SAN management with System Manager

ONTAP 9

NetApp
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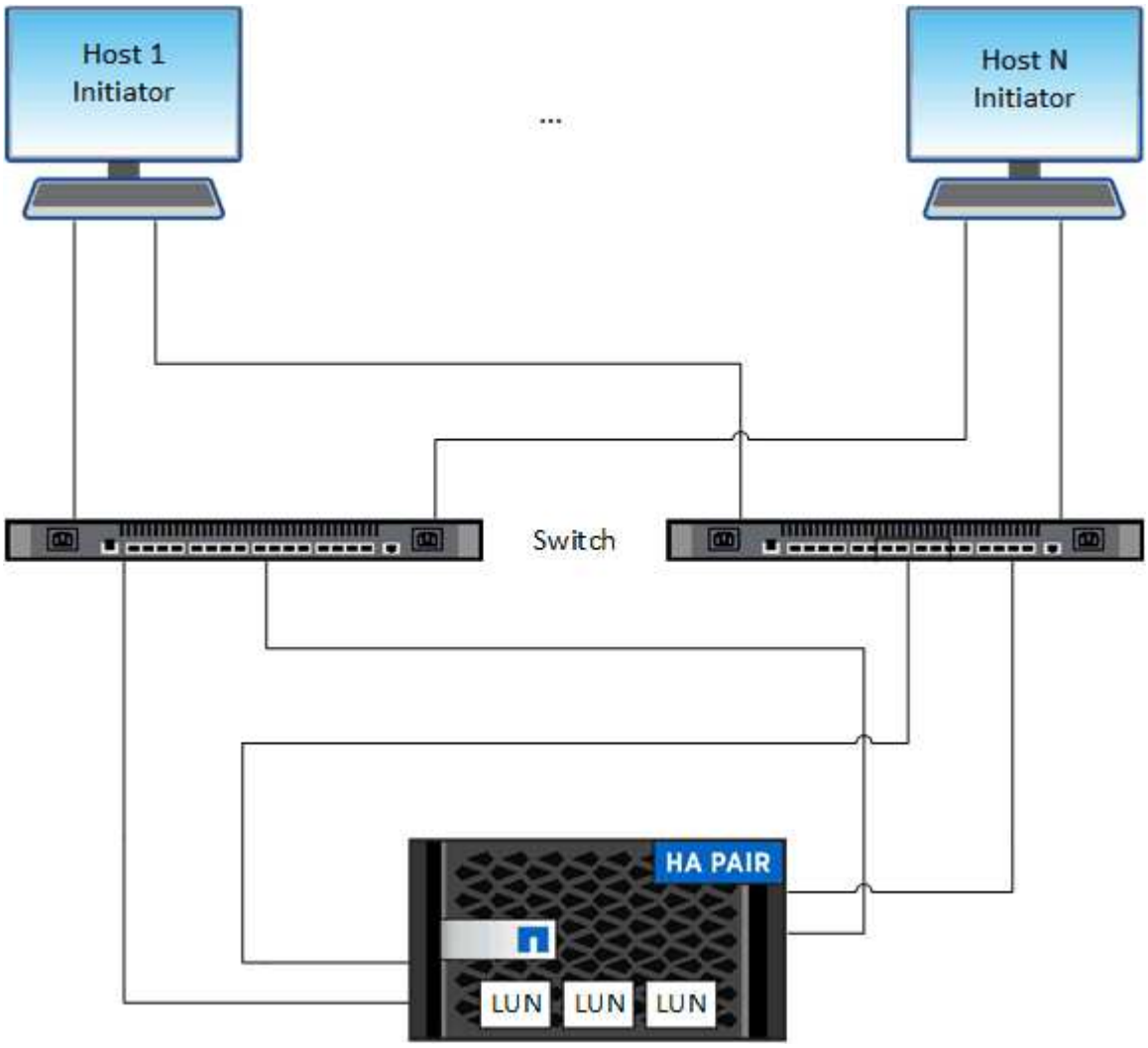
SAN management overview with System Manager

The topics in this section show you how to configure and manage SAN environments with System Manager in ONTAP 9.7 and later releases.

If you are using the classic System Manager (available only in ONTAP 9.7 and earlier), see these topics:

- iSCSI protocol
- FC/FCoE protocol

You can use the iSCSI and FC protocols to provide storage in a SAN environment.



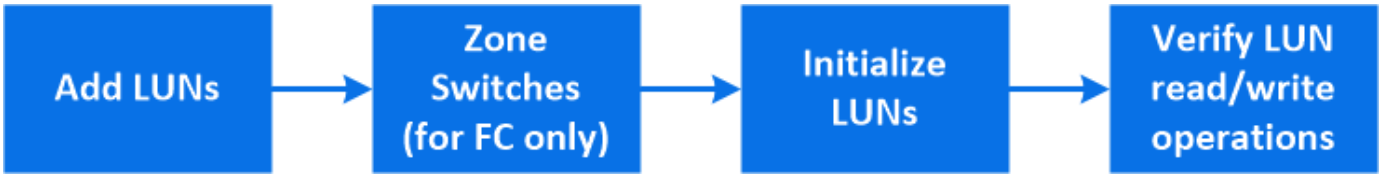
With iSCSI and FC, storage targets are called LUNs (logical units) and are presented to hosts as standard block devices. You create LUNs and then map them to initiator groups (igroups). Initiator groups are tables of FC host WWPs and iSCSI host node names and control which initiators have access to which LUNs.

FC targets connect to the network through FC switches and host-side adapters and are identified by world-wide port names (WWPNs). iSCSI targets connect to the network through standard Ethernet network adapters (NICs), TCP offload engine (TOE) cards with software initiators, converged network adapters (CNAs) or dedicated host bust adapters (HBAs) and are identified by iSCSI qualified names (IQNs).

Provision SAN storage for VMware datastores

Create LUNs to provide storage for an ESXi host using the FC or iSCSI SAN protocol with ONTAP System Manager (9.7 and later). LUNs appear as disks to the ESXi host.

This procedure creates new LUNs on an existing storage VM. Your FC or iSCSI protocol should already be set up.



Beginning with ONTAP 9.8, when you provision storage, QoS is enabled by default. You can disable QoS or choose a custom QoS policy during the provisioning process or at a later time.

When you have completed this procedure, you can manage VMware datastores with Virtual Storage Console (VSC) for VMware vSphere. Beginning with VSC 7.0, VSC is part of the ONTAP Tools for VMware vSphere virtual appliance, which includes VSC, vStorage APIs for Storage Awareness (VASA) Provider, and Storage Replication Adapter (SRA) for VMware vSphere capabilities.

Be sure to check the NetApp Interoperability Matrix to confirm compatibility between your current ONTAP and VSC releases.

To set up SAN protocol access for ESXi hosts to datastores using System Manager Classic (for ONTAP 9.7 and earlier releases), see the following topics:
* FC configuration for ESXi using VSC overview
* iSCSI configuration for ESXi using VSC overview

For more information, see TR-4597: VMware vSphere for ONTAP and the documentation for your VSC release.

Steps

1. In System Manager, click **Storage > LUNs** and then click **Add**.
   a. Enter the required information to create the LUN.
   b. You can click **More Options** to do the following, depending upon your version of ONTAP.

Option	Available beginning with

Assign QoS policy to LUNs instead of parent volume • **More Options > Storage and Optimization** • Select **Performance Service Level**. • To apply the QoS policy to individual LUNs instead of the entire volume, select **Apply these performance limits enforcements to each LUN**. `By default, performance limits are applied at the volume level.`	ONTAP 9.10.1
Create a new initiator group using existing initiator groups • **More Options > HOST INFORMATION** • Select **New initiator group using existing initiator groups**. **NOTE**: The OS type for an igroup containing other igroups cannot be changed after it has been created.	ONTAP 9.9.1
Add a description to your igroup or host initiator The description serves as an alias for the igroup or host initiator. • **More Options > HOST INFORMATION**	ONTAP 9.9.1
Create your LUN on an existing volume By default, a new LUN is created in a new volume. • **More Options > Add LUNs** • Select **Group related LUNs**.	ONTAP 9.9.1
Disable QoS or choose a custom QoS policy • **More Options > Storage and Optimization** • Select **Performance Service Level**. **NOTE**: In ONTAP 9.9.1 and later, if you select a custom QoS policy, you can also select manual placement on a specified local tier.	ONTAP 9.8

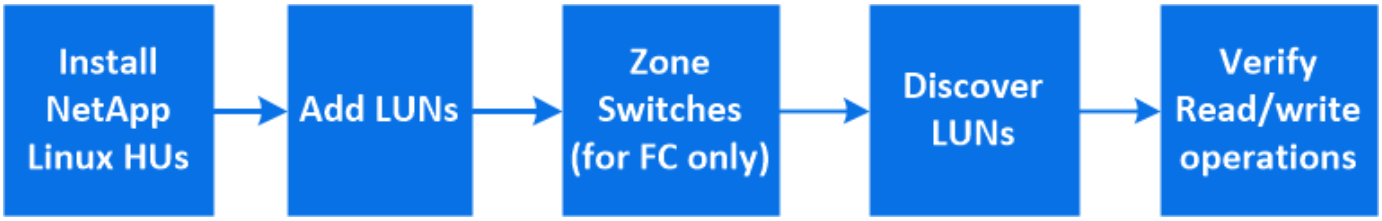
2. For FC, zone your FC switches by WWPN. Use one zone per initiator and include all target ports in each zone.
3. Use Virtual Storage Console (VSC) for VMware vSphere, to discover and initialize the LUN.
4. Verify that the ESXi hosts can write and read data on the LUN.

Provision SAN storage for Linux servers

Create LUNs to provide storage for a Linux server using the FC or iSCSI SAN protocol with ONTAP System Manager, which is available with ONTAP 9.7 and later ONTAP 9 releases.

This procedure creates new LUNs on an existing storage VM. LUNs appear to Linux as SCSI disk devices.

Your FC or iSCSI protocol should already be set up. You need to know the initiator identifiers (FC WWPN or iSCSI iqn) for your Linux server.



Beginning with ONTAP 9.8, when you provision storage, QoS is enabled by default. You can disable QoS or choose a custom QoS policy during the provisioning process or at a later time.

Steps

1. On your Linux server, install the NetApp Linux Host Utilities package.
2. In System Manager, click **Storage > LUNs** and then click **Add**.
   a. Enter the required information to create the LUN.
   b. You can click **More Options** to do the following, depending upon your version of ONTAP.

Option	Available beginning with
Assign QoS policy to LUNs instead of parent volume • **More Options > Storage and Optimization** • Select **Performance Service Level**. • To apply the QoS policy to individual LUNs instead of the entire volume, select **Apply these performance limits enforcements to each LUN**. `By default, performance limits are applied at the volume level.`	ONTAP 9.10.1

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3. For FC, zone your FC switches by WWPN. Use one zone per initiator and include all target ports in each zone.
4. On your Linux server, discover the new LUNs:

   ```
   /usr/bin/rescan-scsi-bus.sh
   ```

   Optionally partition the LUNs and create file systems.

5. Verify the Linux server can write and read data on the LUN.

Related information

If you want additional details about SAN Administration, consult the SAN Administration overview.

Other ways to do this in ONTAP

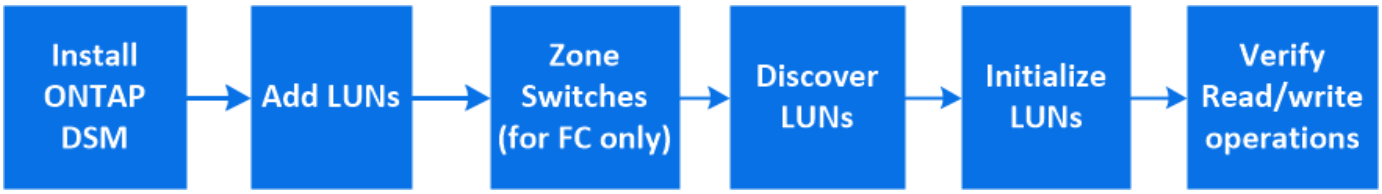
To complete this task using…	Refer to…
System Manager Classic (available with 9.7 and earlier)	iSCSI configuration for Red Hat Enterprise Linux

The ONTAP command line interface (CLI)	LUN setup workflow with the CLI

Provision SAN storage for Windows servers

Create LUNs to provide storage for a Windows server using the FC or iSCSI SAN protocol. LUNs appear as disks to the Windows host.

This procedure creates new LUNs on an existing storage VM. Your FC or iSCSI protocol should already be set up.



Beginning with ONTAP 9.8, when you provision storage, QoS is enabled by default. You can disable QoS or choose a custom QoS policy during the provisioning process or at a later time.

Steps

1. On your Windows server, install the native DSM for Windows MPIO.
2. In System Manager, click **Storage > LUNs** and then click **Add**.
   a. Enter the required information to create the LUN.
   b. You can click **More Options** to do the following, depending upon your version of ONTAP.

Option	Available beginning with
Assign QoS policy to LUNs instead of parent volume • **More Options > Storage and Optimization** • Select **Performance Service Level**. • To apply the QoS policy to individual LUNs instead of the entire volume, select **Apply these performance limits enforcements to each LUN**. `By default, performance limits are applied at the volume level.`	ONTAP 9.10.1
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3. For FC, zone your FC switches by WWPN. Use one zone per initiator and include all target ports in each zone.
4. On your Windows server, discover the new LUN.
5. Initialize the LUN and optionally format it with a file system.
6. Verify the Windows server can write and read data on the LUN.

Related information

If you want additional details about SAN administration, consult the SAN Administration overview.

Other ways to do this in ONTAP

To complete this task using…	Refer to…
System Manager Classic (available with 9.7 and earlier)	iSCSI configuration for Windows overview
The ONTAP command line interface (CLI)	LUN setup workflow with the CLI

Create nested igroup

Beginning with ONTAP 9.9.1, you can create an igroup that consists of other existing igroups.

1. In System Manager, click **Host > SAN Initiator Groups**, and then click **Add**.
2. Enter the igroup **Name** and **Description**.

   The description serves as the igroup alias.

3. Select the **Storage VM** and **Host Operating System**.

   The OS type of a nested igroup cannot be changed after the igroup is created.

4. Under **Initiator Group Members** select **Existing initiator group**.

   You can use **Search** to find and select the initiator groups you want to add.

Map igroups to multiple LUNs

Beginning with ONTAP 9.9.1, you can map igroups to two or more LUNs simultaneously.

1. In System Manager, click **Storage > LUNs**.
2. Select the LUNs you want to map.
3. Click **More**, then click **Map To Initiator Groups**.

The selected igroups are added to the selected LUNs. The pre-existing mappings are not overwritten.

Create and manage portsets

In addition to Selective LUN Map (SLM), you can use portsets to further limit which LIFs can be used by an initiator to access a LUN.

Beginning with ONTAP 9.10.1, you can use System Manager to create portsets and bind them to igroups. You can also use System Manager to change the network interfaces associated with portsets and to delete portsets.

Create a portset and bind to an igroup

If you do not bind a port set to an igroup, then all of the initiators in the igroup can access mapped LUNs through all of the LIFs on the node owning the LUN and the owning node's HA partner.

If you need to create a portset and bind it to an igroup in an ONTAP release earlier than 9.10.1 you must use the ONTAP CLI procedure.

1. In System Manager, click **Network > Overview > Portsets**, and click **Add**.
2. Enter the information for the new portset and click **Add**.
3. Click **Hosts > SAN Initiator Groups**.
4. To bind the portset to a new igroup, click **Add**.

   To bind the portset to an existing igroup, select the igroup, click ⋮, and then click **Edit Initiator Group**.

Change network interfaces associated with a portset

1. In System Manager, click **Network > Overview > Portsets**.
2. Select the portset you want to edit and click ⋮, then select **Edit Portset**.

Delete a portset

1. In System Manager, click **Network > Overview > Portsets**.
2. To delete a single portset, select the portset, click ⋮ and then select **Delete Portsets**.

   To delete multiple portsets, select the portsets, and click **Delete**.

Edit LUN QoS policy group

Beginning with ONTAP 9.10.1, you can use System Manager to assign or remove Quality of Service (QoS) polices on multiple LUNs at the same time.

> ⓘ If the QoS policy is assigned at the volume level, it must be change at the volume level. You can only edit the QoS policy at the LUN level if it was originally assigned at the LUN level.

Steps

1. In System Manager, click **Storage > LUNs**.
2. Select the LUN or LUNs you want to edit.

   If you are editing more than one LUN at a time, the LUNs must belong to the same Storage Virtual Machine (SVM). If you select LUNs that do not belong to the same SVM, the option to edit the QoS Policy Group is not displayed.

3. Click **More** and select **Edit QoS Policy Group**.

Take a LUN offline

Beginning with ONTAP 9.10.1 you can use System Manager to take LUNs offline. Prior to ONTAP 9.10.1, you must use the ONTAP CLI to take LUNs offline.

System Manager Procedure

Steps

1. In System Manager, click **Storage>LUNs**.
2. Take a single LUN or multiple LUNs offline

If you want to…
Do this…
Take a single LUN offline
Next to the LUN name, click ⋮ and select **Take Offline**.
Take multiple LUNs offline
a. Select the LUNs you want to take offline. b. Click **More** and select **Take Offline**.

CLI Procedure

You can only take one LUN offline at a time when using the CLI.

Step

1. Take the LUN offline: `lun offline lun_name -vserver SVM_name`

NVMe storage

Provision NVMe storage

You can use the non-volatile memory express (NVMe) protocol to provide storage in a SAN environment. The NVMe protocol is optimized for performance with solid state storage.

For NVMe, storage targets are called namespaces. An NVMe namespace is a quantity of non-volatile storage that can be formatted into logical blocks and presented to a host as a standard block device. You create namespaces and subsystems, and then map the namespaces to the subsystems, similar to the way LUNs are provisioned and mapped to igroups for FC and iSCSI.

NVMe targets are connected to the network through a standard FC infrastructure using FC switches or a standard TCP infrastructure using Ethernet switches and host-side adapters.

The following NVMe protocols are supported:

Protocol	Beginning with …	Allowed by…
TCP	ONTAP 9.10.1	Default
FCP	ONTAP 9.4	Default

Related information

- Provision NVMe storage for SUSE Linux with System Manager
- Configure an SVM for NVMe with the CLI

Provision NVMe storage for SUSE Linux

Create namespaces to provide storage for a SUSE Linux server using the NVMe protocol. Namespaces appear to Linux as SCSI disk devices.

This procedure creates new namespaces on an existing storage VM. Your storage VM must be configured for NVME, and your FC or TCP transport should already be set up.

Beginning with ONTAP 9.8, when you provision storage, QoS is enabled by default. You can disable QoS or choose a custom QoS policy during the provisioning process or at a later time.

Steps

1. In System Manager, click **Storage > NVMe Namespaces** and then click **Add**.

   If you need to create a new subsystem, click **More Options**.

   a. If you are running ONTAP 9.8 or later and you want to disable QoS or choose a custom QoS policy, click **More Options** and then, under **Storage and Optimization** select **Performance Service Level**.

1. Zone your FC switches by WWPN. Use one zone per initiator and include all target ports in each zone.
2. On your Linux server, discover the new namespaces.
3. Initialize the namespace and format it with a file system.
4. Verify the Linux server can write and read data on the namespace.

Resizing a namespace

Beginning with ONTAP 9.10.1, you can use the ONTAP CLI to increase or decrease the size of a NVMe namespace. You can use System Manager to increase the size of a NVMe namespace.

Increase the size of a namespace

Using System Manager	Using the CLI
1. Click **Storage > NVMe Namespaces**. 2. Hoover over the namespace you want to increase, click ⋮, and then click **Edit**. 3. Under **CAPACITY**, change the size of the namespace.	1. Enter the following command: `vserver nvme namespace modify -vserver` *`SVM_name`* `-path` *`path`* `-size` *`new_size_of_namespace`*

Decrease the size of a namespace

You must use the ONTAP CLI to decrease the size of a NVMe namespace.

1. Change the privilege setting to advanced:

   ```
   set -privilege advanced
   ```

2. Decrease the size of the namespace:

   ```
   vserver nvme namespace modify -vserver SVM_name -path namespace_path -size
   new_size_of_namespace
   ```

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