



Configure datastores

ONTAP tools for VMware vSphere 9.12

NetApp
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Configure datastores

Provision traditional datastores

Provisioning a datastore creates a logical container for your virtual machines and their virtual machine disks (VMDKs). You can provision a datastore, and then attach the datastore to a single host, to all of the hosts in a cluster, or to all of the hosts in a datacenter.

What you will need

- To provision a datastore on an SVM that is directly connected to ONTAP tools, you must have added the SVM to ONTAP tools by using a user account that has the appropriate privileges, not the default vsadmin user account or vsadmin role.

You can also provision a datastore by adding a cluster.

- You must ensure that the subnet details of all the networks to which the ESXi host is connected is entered in the kaminoprefs.xml.

See "Enabling datastore mounting across different subnets".

- If you use NFS or iSCSI, and the subnet is different between your ESXi hosts and your storage system, then the NFS or iSCSI settings in the kaminoprefs preferences file must include ESXi host subnet masks.

This preference file is also applicable to vVols datastore creation. See *Enable datastore mounting across different subnets* and *Configure the ONTAP tools preferences files* for more information.

- If you have enabled VASA Provider and you want to specify storage capability profiles for your NFS datastores or VMFS datastores, then you must have created one or more storage capability profiles.
- To create an NFSv4.1 datastore, you must have enabled NFSv4.1 at the SVM level.

The **Provision Datastore** option enables you to specify a storage capability profile for the datastore. Storage capability profiles help in specifying consistent service level objectives (SLOs) and simplify the provisioning process. You can specify a storage capability profile only if you have enabled VASA Provider. The ONTAP tools for VMware vSphere supports the following protocols:

- NFSv3 and NFSv4.1
- VMFS5 and VMFS6
- From vSphere 8.0 release, NVMe/FC protocol is supported.

ONTAP tools can create a datastore on either an NFS volume or a LUN:

- For an NFS datastore, ONTAP tools creates an NFS volume on the storage system, and then updates the export policies.
- For a VMFS datastore, ONTAP tools creates a new volume (or uses an existing volume, if you selected that option), and then creates a LUN and an igroup.

- ONTAP tools supports provisioning of VMFS5 and VMFS6 datastores up to the maximum VMFS LUN and volume size of 64TB when used with ASA and approved AFF systems running ONTAP 9.8 and later.



On other platforms the maximum LUN size supported is 16TB.

- VMware does not support NFSv4.1 with datastore clusters.

- For Kerberos authentication, you will need the following:

- Windows machine with Active Directory (AD)
- Domain Name Server (DNS)
- Key Distribution Center (KDC)
- ONTAP Storage System (Cluster) with Kerberos configured
- ESXi host with Kerberos configured

If a storage capability profile is not specified during provisioning, you can later use the Storage Mapping page to map a datastore to a storage capability profile. You can apply storage QoS settings, throughput ceiling (Max IOPS) and throughput floor (Min IOPS) on data VMDK files of virtual machines provisioned on FlexGroup backed datastore. QoS settings can be applied either at datastore level or at individual virtual machine level by right clicking the datastore. The right click option is available only on those datastores or virtual machines that are backed by FlexGroup datastore. After the QoS is applied to a datastore, any pre-existing datastore or virtual machine QoS settings are overridden. QoS settings cannot be applied at a datastore level or at a virtual machine level for datastores that are provisioned on direct SVM's, because ONTAP does not support QoS at SVM management level.

Steps

1. You can access the datastore provisioning wizard using one of the following:

If you select from ...	Perform the following...
vSphere Client home page	<ol style="list-style-type: none"> Click Hosts and Clusters. In the navigation pane, select the datacenter on which you want to provision the datastore. To specify the hosts to mount the datastore, see the next step.
ONTAP tools home page	<ol style="list-style-type: none"> Click Overview. Click Getting Started tab. Click Provision button. Click Browse to select the destination to provision the datastore as per the next step.

2. Specify the hosts on which you want to mount the datastore.

To make the datastore available to...	Do this...
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All of the hosts in a datacenter	Right-click a datacenter, and then select NetApp ONTAP tools > Provision Datastore .
All of the hosts in a cluster	Right-click a host cluster, and then select NetApp ONTAP tools > Provision Datastore .
A single host	Right-click a host, and select NetApp ONTAP tools > Provision Datastore .

3. Complete the fields in the New Datastore dialog box to create the datastore.

Most of the fields in the dialog box are self-explanatory. The following table describes some of the fields for which you might require guidance.

Section	Description
General	<p>The General section of the New Datastore provisioning dialog box provides options to enter the destination, name, size, type, and protocol for the new datastore.</p> <p>You can select either NFS, VMFS, or vVols type to configure a datastore. When you select vVols type, NVMe/FC protocol becomes available.</p> <p> NVMe/FC protocol is supported for ONTAP 9.91P3 and later releases.</p> <ul style="list-style-type: none"> • NFS: You can provision NFS datastore using either NFS3 or NFS4.1 protocols. <p>You can select the option Distribute datastore data across the ONTAP cluster to provision a FlexGroup volume on the storage system. Selecting this option automatically deselects the checkbox Use Storage Capability Profile for provisioning.</p> <ul style="list-style-type: none"> • VMFS: You can provision VMFS datastore of file system type VMFS5 or VMFS6 using either iSCSI or FC/FCoE protocols. <p> If VASA Provider is enabled, then you can choose to use the storage capability profiles.</p>

Kerberos authentication	<p>If you have selected NFS 4.1 in the General page, select the security level.</p> <p>Kerberos authentication is supported only for Flexvols.</p>
Storage system	<p>You can select one of the listed storage capability profiles if you have selected the option in the General section.</p> <ul style="list-style-type: none"> • If you are provisioning a FlexGroup datastore, then the storage capability profile for this datastore is not supported. The system-recommended values for the storage system and storage virtual machine are populated for ease. But you can modify the values if required. • For Kerberos authentication, the storage systems enabled for Kerberos are listed.
Storage attributes	<p>By default, ONTAP tools populates the recommended values for Aggregates and Volumes options. You can customize the values based on your requirements. Aggregate selection is not supported for FlexGroup datastores as ONTAP manages the aggregate selection.</p> <p>The Space reserve option available under Advanced menu is also populated to give optimum results.</p> <p>(Optional) You can specify the initiator group name in the Change initiator group name field.</p> <ul style="list-style-type: none"> • A new initiator group will be created with this name if one does not already exist. • The protocol name will be appended to the specified initiator group name. • If an existing igroup is found with the selected initiators, the igroup will be renamed with the provided name and will be reused. • If you do not specify an igroup name, igroup will be created with the default name.
Summary	<p>You can review the summary of the parameters you specified for the new datastore.</p> <p>The field “Volume Style” enables you to differentiate the type of datastore created. The “Volume Style” can be either “FlexVol” or “FlexGroup”.</p>



A FlexGroup that is part of a traditional datastore cannot shrink below the existing size but can grow by 120% maximum. Default snapshots are enabled on these FlexGroup volumes.

4. In the Summary section, click **Finish**.

Related information

[Datastore inaccessible when volume status is changed to offline](#)

[ONTAP support for Kerberos](#)

[Requirements for configuring Kerberos with NFS](#)

[Manage Kerberos realm services with System Manager - ONTAP 9.7 and earlier](#)

[Enable Kerberos on a data LIF](#)

[Configure ESXi Hosts for Kerberos Authentication](#)

Map datastores to storage capability profiles

You can map the datastores that are associated with VASA Provider for ONTAP to storage capability profiles. You can assign a profile to a datastore that is not associated with a storage capability profile.

What you will need

- You must have registered your VASA Provider instance with ONTAP® tools for VMware vSphere.
- ONTAP tools must have already discovered your storage.

You can map traditional datastore with a storage capability profile or change the storage capability profile that is associated with a datastore. VASA Provider does *not* display any virtual volume (VVol) datastores on the Storage Mappings page. All the datastores that are referred to in this task are traditional datastores.

Steps

1. From the ONTAP tools Home page, click **Storage Mapping**.

From the Storage Mapping page, you can determine the following information:

- The vCenter Server that is associated with the datastore
- How many profiles match the datastore

The Storage Mapping page displays only traditional datastores. This page does not display any VVol datastores or qtree datastores.

- Whether the datastore is currently associated with a profile

A datastore can match multiple profiles, but a datastore can be associated with only one profile.

- Whether the datastore is compliant with the profile that is associated with it

2. To map a storage capability profile to a datastore or to change the existing profile of a datastore, select the

datastore.

To locate specific datastores or other information on the Storage Mapping page, you can enter a name or a partial string in the search box. ONTAP tools displays the search results in a dialog box. To return to the full display, you should remove the text from the search box, and then click **Enter**.

3. From the Actions menu, select **Assign matching profile**.
4. Select the profile that you want to map to the datastore from the list of matching profiles that is provided in the **Assign profile to datastore** dialog box, and then click **OK** to map the selected profile to the datastore.
5. Refresh the screen to verify the new assignment.

Assign QoS policies

The provisioning of FlexGroup datastores does not support assigning storage capability profiles to the datastores. But you can assign QoS policies to virtual machines that are created on FlexGroup backed datastores.

About this task

The QoS policies can be applied either at a virtual machine level or a datastore level. The QoS policies are required for a datastore to configure throughput (Max and Min IOPS) thresholds. When you set QoS on a datastore it is applied to the virtual machines residing on the datastore and not on the FlexGroup volume. But if you set QoS on all the virtual machines in a datastore, then any individual QoS settings for the virtual machines are overridden. This is applicable only to the virtual machines available in the datastore and not to any migrated or added virtual machines. If you want to apply QoS to newly added or migrated virtual machines of a particular datastore, then you have to manually set the QoS values.



You cannot apply QoS settings at a datastore or virtual machine level for datastores that are provisioned on direct storage VM's because ONTAP does not support QoS at storage VM management level.

Steps

1. On the ONTAP tools homepage, click **Menu > Host and Clusters**.
2. Right-click the required datastore or virtual machine and click **NetApp ONTAP tools > Assign QoS**.
3. In the Assign QoS dialog box, enter values the required IOPS values, and click **Apply**.

Verify datastore compliance with the mapped storage capability profile

You can quickly verify whether your datastores are compliant with the storage capability profiles that are mapped to the datastores.

What you will need

- You must have registered your VASA Provider instance with ONTAP® tools for VMware vSphere (VSC).
- VSC must have discovered your storage.

Steps

1. From the ONTAP tools Home page, click **Storage Mapping**.
2. Review the information in the Compliance Status column to identify non-compliant datastores and review the alerts for non-compliance reason.



When you click the **COMPLIANCE CHECK** button, VSC performs a rediscovery operation for all of the storage, which might take few minutes.

If a datastore is no longer compliant with its profile, then the Compliance Status column displays an alert stating the reason for non-compliance. For example, a profile might require compression. If that setting has been changed on the storage, compression is no longer used, and the datastore is non-compliant.

When you discover a datastore that is not compliant with its profile, you can modify the settings on the volume backing the datastore to make the datastore compliant, or you can assign a new profile to the datastore.

You can modify the settings from the Storage Capability Profile page.

Provision vVols datastores

You can provision a vVols datastore using the Provision Datastore wizard only if VASA Provider is enabled in your ONTAP tools.

What you will need

- You should ensure that the subnet details of all the networks to which the ESXi host is connected is entered in the Kaminoprefs.xml.

See **Enabling datastore mounting across different subnets** section.

- You should configure similar replication policy and schedule on the datastores at both the source and target sites for reverse replication to be successful.

The Provision datastore menu enables you to specify a storage capability profile for the datastore, which helps in specifying consistent service level objectives (SLOs) and simplifies the provisioning process. You can specify a storage capability profile only if you have enabled VASA Provider.

FlexVol volumes that are used as backing storage are displayed on the vVols dashboard only if they are running ONTAP 9.5 or later. You should not use the vCenter Server New Datastore wizard to provision vVols datastores.

- You must use cluster credentials to create vVols datastores.

You cannot use SVM credentials to create vVols datastores.

- VASA Provider does not support the cloning of a virtual machine that is hosted on the vVols datastore of one protocol to another datastore with a different protocol.
- You should have completed cluster pairing and SVM pairing both on the source and destination sites.

About this task



The 9.10 release of ONTAP tools supports creating vVols datastores with vmdk size greater than 16TB for All SAN Array (ASA) type ONTAP 9.9.1 or later storage platforms.

Steps

1. From the vSphere Client home page, click **Hosts and Clusters**.
2. In the navigation pane, select the datacenter on which you want to provision the datastore.
3. Specify the hosts on which you want to mount the datastore.

To make the datastore available to...	Do this...
All of the hosts in a datacenter	Right-click a datacenter, and then select NetApp ONTAP tools > Provision Datastore .
All of the hosts in a cluster	Right-click a cluster, and then select NetApp ONTAP tools > Provision Datastore .
A single host	Right-click a host, and then select NetApp ONTAP tools > Provision Datastore .

4. Complete the fields in the New Datastore dialog box to create the datastore.

Most of the fields in the dialog box are self-explanatory. The following table describes some of the fields for which you might require guidance.

Section	Description
General	<p>The General section of the New Datastore dialog box provides options to enter the location, name, description, type, and protocol for the new datastore. The vVols datastore type is used to configure a vVols datastore.</p> <p>You can provision the vVols datastore if VASA provider capability is enabled. See, Enable VASA Provider for configuring virtual datastores for details. The vVols datastore supports NFS, iSCSI, FC/FEoE, and NVMe/FC protocols.</p> <p> NVMe/FC protocol for vVols datastore is available if ONTAP tools is registered with vCenter 8.0 and later, and if the ONTAP version is ONTAP 9.91P3 and later.</p> <p> If you are provisioning iSCSI vVols datastore for vVols replication, then before creating vVols datastore at the target site, you need to perform SnapMirror update and cluster rediscovery.</p>

<p>Storage system</p>	<p>This section enables you to select whether you want the vVols datastore to have either replication enabled or disabled. Only asynchronous type replication profile is allowed for this release. You can then select one or more storage capability profiles listed. The system recommended values of paired Storage system and Storage VM are populated automatically. The recommended values are populated only if they are paired in ONTAP. You can modify these values if required.</p> <p>Note: While creating FlexVol volumes in ONTAP, you should ensure to create them with the attributes you wish to select in the storage capability profile. Both read write and data protection FlexVol volumes should have similar attributes.</p> <p>After FlexVol volumes are created and SnapMirror is initialized in ONTAP, you should run a storage rediscovery in VSC to be able to see the new volumes.</p>
<p>Storage attributes</p>	<p>You should select the schedule for SnapMirror and the required FlexVol volume from the existing list. This schedule should be similar to the one selected in the VM Storage Policies page. The user should have created FlexVol volumes on ONTAP with SnapMirror that are listed. You can select the default storage capability profile to be used for creating vVols using the Default storage capability profile option. By default all the volumes are set to maximum Autogrow size to 120 % and default Snapshots are enabled on these volumes.</p> <p>Note:</p> <ul style="list-style-type: none"> • A FlexVol volume that is part of a vVols datastore cannot shrink below the existing size but can grow by 120% maximum. Default snapshots are enabled on this FlexVol volume. • The minimum size of FlexVol volume that you should create is 5GB.

5. In the Summary section, click **Finish**.

Result

A Replication group is created in the backend when a vVols datastore is configured.

Related information

[Analyze performance data using the vVols dashboard](#)

Rebalance vVols datastores

ONTAP tools supports a command to rebalance FlexVol volumes in your datacenter. The main goal is to enable even space utilization among FlexVol volumes. ONTAP tools redistributes vVols among existing volumes based on space usage, thin provisioning, LUN count, and storage capability profiles.

The rebalancing of vVols datastore is performed by LUN move or file move. The criteria considered during vVols rebalancing are as follows:

- NFS vVol datastores are not supported
- Existing FlexVol volumes will not be resized and neither will new FlexVol volumes be added
- Only FlexVol volumes that have same storage capability or volume attributes are rebalanced
- FlexVol volumes with highest space utilization are considered for rebalancing
- All vVols associated with a virtual machine are moved to the same FlexVol volumes
- LUN and File count limit is retained
- Rebalance is not performed if the delta between the FlexVol volumes space utilization is 10%

The rebalance command removes empty FlexVol volumes to provide space for other datastores. Thus, the command enables you to remove unwanted FlexVol volumes so that they can be removed from the datastore. The command intends to move all the vVols associated with a virtual machine to same FlexVol volume. There is a precheck performed by the command before rebalance is started to minimize failures. But even with successful precheck, the rebalance operation might fail for one or more vVols. When this happens, then there is no rollback of the rebalance operation. So, vVols associated with a virtual machine might be placed on different FlexVol volumes and will result in warning logs.

- Parallel datastore and virtual machine operations are not supported.
- You must perform cluster rediscovery operation after every vVols rebalance operation completes.
- During vVols rebalance operation, if large number of vVols datastores are identified, then the transfer operation times out after the set default value.
 - If this occurs, then you should modify the `vvol.properties` file to set the value to `offtap.operation.timeout.period.seconds=29700` and restart VASA Provider service.
- If a FlexVol volume has Snapshots, then during the vVols rebalance operation, the vVols are not correctly rebalanced due to insufficient details on the space utilization.
- You can set the VASA Provider property `enable.update.vvol.through.discovery` to true to get consistent data between ONTAP tools and ONTAP, when timeout occurs during container rebalance operation.

Delete vVols datastores

Delete vVOL datastore task from ONTAP tools in the VCenter does the following:

- Unmounts the vVol container.
- Cleans up Igroup. If igroup is not in use, removes iqn from igroup.

- Deletes Vvol container.
- Leaves the Flex volumes on the storage array.

Follow the steps below to delete vVOL datastore from ONTAP Tools from the vCenter:

Steps:

1. From the Inventory **view** select the datastore.
2. Right click on the vVol datastore and select **NetApp Ontap tools > Delete vVols datastore**.
3. Clean up the Flex volumes at the Storage array and the igroup.

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