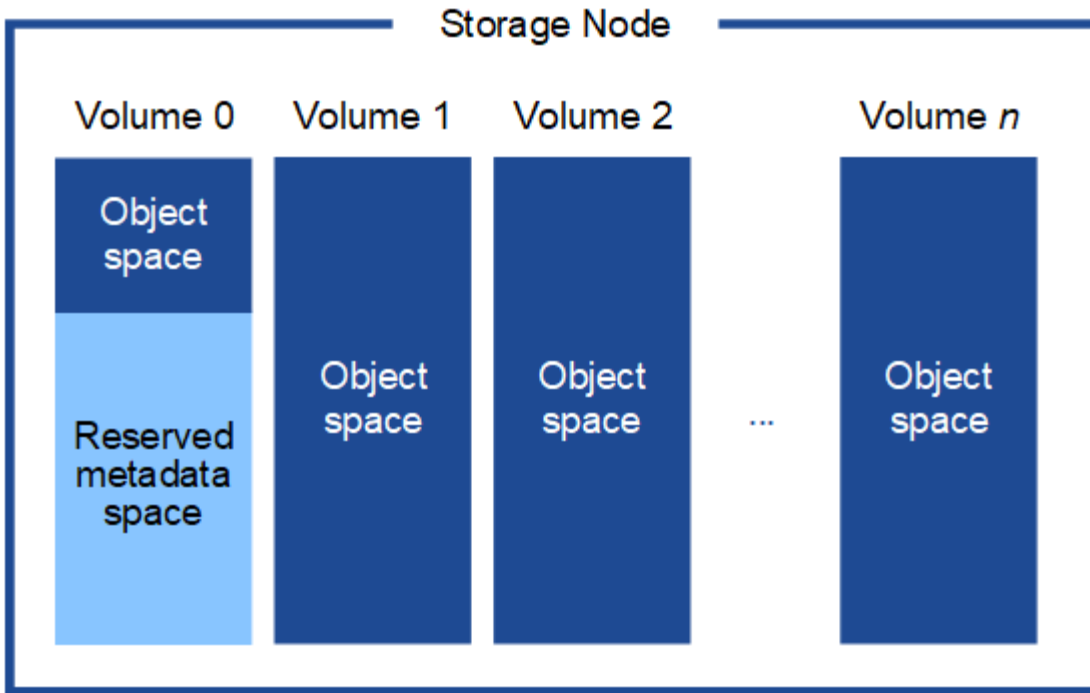
## Storage requirements for Storage Nodes

A software-based Storage Node can have 1 to 16 storage volumes—3 or more storage volumes are recommended. Each storage volume should be 4 TB or larger.



An appliance Storage Node can have up to 48 storage volumes.

As shown in the figure, StorageGRID reserves space for object metadata on storage volume 0 of each Storage Node. Any remaining space on storage volume 0 and any other storage volumes in the Storage Node are used exclusively for object data.



To provide redundancy and to protect object metadata from loss, StorageGRID stores three copies of the metadata for all objects in the system at each site. The three copies of object metadata are evenly distributed across all Storage Nodes at each site.

When you assign space to volume 0 of a new Storage Node, you must ensure there is adequate space for that node's portion of all object metadata.

- At a minimum, you must assign at least 4 TB to volume 0.



If you use only one storage volume for a Storage Node and you assign 4 TB or less to the volume, the Storage Node might enter the Storage Read-Only state on startup and store object metadata only.



If you assign less than 500 GB to volume 0 (non-production use only), 10% of the storage volume's capacity is reserved for metadata.

- If you are installing a new system (StorageGRID 11.6 or higher) and each Storage Node has 128 GB or more of RAM, assign 8 TB or more to volume 0. Using a larger value for volume 0 can increase the space allowed for metadata on each Storage Node.
- When configuring different Storage Nodes for a site, use the same setting for volume 0 if possible. If a site contains Storage Nodes of different sizes, the Storage Node with the smallest volume 0 will determine the metadata capacity of that site.

For details, go to [Manage object metadata storage](#).

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