Virtual Storage Console, VASA Provider, and Storage Replication Adapter for VMware® vSphere

Administration Guide

For 9.6 Release

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Contents

Deciding whether to use this guide

You can use this guide to quickly find information about tasks involving provisioning and optimizing storage and monitoring datastores and virtual machines.

The information in this guide is for the VSC user, not the system administrator. This guide provides information about all post-deployment tasks for the VSC, VASA Provider, and SRA.

Requirements for using this guide

This guide is based on the following assumptions:

- You have installed and configured VSC.
- The features that you need for the tasks you are performing have been installed.
  These features might include the NFS Plug-in for VMware VAAI, the VASA Provider for ONTAP, and Storage Replication Adapter.
- VSC has discovered all the storage systems that you are using.
- Role-based access control (RBAC) for both vCenter Server and ONTAP has been set up.
  If you do not have all of the necessary privileges and permissions, the task you are performing might appear to work as you go through the wizard, but still fail to complete successfully.

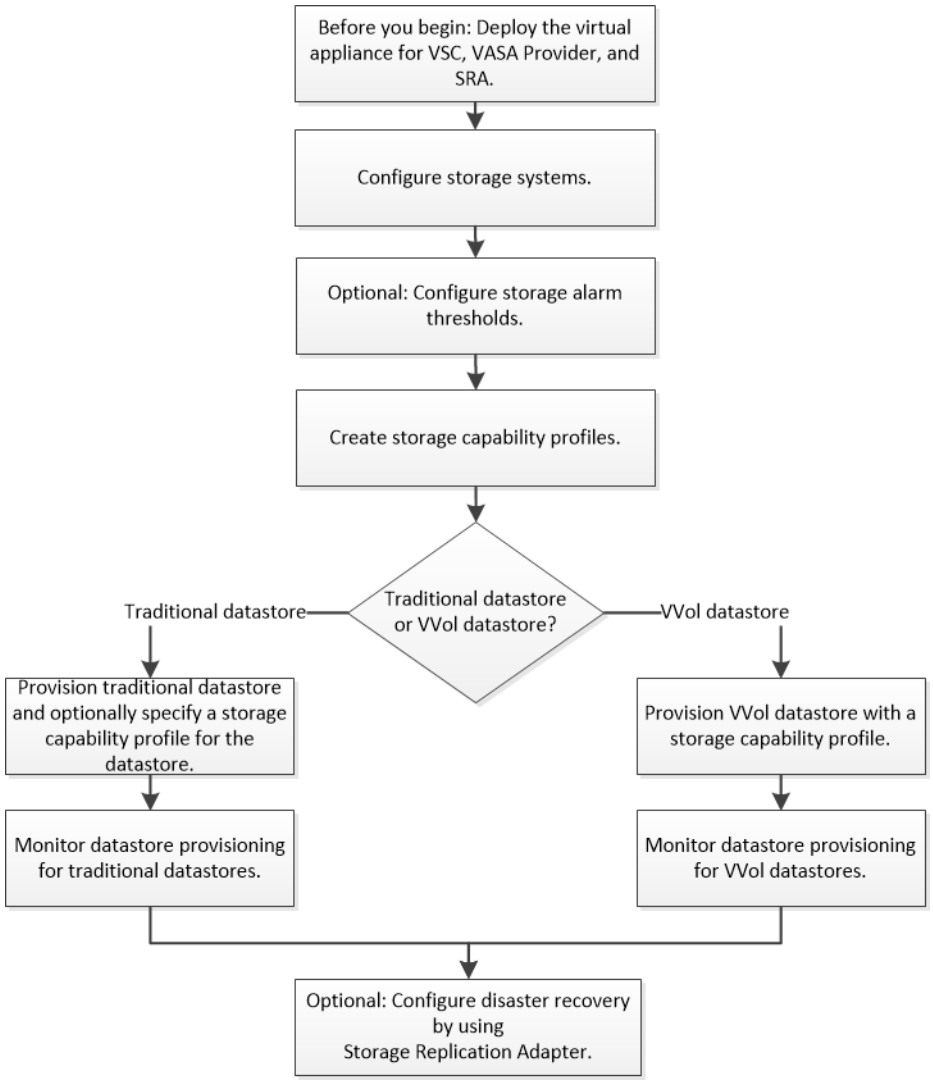
Most of the tasks presented in this guide also require that only one operation at a time be performed on the target datastore or virtual machine.

If you have questions about VSC or want share information with other VSC users, you can go to the NetApp Communities Forum.

NetApp Community: Virtual Storage Console for VMware vSphere

Workflow for configuring the virtual appliance for VSC, VASA Provider, and SRA

Configuring the virtual machine for VSC, VASA Provider, and SRA involves configuring your storage systems, creating a storage capability profile, provisioning the datastore, and optionally configuring SRA for disaster recovery.



Configuring storage systems for VSC, VASA Provider, and SRA

You should add storage systems to the virtual appliance and set default credentials, if required, by using the VSC interface.

Adding storage systems to VSC

You can manually add storage system to Virtual Storage Console (VSC). If you have a large number of storage systems, manually adding a new storage system might be faster than using the **REDISCOVER ALL** option to discover the storage system.

About this task

Each time you start Virtual Storage Console (VSC) or select the **REDISCOVER All** option, VSC automatically discovers the available storage systems. Alternatively, you can manually add storage systems to VSC.

Steps

1. Add a storage system to VSC by using the VSC home page:
   - Click **Storage Systems > Add**.
   - Click **Overview > Getting Started**, and then click **ADD** button under Add Storage System.
2. In the **Add Storage System** dialog box, enter the management IP address and credentials for that storage system.

   You can also add storage systems using the IPv6 address of the cluster or SVM. You can also change the defaults for TLS and the port number in this dialog box.

   When you add storage from the VSC Storage System page, you must also specify the vCenter Server instance where the storage will be located. The Add Storage System dialog box provides a drop-down list of the available vCenter Server instances. VSC does not display this option if you are adding storage to a datacenter that is already associated with a vCenter Server instance.
3. Click **OK** after you have added all of the required information.

Setting default credentials for storage systems

You can use Virtual Storage Console for VMware vSphere to set default credentials for a storage system in your vCenter Server.

Before you begin

You must have selected the vCenter Server that you want to use for creating default credentials.

About this task

If you set up default credentials for storage systems, Virtual Storage Console (VSC) uses these credentials to log in to a storage system that VSC has just discovered. If the default credentials do not work, you must manually log in to the storage system. VSC and SRA support addition of storage system credentials at the cluster level or the SVM level. But VASA Provider will only work with cluster level credentials.

Steps

1. In the VSC **Home** page, click **Settings > Administrative Settings > Configure Default Credentials for Storage System**.
2. In the **Storage System Default Credentials** dialog box, enter the user name and password for the storage system.

   Storage controller credentials are assigned in ONTAP based on the user name and password pair. The storage controller credentials can be the administrator account or a custom account that uses role-based access control (RBAC).

   You cannot use VSC to change the roles that are associated with the user name and password pair of the storage controller. To change the storage controller credentials, you must use a tool such as RBAC User Creator for ONTAP.
3. Click **OK** to save the default credentials.

After you finish

If you updated the storage system credentials because a storage system reported "Authentication Failure" status, you should click the **REDISCOVER ALL** option available in the Storage Systems page. When you do this, VSC tries to connect to the storage system by using the new credentials.

Configuring alarm thresholds

You can use VSC to set alarms to notify you when volume thresholds and aggregate thresholds reach the set limits.

Steps

1. From the Virtual Storage Console **Home** page, click **Settings**.
2. Click **Unified Appliance Settings**.
3. Specify the percent values for the **Nearly full threshold (%)** field and the **Full threshold (%)** field for both the volume alarm thresholds and the aggregate alarm thresholds.

   While setting the values, you must keep the following information in mind:

   - Clicking **Reset** resets the thresholds to the previous values.
     Clicking **Reset** does not reset the thresholds to the default values of 80 percent for "Nearly full" and 90 percent for "Full".
   - There are two ways to set the values:
     - You can use the up and down arrows next to the values to adjust the threshold values.
     - You can slide the arrows on the track bar below the values to adjust the threshold values.
   - The lowest value that you can set for the **Full threshold (%)** field for volumes and aggregates is 6 percent.
4. After specifying the required values, click **Apply**.

   You must click **Apply** for both volume alarm and aggregate alarm.

Creating storage capability profiles

VASA Provider for ONTAP allows you to create storage capability profiles and map them to your storage. This helps you maintain consistency across the storage. You can also use VASA Provider to check for compliance between the storage and the storage capability profiles.

What storage capabilities are

A storage capability is a set of storage system attributes that identifies a specific level of storage performance , storage efficiency, and other capabilities such as encryption for the storage object that is associated with the storage capability.

For traditional datastores, you can use a storage capability profile to create datastores consistently with common attributes, and assign QoS policy to them. During provisioning VSC displays clusters, SVMs, and aggregates that match the storage capability profile. You can generate a storage capability profile from existing traditional datastores by using the **GLOBAL AUTO-GENERATE PROFILES** option from the Storage Mapping menu. After the profile is created, you can use VSC to monitor the compliance of datastores with the profile.

When used with VVol datastores, the provisioning wizard can use multiple storage capability profiles to create different FlexVol volumes in thedatastore. You can use the VM storage policy to automatically create VVols for a virtual machine in appropriate FlexVol volumes as defined. For example, you can create profiles for common storage classes (such as for performance limits and other capabilities like encryption or FabricPool). You can later create VM storage policies in vCenter Server representing business classes of virtual machines: Production, Test, HR, and link these to the appropriate storage capability profile by name.

When used with VVols, the storage capability profile is also used to set the storage performance for the individual virtual machine and place it on the FlexVol volume in the VVol datastore that best satisfies the performance requirement. You can specify QoS policy with minimum and/or maximum IOPS for performance. You can use the default policies when you initially provision a virtual machine, or change your VM storage policy later if your business requirements change.

The vCenter Server then associates the storage capability of a LUN or volume with the datastore that is provisioned on that LUN or volume. This enables you to provision a virtual machine in a datastore that matches the storage profile of the virtual machine and to ensure that all of the datastores in a datastore cluster have the same storage service levels.

With the virtual appliance for Virtual Storage Console (VSC), VASA Provider, and Storage Replication Adapter (SRA), you can configure every virtual volume (VVol) datastore with a new storage capability profile that supports the provisioning of virtual machines with varying IOPS requirements on the same VVol datastore. While executing the VM provisioning workflow with IOPS requirement, all of the VVol datastores are listed in the compatible datastore list.

Note: When you try to provision or modify virtual machines for vCenter Server earlier than 6.5, only the VVol datastores that contain storage capability profiles with performance set to “MAX_IOPS” are listed in the compatible datastore list. The remaining VVol datastores are listed in the incompatible datastore list. You can ignore this classification and select any VVol datastore from the incompatible datastore list to provision or modify the virtual machine.

Considerations for creating and editing storage capability profiles

You should be aware of the considerations for creating and editing storage capability profiles.

- You can configure Min IOPS only on AFF systems.
- You can configure QoS metrics at a virtual volume (VVol) datastore level.
  This capability provides greater flexibility in assigning varied QoS metrics for different VMDKs of the same virtual machine that is provisioned on a virtual datastore.
- You can configure storage capability profiles for both FAS and AFF datastores.
  For FAS systems, you can configure space reserve to be either thick or thin, but for AFF systems, space reserve can only be configured to thin.
- You can use storage capability profiles to provide encryption for your datastores.
- You cannot modify existing storage capability profiles after upgrading from an earlier version of the virtual appliance for Virtual Storage Console (VSC), VASA Provider, and Storage Replication Adapter (SRA) to the latest version of the virtual appliance for VSC, VASA Provider, and SRA.
  The legacy storage capability profiles are retained for backward compatibility. If the default templates are not in use, then during the upgrade to the latest version of the virtual appliance for VSC, VASA Provider, and SRA, the existing templates are overridden to reflect the new QoS metrics related to the performance of the storage capability profiles.
- You cannot modify or use the legacy storage capability profiles to provision new virtual datastores or VM storage policies.
- You must use new storage capability profiles for all new datastores.

Configuring storage capability profiles

You can use VSC to manually create storage capability profiles, automatically generate a profile based on the capabilities of a datastore, or modify a profile to meet your requirements.

Before you begin

You must have registered your VASA Provider instance with Virtual Storage Console for VMware vSphere.

About this task

After setting up a profile, you can edit the profile as required.

Steps

1. On the Virtual Storage Console (VSC) **Home** page, click **Storage Capability Profiles**.
2. Create a profile or edit an existing profile, as required:

If you want to…	Do this…
Create a profile	Click  .
Edit an existing profile	Click the profile that you want to modify from the profiles listed on the Storage Capability Profiles page.

Note:

- To view the values that are associated with an existing profile, you can click the profile name in the Storage Capabilities Profile page. VASA Provider then displays the Summary page for that profile.
- You cannot modify any existing storage capability profiles that were created before the 9.6 virtual appliance for VSC, VASA Provider, and SRA.

3. Complete the pages in the **Create Storage Capability Profile** wizard to set up a profile or to edit values to modify an existing profile.

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

Field	Explanation
Identifying multiple profiles	You can use the **Description** field on the Name and Description tab to describe the purpose of the storage capability profile. Providing a good description is useful because it is a good practice to set up different profiles based on the applications that are being used. For example, a business-critical application requires a profile with capabilities that support higher performance, such as an AFF platform. A datastore that is used for testing or training might use a profile with a lower performance FAS platform, and enable all of the storage efficiency capabilities and tiering to control costs. If you have enabled “linked” mode for your vCenter Servers, then you must select the vCenter Server for which you are creating the storage capability profile.
Platform	You can select your storage system to have either the AFF or FAS platform type. The options on the subsequent screens are updated based on your selection of the type of storage system.
Performance	You can set traditional QoS policies for your storage system by using the Performance tab. • When you select **None**, a QoS policy with no limit (infinite) is applied to a data VVol. • When you select **QoS Policy Group**, then a traditional QoS policy is applied to a VVol. You can set the value for **Max IOPS** and **Min IOPS** which enables you to use the QoS functionality. If you select Infinite IOPS, the Max IOPS field is disabled. When applied for a traditional datastore, a QoS policy with “Max IOPS” value is created and assigned to a FlexVol volume. When used with a VVol datastore, a QoS policy with Max IOPS and Min IOPS values is created for each data VVol. **Note:** ◦ Max IOPS and Min IOPS can also be applied to the FlexVol volume for a traditional datastore. ◦ You must ensure that the performance metrics are not also set separately at an storage virtual machine (SVM) level, an aggregate level, or a FlexVol volume level.

Field	Explanation
Storage Attributes	The storage attributes that you can enable in this tab depend on the storage type that you select in the Personality tab. • If you select FAS storage, you can configure space reserve (thick or thin), enable deduplication, compression, and encryption. The tiering attribute is disabled because this attribute is not applicable to FAS storage. • If you select AFF storage, you can enable encryption and tiering. Deduplication and compression are enabled by default for AFF storage and cannot be disabled. Space reserve is configured as thin and cannot be changed to thick (thin is required for aggregate efficiency and tiering). The tiering attribute enables the use of volumes that are part of a FabricPool-enabled aggregate (supported by VASA Provider for AFF systems with ONTAP 9.4 and later). You can configure one of the following policies for the tiering attribute: • Any: Allows use of this storage capability profile with any FlexVol volume whether Fabric Pool is used or not • None: Prevents volume data from being moved to the capacity tier • Snapshot-Only: Moves user data blocks of volume Snapshot copies that are not associated with the active file system to the capacity tier • Auto: Moves cold user data blocks in the Snapshot copies and the active file system to the capacity tier

4. Review your selections on the **Summary** page, and then click **OK**.

   After you create a profile, you can return to the Storage Mapping page to view which profiles match which datastores.

Configuring traditional datastores and virtual machines

You can use Virtual Storage Console (VSC) to configure datastores and virtual machines in your vCenter Server. The datastores and virtual machines that are provisioned by VSC are displayed on the dashboard of VSC. This enables you to easily monitor and manage these datastores and virtual machines.

Steps

1. Provisioning datastores on page 13
   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.
2. Mapping datastores to storage capability profiles on page 15
   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.
3. Generating storage capability profiles automatically on page 16
   VASA Provider for ONTAP enables you to automatically generate storage capability profiles for existing traditional datastores. When you select the auto-generate option for a datastore, VASA Provider creates a profile that contains the storage capabilities that are used by that datastore.
4. Verifying datastore compliance with the mapped storage capability profile on page 17
   You can quickly verify whether your datastores are compliant with the storage capability profiles that are mapped to the datastores.
5. Monitoring datastores and virtual machines using the traditional dashboard on page 17
   You can monitor the traditional datastores and virtual machines using the traditional dashboard of the virtual appliance for Virtual Storage Console, VASA Provider, and Storage Replication Adapter. The dashboard data enables you to analyze the datastore usage and to take corrective action to prevent the virtual machines from running into space-related constraints.
6. Editing ESXi host settings for VSC, VASA Provider, and SRA on page 18
   You can use the dashboard of the virtual appliance for Virtual Storage Console (VSC), VASA Provider, and Storage Replication Adapter (SRA) to editing your ESXi host settings.

Provisioning 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.

Before you begin

- To provision a datastore on an SVM that is directly connected to Virtual Storage Console (VSC), you must have added the SVM to VSC 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 hosted is connected is entered in the `kaminoprefs.xml`.

  See "Enabling datastore mounting across different subnets" section in *VSC 9.6 Deployment and Setup Guide*.

- 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 VVol datastore creation. *Virtual Storage Console, VASA Provider, and Storage Replication Adapter Deployment and Setup Guide for 9.6 release* has more information on preferences file and enabling datastore mounting across different subnets.
- 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.

About this task

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 virtual appliance for VSC, VASA Provider, and SRA supports the following protocols:

- NFSv3 and NFSv4.1
- VMFS5 and VMFS6

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

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

Note: VMware does not support NFSv4.1 with datastore clusters.

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.

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	**a.** Click **Hosts and Clusters**. **b.** In the navigation pane, select the datacenter on which you want to provision the datastore. **c.** To specify the hosts to mount the datastore, see the next step.
Virtual Storage Console Home page	**a.** Click **Overview**. **b.** Click **Getting Started** tab. **c.** Click **Provision** button. **d.** 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...
All of the hosts in a datacenter	Right-click a datacenter, and then select **NetApp VSC > Provision Datastore**.
All of the hosts in a cluster	Right-click a host cluster, and then select **NetApp VSC > Provision Datastore**.
A single host	Right-click a host, and select **NetApp VSC > 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	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. You can select **NFS** or **VMFS** protocol to configure a traditional datastore. The VVol datastore type is used to configure a VVol datastore. If VASA Provider is enabled, then you can also decide whether to use storage capability profiles. The **Datastore cluster** option is available only for traditional datastores. You should use the **Advanced** option to specify **VMFS5** or **VMFS6** file system.
Storage system	You can select one of the listed storage capability profiles if you have selected the option in the General section. The system-recommended values for the storage system and storage virtual machine are populated for ease. But you can modify the values if required.
Storage attributes	By default, VSC populates the recommended values for **Aggregates** and **Volumes** options. You can customize the values based on your requirements. The **Space reserve** option available under **Advanced** menu is also populated to give optimum results.
Summary	You can review the summary of the parameters you specified for the new datastore.

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

Mapping 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.

Before you begin

- You must have registered your VASA Provider instance with Virtual Storage Console for VMware vSphere.
- Virtual Storage Console (VSC) must have already discovered your storage.

About this task

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 VSC **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. VSC 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.

Generating storage capability profiles automatically

VASA Provider for ONTAP enables you to automatically generate storage capability profiles for existing traditional datastores. When you select the auto-generate option for a datastore, VASA Provider creates a profile that contains the storage capabilities that are used by that datastore.

Before you begin

- You must have registered your VASA Provider instance with Virtual Storage Console (VSC).
- VSC must have discovered your storage.

About this task

After you create a storage capability profile, you can modify the profile to include more capabilities. The Create storage capability profile wizard provides information about the capabilities that you can include in a profile.

Steps

1. From the VSC home page, click **Storage Mapping**.

2. Select the datastore from the available list.

3. From the **Actions** menu, select **Auto-generate**.

4. When the auto-generate process finishes, refresh the screen to view information about the new profile.

The new profile is listed in the Associated profile column. The name of the new profile is based on the resources in the profile. You can rename the profile, if required.

Verifying 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.

Before you begin

- You must have registered your VASA Provider instance with Virtual Storage Console for VMware vSphere (VSC).
- VSC must have discovered your storage.

Steps

1. From the VSC **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.

   Note: 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.

After you finish

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.

Monitoring datastores and virtual machines using the traditional dashboard

You can monitor the traditional datastores and virtual machines using the traditional dashboard of the virtual appliance for Virtual Storage Console, VASA Provider, and Storage Replication Adapter. The dashboard data enables you to analyze the datastore usage and to take corrective action to prevent the virtual machines from running into space-related constraints.

Before you begin

You should select either the **Enable Storage I/O Control and statistics collection** or **Disable Storage I/O Control but enable statistics collection** option in the Configure Storage I/O Control dialog box. You can enable Storage I/O Control only if you have the Enterprise Plus license from VMware.

VMware vSphere Documentation: Enable Storage I/O Control

About this task

The VSC dashboard displays IOPS, space utilized, latency, and committed capacity metrics that are obtained from your vCenter Server. ONTAP provides volume space saving metrics to the VSC dashboard. These performance parameters enable you to identify performance bottlenecks in the virtual environment and to take corrective action to resolve the issues.

The traditional dashboard of the virtual appliance for VSC, VASA Provider, and SRA enables you to view either NFS datastores or VMFS datastores. You can click a datastore to navigate to the datastore details view that is provided by the vCenter Server instance to view and fix any issues with the datastores in your vCenter Server.

Steps

1. From the vSphere Client home page, click **Virtual Storage Console**.
2. Select the required vCenter Server using the **vCenter Server** drop-down menu to view the datastores.
3. Click **Traditional Dashboard**.

   The Datastores portlet provides the following details:

   - The number of traditional datastores along with their performance metrics that are managed by VSC in your vCenter Server instance
   - The top five datastores based on resource usage and performance parameters that can be modified, if required

   You can change the listing of the datastores based on the space utilized, IOPS, or latency and in the order required.

   The Virtual Machines portlet provides the following details:

   - Number of virtual machines using NetApp datastores in your vCenter Server
   - Top five virtual machines based on committed capacity, latency, and uptime

Editing ESXi host settings for VSC, VASA Provider, and SRA

You can use the dashboard of the virtual appliance for Virtual Storage Console (VSC), VASA Provider, and Storage Replication Adapter (SRA) to editing your ESXi host settings.

Before you begin

You must have configured an ESXi host system for your vCenter Server instance.

About this task

If there is an issue with your ESXi host settings, the issue is displayed in the ESXi Host Systems portlet of the dashboard. You can click the issue to view the host name or the IP address of the ESXi host that has the issue.

Steps

1. From the vSphere Client **Home** page, click **Virtual Storage Console**.
2. Edit the ESXi host settings.

If you want to edit the ESXi host settings from...	Do this...
Issues displayed	**a.** Click the issue in the ESXi Host Systems portlet. **b.** Click the ESXi host names for which you want to modify the settings. **c.** Right-click the ESXi host name, and click **NetApp VSC > Set Recommended Values**. **d.** Modify the required settings, and then click **OK**.
vSphere Client home page	**a.** Click **Menu > Hosts and Clusters**. **b.** Right-click the required ESXi host, and select **NetApp VSC > Set Recommended Value**. **c.** Click **OK**.
ESXi Host Systems portlet	**a.** Click the **Traditional dashboard** tab in the Overview section of VSC. **b.** Click **Edit ESXi Host Settings**. **c.** Select the ESXi host name in the Host settings and status tab for which you want to modify the settings, and click **NEXT**. **d.** Select the required settings in the Recommended host settings tab, and then click **Next**. **e.** Review your selection in the Summary tab, and then click **FINISH**.

Configuring virtual volume datastores

You can use VASA Provider for ONTAP to create and manage virtual volumes (VVols). You can provision, edit, mount, and delete a virtual datastore. You can also add storage to the datastore or remove storage from the virtual datastore. VVols provide greater flexibility. You can provision and manage every virtual machine and the related VMDK.

A VVol datastore consists of one or more FlexVol volumes within a storage container (also called “backing storage”). A virtual machine can be spread across one datastore or multiple datastores.

While you can create a VVol datastore that has multiple FlexVol volumes, all of the FlexVol volumes within the storage container must use the same protocol (NFS, iSCSI, or FCP) and the same storage virtual machines (SVMs).

You do not require detailed knowledge of the underlying storage. For example, you do not have to identify a specific FlexVol volume to contain the storage. After you add FlexVol volumes to the VVol datastore, the storage container manages the storage requirements and prevents any situations where one FlexVol volume is full while another FlexVol volume has no storage.

Note: It is a good practice to include multiple FlexVol volumes in a VVol datastore for performance and flexibility. Because FlexVol volumes have LUN count restrictions that limit the number of virtual machines, including multiple FlexVol volumes allows you to store more virtual machines in your VVol datastore.

As part of the setup process, you must specify a storage capability profile for the VVol datastore that you are creating. You can select one or more VASA Provider storage capability profiles for a VVol datastore. You can also specify a default storage capability profile for any VVol datastores that are automatically created in that storage container.

VASA Provider creates different types of VVols during virtual machine provisioning or VMDK creation, as required.

- **Config**
  VMware vSphere uses this VVol datastore to store configuration information.
  In SAN (block) implementations, the storage is a 4 GB LUN.
  In an NFS implementation, this is a directory containing VM config files such as the vmx file and pointers to other VVol datastores.
- **Data**
  This VVol contains operating system information and user files.
  In SAN implementations, this is a LUN that is the size of the virtual disk.
  In an NFS implementation, this is a file that is the size of the virtual disk.
- **Swap**
  This VVol is created when the virtual machine is powered on and is deleted when the virtual machine is powered off.
  In SAN implementations, this is a LUN that is the size of the virtual memory.
  In an NFS implementation, this is a file that is the size of the virtual memory.
- **Memory**
  This VVol is created if the memory snapshots option is selected when creating VM snapshot.
  In SAN implementations, this is a LUN that is the size of the virtual memory.
  In an NFS implementation, this is a file that is the size of the virtual memory.

Steps

1. Provisioning VVol datastores on page 21

You can provision a VVol datastore using the Provision Datastore wizard only if VASA Provider is enabled in your virtual appliance for VSC, VASA Provider, and SRA.

2. Monitoring VVol datastores and virtual machines using the VVol dashboard on page 22
   You can monitor the performance and view the top five virtual volume (VVol) datastores in your vCenter Server based on the parameters that you select by using the dashboard of the virtual appliance for Virtual Storage Console (VSC), VASA Provider, and Storage Replication Adapter (SRA).

Provisioning VVol datastores

You can provision a VVol datastore using the Provision Datastore wizard only if VASA Provider is enabled in your virtual appliance for VSC, VASA Provider, and SRA.

Before you begin

You must ensure that the subnet details of all the networks to which the ESXi hosted is connected is entered in the `Kaminoprefs.xml`.

See Enabling datastore mounting across different subnets section in *VSC 9.6 Deployment and Setup Guide*.

About this task

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 VASA Provider dashboard only if they are running ONTAP 9.3 or later. You should not use the vCenter Server New Datastore wizard to provision VVol datastores.

- You must use cluster credentials to create VVol datastores.
  You cannot use SVM credentials to create VVol datastores.
- VASA Provider does not support the cloning of a virtual machine that is hosted on the VVol datastore of one protocol to another datastore with a different protocol.

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 VSC** > **Provision Datastore**.
All of the hosts in a cluster	Right-click a cluster, and then select **NetApp VSC** > **Provision Datastore**.
A single host	Right-click a host, and then select **NetApp VSC** > **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	The General section of the New Datastore dialog box provides options to enter the destination, name, description, type, and protocol for the new datastore. The VVol datastore type is used to configure a VVol datastore.
Storage system	You can select one or more storage capability profiles listed. The system recommended values for the **Storage system** and **Storage VM** are populated based on your selection of storage capability profile. You can modify these values if required.
Storage attributes	You can either select existing volumes or create new volumes to configure FlexVol volumes. • When you select the option to create new volumes, the Create new volumes section is enabled. You can specify the name and size for the FlexVol volume, and then select from the available list of storage capability profiles and aggregates. Your selection decides the **Space reserve** option. You can select the **Auto Grow** checkbox and a value that is 120% of the specified FlexVol volume size is displayed. Use the radio buttons to select either **Grow** or **Grow/ Shrink** behavior, which will grow or shrink the volume as space used changes.Add the FlexVol volume to the list of volumes using the **ADD** button. You can select the default storage capability profile to be used for creating VVols using the **Default storage capability profile**option. • When you choose to select existing volumes, the available volumes are listed. You should select the required volume and modify the storage capability profile if required for each volume. You can later select the default storage capability profile to be used for creating VVols using the **Default storage capability profile** option.

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

Related references

VVol dashboard data requirements on page 24

Monitoring VVol datastores and virtual machines using the VVol dashboard

You can monitor the performance and view the top five virtual volume (VVol) datastores in your vCenter Server based on the parameters that you select by using the dashboard of the virtual appliance for Virtual Storage Console (VSC), VASA Provider, and Storage Replication Adapter (SRA).

Before you begin

- You should have enabled OnCommand API Services 2.1 or later.
  NetApp Support
- You should be using ONTAP 9.3 or later for your storage system.

VVol dashboard data requirements on page 24

About this task

The IOPS data that is provided by ONTAP is rounded off and displayed on the VASA Provider dashboard. There might be a difference between the actual IOPS value that is provided by ONTAP and the IOPS value that is displayed on the VVol dashboard.

Note:

- If you are registering OnCommand API Services for the first time, then you can view all of the performance metrics data on the VASA Provider dashboard only after 15 to 30 minutes.
- The VASA Provider dashboard data is refreshed periodically, at an interval of 10 minutes.

  You must click  to update the dashboard view with the latest available data.
- If you have added, modified, or deleted a storage system from your vCenter Server instance, then you might not notice any change in the data on the VASA Provider dashboard for some time.

  This is because OnCommand API Services takes time to obtain updated metrics from ONTAP.
- The Total IOPS value that is displayed in the Overview portlet of the VASA Provider dashboard is not a cumulative value of the Read IOPS value and Write IOPS value.

  Read IOPS, Write IOPS, and Total IOPS are separate metrics that are provided by OnCommand API Services. If there is a difference between the Total IOPS value and the cumulative IOPS value (Read IOPS value + Write IOPS value) provided by OnCommand API Services, then the same difference is observed in the IOPS values on the VASA Provider dashboard.

Steps

1. From the vSphere Client home page, click **Virtual Storage Console**.
2. Select the required vCenter Server using the **vCenter server** drop-down menu to view the datastores.
3. Click **VVol Dashboard**.

   The Datastores portlet provides the following details:

   - The number of VVol datastores that are managed by VASA Provider in your vCenter Server instance
   - The top five VVol datastores based on resource usage and performance parameters

   You can change the listing of the datastores based on the space utilized, IOPS, or latency and in the order required.
4. View the details of the virtual machines using the **Virtual Machines** portlet.

   The Virtual Machines portlet provides the following details:

   - Number of virtual machines using ONTAP datastores in your vCenter Server
   - Top five virtual machines based on IOPS, latency, throughput, committed capacity, uptime, and logical space

   You can customize how the top five virtual machines are listed in the VVol dashboard.

VVol dashboard data requirements

You must verify some important requirements of the VVol dashboard to display dynamic details of the virtual volume (VVol) datastores and virtual machines.

The following table presents an overview of what you should verify if the VVol dashboard does not display the performance metrics for the provisioned VVol datastores and virtual machines.

Considerations	Description
First-time deployment of OnCommand API Services	• You are using OnCommand API Services 2.1 or later. • You must have followed the installation instructions that are provided in the *OnCommand API Services Installation and Setup guide* after downloading and installing OnCommand API Services from the NetApp Support Site. • Each VASA Provider instance must have a dedicated OnCommand API Services instance. OnCommand API Services must not be shared among multiple VASA Provider instances or vCenter Servers. • OnCommand API Services is running and accessible.
Storage system	• You are using ONTAP 9.3 or later. • You are using appropriate credentials for the storage system. • Your storage system is active and accessible. • The virtual machine that you selected must be using at least one VVol datastore, and I/O operations are executing on the disk of the virtual machine.

Managing disaster recovery setup by using Storage Replication Adapter

You can create and manage the disaster recovery setup in your vCenter Server by using Storage Replication Adapter (SRA).

But you should have installed the SRA plug-in and enabled the SRA capability using the VSC interface.

Pairing protected and recovery sites

You must pair the protected and recovery sites created using your vSphere Client to enable Storage Replication Adapter (SRA) to discover the storage systems.

Before you begin

- You must have installed Site Recovery Manager (SRM) on the protected and recovery sites.
- You must have installed SRA on the protected and recovery sites.

About this task

Note: Storage Replication Adapter (SRA) does not support fan-out SnapMirror configurations.

Steps

1. Double-click **Site Recovery** on the vSphere Client home page, and then click **Sites**.
2. Click **Objects** > **Actions** > **Pair Sites**.
3. In the **Pair Site Recovery Manager Servers** dialog box, enter the address of the protected site's Platform Services Controller, and then click **Next**.
4. In the **Select vCenter Server** option, do the following:
   a. Verify that the protected site's vCenter Server appears as a matching candidate to pair.
   b. Enter the SSO administrative credentials, and then click **Finish**.
5. If prompted, click **Yes** to accept the security certificates.

Result

Both the protected and recovery sites will appear in the Objects dialog box.

Configuring protected and recovery site resources

You must configure your resources like VM networks, ESXi hosts, and folders on both the protected site to enable identification of each resource on the protected site with a resource at the recovery site.

You must complete the following resource configurations:

- Network mappings
- Folder mappings
- Resource mappings

- Placeholder datastores

Configuring network mappings

You must map your networks on the protected site and the recovery site to enable communication between them.

Before you begin

You must have connected the protected and recovery sites.

Steps

1. Log in to your vCenter Server and click on **Site Recovery** > **Sites**.
2. Select your protected site, and then click **Manage**.
3. In the Manage tab, select **Network Mappings**.
4. Click the  icon to create a new network mapping.

   The Create Network Mapping wizard appears.
5. In the Create Network Mapping wizard, perform the following:
   a. Select **Automatically Prepare Mappings for Networks with Matching Names**, and click **Next**.
   b. Select the required data center objects for the protected and recovery sites, and click **Add Mappings**.
   c. Click **Next** after mappings are created successfully.
   d. Select the object that was used earlier to create reverse mapping, and then click **Finish**.

Result

The Network Mappings page displays the protected site resources and the recovery site resources. You can follow the same steps for other networks in your environment.

Configuring folder mappings

You must map your folders on the protected site and recovery site to enable communication between them.

Before you begin

You must have connected the protected and recovery sites.

Steps

1. Log in to your vCenter Server, and click on **Site Recovery** > **Sites**.
2. Select your protected site, and then click **Manage**.
3. In the Manage tab, select **Folder Mappings**.
4. Click the  icon to create a new folder mapping.

   The Create Folder Mapping wizard appears.

5. In the **Create Folder Mapping** wizard, perform the following:
   a. Select **Automatically Prepare Mappings for Folders with Matching Names**, and click **Next**.
   b. Select the required data center objects for the protected and recovery sites, and click **Add Mappings**.
   c. Click **Next** after mappings are created successfully.
   d. Select the object that was used earlier to create reverse mapping, and then click **Finish**.

Result

The Folder Mappings page displays the protected site resources and the recovery site resources. You can follow the same steps for other networks in your environment.

Configuring resource mappings

You must map your resources on the protected site and recovery site so that virtual machines are configured to fail over into one group of hosts or the other.

Before you begin

You must have connected the protected and recovery sites.

About this task

Note: In Site Recovery Manager (SRM), resources can be resource pools, ESXi hosts, or vSphere clusters.

Steps

1. Log in to your vCenter Server, and click on **Site Recovery** > **Sites**.
2. Select your protected site, and then click **Manage**.
3. In the Manage tab, select **Resource Mappings**.
4. Click the  icon to create a new resource mapping.

   The Create Resource Mapping wizard appears.
5. In the **Create Resource Mapping** wizard, perform the following:
   a. Select **Automatically Prepare Mappings for Resource with Matching Names**, and click **Next**.
   b. Select the required data center objects for the protected and recovery sites, and click **Add Mappings**.
   c. Click **Next** after mappings are created successfully.
   d. Select the object that was used earlier to create reverse mapping, and then click **Finish**.

Result

The Resource Mappings page displays the protected site resources and the recovery site resources. You can follow the same steps for other networks in your environment.

Configuring placeholder datastores

You must configure a placeholder datastore to hold a place in the vCenter inventory at the recovery site for the protected virtual machine (VM). The placeholder datastore does not need to be large as the placeholder VMs are small and use only a few hundred or fewer kilobytes.

Before you begin

- You must have connected the protected and recovery sites.
- You must have configured your resource mappings.

Steps

1. Log in to your vCenter Server, and click on **Site Recovery > Sites**.
2. Select your protected site, and then click **Manage**.
3. In the Manage tab, select **Placeholder Datastores**.
4. Click the  icon to create a new placeholder datastore.
5. Select the appropriate datastore, and then click **OK**.

   Note: Placeholder datastores can be local or remote and should not be replicated.
6. Repeat the steps 3 to 5 to configure a placeholder datastore for the recovery site.

Configuring SRA using array manager

You can configure Storage Replication Adapter (SRA) by using the Array Manager wizard of Site Recovery Manager (SRM) to enable interactions between SRM and storage virtual machines (SVMs).

Before you begin

- You must have paired the protected sites and recovery sites in SRM.
- You must have configured your storage before configuring array manager.
- You must have configured and replicated SnapMirror relationships between the protected sites and recovery sites.
- You must have enabled SVM management LIFs to enable multitenancy.

About this task

SRA supports cluster-level management and SVM-level management. If you add storage at a cluster level, then you can discover and perform operations on all of the SVMs in the cluster. If you add storage at an SVM level, then you can manage only that specific SVM.

Note: VMware does not support NFS4.1 protocol for SRM.

Steps

1. In SRM, click **Array Managers**, and then click **Add Array Manager**.
2. Enter the following information to describe the array in SRM:

   a. Enter a name to identify the array manager in the **Display Name** field.

b. In the **SRA Type** field, select **NetApp Storage Replication Adapter for ONTAP**.

c. Enter the information to connect to the cluster or the SVM:

- If you are connecting to a cluster, you should enter the cluster management LIF.
- If you are connecting directly to an SVM, you should enter the IP address of the SVM.

Note: When configuring array manager, you must use the same connection and credentials for the storage system that was used to add the storage system in Virtual Storage Console's Storage Systems menu. For example, if the array manager configuration is SVM scoped, then the storage under VSC must be added at SVM level.

d. If you are connecting to a cluster, enter the name of the SVM in the **SVM name** field.

You can also leave this field blank.

e. Optional: Enter the volumes to be discovered in the **Volume include list** field.

You can enter the source volume at the protected site and the replicated destination volume at the recovery site. You can enter either the full volume name or the partial volume name.

Example

For example, if you want to discover volume *src_vol1* that is in a SnapMirror relationship with volume *dst_vol1*, you must specify *src_vol1* in the protected site field and *dst_vol1* in the recovery site field.

f. Optional: Enter the volumes to be excluded from discovery in the **Volume exclude list** field.

You can enter the source volume at the protected site and the replicated destination volume at the recovery site. You can enter either the full volume name or the partial volume name.

Example

For example, if you want to exclude volume *src_vol1* that is in a SnapMirror relationship with volume *dst_vol1*, you must specify *src_vol1* in the protected site field and *dst_vol1* in the recovery site field.

g. Enter the user name of the cluster-level account or SVM-level account in the **Username** field.

h. Enter the password of the user account in the **Password** field.

3. Click **Next**.
4. Verify that the array is discovered and displayed at the bottom of the **Add Array Manager** window.
5. Click **Finish**.

After you finish

You can follow the same steps for the recovery site by using the appropriate SVM management IP addresses and credentials. On the Enable Array Pairs screen of the Add Array Manager wizard, you should verify that the correct array pair is selected, and that it shows as ready to be enabled.

Verifying replicated storage systems

You must verify that the protected site and recovery site are successfully paired after configuring Storage Replication Adapter (SRA). The replicated storage system must be discoverable by both the protected site and the recovery site.

Before you begin

- You must have configured your storage system.
- You must have paired the protected site and recovery site by using the SRM array manager.
- You must have enabled FlexClone license and SnapMirror license before performing the test failover operation and failover operation for SRA.

Steps

1. Log in to your vCenter Server.
2. Navigate to **Site Recovery > Array Based Replication**.
3. Select the required SVM, and then verify the corresponding details in the **Array Pairs**.

   The storage systems must be discovered at the protected site and recovery site with the Status as “Enabled”.

Managing traditional and VVol datastores

You can use the VSC interface to manage both traditional and VVol datastores and perform mount, resize, edit, and remove datastore operations.

Mounting datastore on additional hosts

Mounting a datastore provides storage access to additional hosts. You can mount the datastore on the additional hosts after you add the hosts to your VMware environment.

Before you begin

You must ensure that the subnet details of all the networks to which the ESXi hosted is connected is entered in the `Kaminoprefs.xml`.

See Enabling datastore mounting across different subnets section in *VSC 9.6 Deployment and Setup Guide*.

Steps

1. From the vSphere Client **Home** page, click **Hosts and Clusters**.
2. In the navigation pane, select the datacenter that contains the host.
3. Repeat Step 2 for any additional hosts.
4. Right-click the host and select **NetApp VSC > Mount Datastores**.
5. Select the datastores that you want to mount, and then click **OK**.

Resizing datastores

Resizing a datastore enables you to increase or decrease the storage for your virtual machine files. You might need to change the size of a datastore as your infrastructure requirements change.

Before you begin

If you want VSC to resize the containing volume when it resizes the VMFS datastore, you should not use the **Use existing volume** option under Storage attributes section when initially provisioning VMFS datastore, but instead let it automatically create a new volume for each datastore.

About this task

You can increase or decrease the size of an NFS datastore. You can only increase the size of a VMFS datastore.

Steps

1. From the vSphere Client **Home** page, click **Hosts and Clusters**.
2. In the navigation pane, select the datacenter that contains the datastore.
3. Right-click the datastore and select **NetApp VSC > Resize**.
4. In the **Resize** dialog box, specify a new size for the datastore, and then click **OK**.

You can run the **REDISCOVER ALL** option in the Storage Systems menu to manually update the storage listing under Storage Systems and dashboard, or wait for the next scheduled refresh.

Editing a VVol datastore

You can edit an existing virtual volume (VVol) datastore to change the default storage capability profile. The default storage capability profile is primarily used for Swap VVols.

Steps

1. From the vSphere Client page, click **Hosts and Clusters**.
2. Right-click the datastore, and then select **NetApp VSC > Edit Properties of VVol Datastore**.

   The Edit Properties of VVol Datastore dialog box is displayed.
3. Make the required changes.

   You can change the default storage capability profile for the VVol datastore by selecting a new profile from the drop-down list in the Edit VVol Datastore dialog box. You can also change the VVol datastore name and description.

   Note: You cannot change the vCenter Server where the VVol datastore is located.
4. When you have made your changes, click **OK**.

   A message box asks whether you want to update the VVol datastore.
5. Click **OK** to apply your changes.

   A success message appears to inform that the VVol datastore has been updated.

Adding storage to a VVol datastore

You can increase the available storage by using the Add Storage wizard to add FlexVol volumes to an existing VVol datastore.

About this task

When you add a FlexVol volume, you also have the option of changing the storage capability profile associated with that volume. You can either use the VASA Provider auto-generate feature to create a new profile for the volume, or you can assign one of the existing profiles to the volume.

Steps

1. On the vSphere Client Home page, click **Hosts and Clusters**.
2. Right-click the VVol datastore, and then select **NetApp VSC > Expand Storage of VVol Datastore**.
3. In the **Expand Storage of VVol Datastore** page, you can either add an existing FlexVol volume to the VVol datastore or create a new FlexVol volume to add to the database.

If you select...	Perform the following...
Select volumes	**a.** Select the FlexVol volumes that you want to add to the VVol datastore. **b.** In the Storage Capability Profiles column, use the drop-down list to either create a new profile based on the FlexVol volumes, or select one of the existing profiles. The auto-generate feature creates a profile based the storage capabilities that are associated with that FlexVol volume. For example: disk type, high availability, disaster recovery, performance features, and deduplication.
Create new volumes	**a.** Enter the name, size, and storage capability profile for the FlexVol. The aggregates are selected by the system based on the storage capability profile selected. **b.** Select the **Auto Grow** option and provide the maximum size. **c.** Click **ADD** to add the FlexVol to the list of volumes.

Reminder: All FlexVol volumes in a VVol datastore must be from the same storage virtual machine (SVM, formerly known as Vserver).

After you create a FlexVol volume, you can edit it by clicking the **Modify** button. You can also delete it.

4. Select a default storage capability profile to be used during virtual machine creation, and click **Next** to review the summary of the storage added to VVol datastore.
5. Click **Finish**.

   The wizard adds the storage that you specified to the VVol datastore. It displays a success message when it finishes.

   Note: The Expand Storage of VVol Datastore wizard automatically handles any ESXi storage rescans or any other significant operations that are required. Because a VVol datastore is a logical entity controlled by VASA Provider, adding the FlexVol volume is the only thing you need to do to enlarge the capacity of your storage container.

Removing storage from a VVol datastore

If a virtual volume (VVol) datastore has multiple FlexVol volumes, you can remove one or more of the FlexVol volumes from the VVol datastore without deleting the datastore.

About this task

A VVol datastore exists until there is at least one FlexVol volume.

Steps

1. From the vSphere Client **Home** page, click **Hosts and Clusters**.
2. Right-click the VVol datastore that you want to modify, and then select **NetApp VSC > Remove Storage from VVol Datastore**.

   The Remove Storage from VVol Datastore dialog box is displayed.
3. Select the FlexVol volumes that you want to remove from the VVol datastore, and click **Remove**.

4. Click **OK** in the confirmation dialog box.

   Note: If you select all of the FlexVol volumes, an error message is displayed, indicating that the operation will fail.

Mounting a VVol datastore

You can mount a virtual volume (VVol) datastore to one or more additional hosts by using the Mount VVol Datastore dialog box. Mounting the datastore provides storage access to additional hosts.

Steps

1. From the vSphere Client **Home** page, click **Hosts and Clusters**.
2. Right-click the datastore that you want to mount, and then select **NetApp VSC > Mount VVol Datastore**.

   The Mount VVol Datastore dialog box is displayed, which provides a list of the hosts that are available in the datacenter where you can mount the datastore. The list does not include the hosts on which the datastore has already been mounted, hosts that are running ESX 5.x or earlier versions, or hosts that do not support the datastore protocol. For example, if a host does not support the FC protocol, you cannot mount an FC datastore to the host.

   Important: Even though the vSphere Client provides a mount dialog box for the vCenter Server, you must always use the VASA Provider dialog box for this operation. VASA Provider sets up access to storage systems that are running ONTAP software.

3. Select the host on which you want to mount the datastore, and then click **OK**.

Migrating traditional virtual machines to VVol datastores

You can migrate virtual machines from traditional datastores to virtual volume (VVol) datastores to take advantage of policy-based VM management and other VVol capabilities. VVol datastores enable you to scale to meet increased workload requirements.

Before you begin

- You must have ensured that VASA Provider is not running on any of the virtual machines that you plan to migrate.

  If you migrate a virtual machine that is running VASA Provider to a VVol datastore, you cannot perform any management operations, including powering on the virtual machines that are on VVol datastores.

- You must not migrate the virtual appliance for VSC, VASA Provider, and SRA to a VVol datastore.

  This can impact availability of VVol VMs.

About this task

When you migrate from a traditional datastore to a VVol datastore, the vCenter Server uses vStorage APIs for Array Integration (VAAI) offloads when moving data from VMFS datastores, but not from an NFS VMDK file. VAAI offloads normally reduce the load on the host.

Steps

1. Right-click the virtual machine that you want to migrate, and then click **Migrate**.

2. Select **Change storage only**, and then click **Next**.
3. Select a virtual disk format, a VM Storage Policy and a VVol datastore that matches the features of the datastore that you are migrating, and then click **Next**.
4. Review the settings, and then click **Finish**.

Migrating virtual machines with older storage capability profiles

If you are using the latest version of the virtual appliance for Virtual Storage Console (VSC), VASA Provider, and Storage Replication Adapter (SRA), then you should migrate your virtual machines that are provisioned with the “MaxThroughput MBPS” or “MaxThroughput IOPS” QoS metrics to new VVol datastores that are provisioned with the “Max IOPS” QoS metrics of the latest version of the virtual appliance for VSC, VASA Provider, and SRA.

About this task

With the latest version of the virtual appliance for VSC, VASA Provider, and SRA, you can configure QoS metrics for each virtual machine or virtual machine disk (VMDK). The QoS metrics were earlier applied at the ONTAP FlexVol volume level and were shared by all of the virtual machines or VMDKs that were provisioned on that FlexVol volume.

Starting with the 7.2 version of the virtual appliance for VSC, VASA Provider, and SRA, the QoS metrics of one virtual machine is not shared with other virtual machines.

Note: You must not modify the existing VM Storage Policy as the virtual machines might become non-compliant.

Steps

1. Create VVol datastores by using a new storage capability profile with the required “Max IOPS” value.
2. Create a VM Storage Policy, and then map the new VM Storage Policy with the new storage capability profile.
3. Migrate the existing virtual machines to the newly created VVol datastores by using the new VM Storage Policy.

Understanding Virtual Storage Console reports

You can use the Virtual Storage Console (VSC) **Reports** menu to view pre-defined reports for all the datastores managed by a selected VSC instance in a particular vCenter Server. You can perform operations such as sorting and exporting reports.

What reports do

Reports display detailed information about datastores and virtual machines, that enables you to review and identify potential issues with datastores and virtual machines in your vCenter Server.

You can view, sort, and export reports.

Virtual Storage Console (VSC) provides the following pre-defined reports:

- Datastore Report
- Virtual Machine Report
- VVol Datastore Report
- VVol Virtual Machine Report

Datastore Reports

The Datastore reports provide detailed information about traditional datastores and the virtual machines that are created on these datastores. The traditional dashboard enables you to review and identify potential issues with the datastores and virtual machines in your vCenter Server.

You can view, sort, and export reports. The data for the traditional datastores and virtual machines report is provided by the vCenter Server.

The Datastore provides the following pre-defined reports:

- Datastore Report
- Virtual Machine Report

Datastore Report

The Datastore Report menu provides information on the following parameters for datastores:

- Datastore name
- Type of datastore: NFS or VMFS
- Free space
- Used space
- Total space
- Percentage of space utilized
- Percentage of space available
- IOPS
  The report displays the IOPS for the datastore.

- Latency
  The report displays the latency information for the datastore.

You can also verify the time at which the report was generated. The Datastore Report menu enables you to organize the report as per your requirement, and then export the organized report using the **Export to CSV** button. The datastore names in the report are links that navigate to the Monitor tab of the selected datastore, where you can view the datastore performance metrics.

Virtual Machine Report

The Virtual Machine Report menu provides the following performance metrics for all the virtual machines that use datastores provisioned by VSC for a selected vCenter Server:

- Name of the virtual machine
- Committed capacity
  The report displays the value for the committed capacity for a virtual machine.
- Uptime
  The report displays the time for which the virtual machines is powered on and is available on an ESXi host.
- Latency
  The report displays the latency for virtual machines across all datastores associated with the virtual machines.
- Power state
  The report displays whether the virtual machine is powered on or powered off.
- Host
  The report displays the host systems on which the virtual machine is available.

Each virtual machine name in the report is a link to the Monitor tab of the selected virtual machine. You can sort the virtual machine report as per your requirement and export the report in a `.CSV` file, and save the report on your local system. The timestamp of the report is also appended to the saved report.

VVol reports

VVol reports display detailed information about virtual volume (VVol) datastores and the virtual machines that are created on these datastores. The VVol dashboard enables you to review and identify potential issues with the VVol datastores and virtual machines in your vCenter Server.

You can view, sort, and export reports. The data for the VVol datastores and virtual machines report is provided by the ONTAP along with OnCommand API Services.

VVol provides the following pre-canned reports:

- VVol Datastore Report
- VVol VM Report

VVol Datastore Report

The VVol Datastore Report menu provides information about the following parameters for datastores:

- VVol datastore name
- Free space

- Used space
- Total space
- Percentage of space utilized
- Percentage of space available
- IOPS
- Latency

You can also verify the time at which the report was generated. The VVol Datastore Report menu enables you to sort the report as per your requirement, and then export the sorted report by using the **Export to CSV** button. Each VVol datastore name in the report is a link that navigates to the Monitor tab of the selected VVol datastore, which you can use to view the performance metrics.

VVol Virtual Machine Report

The VVol Virtual Machine Summary Report menu provides the following performance metrics for all of the virtual machines that use the VVol datastores that are provisioned by VASA Provider for ONTAP for a selected vCenter Server:

- Name of the virtual machine
- Committed capacity
- Uptime
- Throughput
  The report displays whether the virtual machine is powered on or powered off.
- Logical space
- Host
- Power state
- Latency
  The report displays the latency for virtual machines across all of the VVol datastores that are associated with the virtual machines.

Each virtual machine name in the report is a link to the Monitor tab of the selected virtual machine. You can organize the virtual machine report according to your requirement, export the report in `.CSV` format, and then save the report on your local system. The timestamp of the report is appended to the saved report.

Troubleshooting issues with the virtual appliance for VSC, VASA Provider, and SRA

If you encounter unexpected behavior during the configuration or management of the virtual appliance for Virtual Storage Console (VSC), VASA Provider, and Storage Replication Adapter (SRA), then you can follow specific troubleshooting procedures to identify and resolve the cause of such issues.

Collecting the log files

You can collect log files for d Virtual Storage Console for VMware vSphere from the option available in the VSC graphical user interface (GUI). Technical support might ask you to collect the log files to help troubleshoot a problem.

About this task

If you need VASA Provider log files, you can generate a support bundle from the Vendor Provider Control Panel screen. This page is part of the VASA Provider maintenance menus, which are accessible from the virtual appliance's console.

https://vm_ip:9083

You collect the VSC log files by using the “Export VSC Logs” feature in the VSC GUI. The following steps tell you how to collect the VSC log files:

Steps

1. From the Virtual Storage Console home page, click **Configuration** > **Export VSC Logs**.

   This operation can take several minutes.

2. When prompted, save the file to your local computer.

   You can then send the `.zip` file to technical support.

VVol datastore provisioning fails with large number of volumes

Issue

VVol datastore provisioning fails when you try to provision VVol datastores with more than six volumes.

Cause

VVol datastore provisioning fails because of socket timeouts between VSC and VASA Provider.

Corrective action

You should either create VVol datastore with less than six volumes or increase the VVol datastore size after provisioning using the Expand VVol Datastore option.

Issue while editing VM Storage Policies after upgrade

After upgrading from the 7.0 version of the virtual appliance for Virtual Storage Console (VSC), VASA Provider, and Storage Replication Adapter (SRA) to the latest version of the virtual appliance for VSC, VASA Provider, and SRA, if you attempt to edit an existing VM Storage Policy before you configure any new storage capability profiles, the following error message might be displayed: `There are incorrect or missing values below`.

Cause

You might get this error if you have not created any new storage capability profiles.

Corrective action

You must perform the following:

1. Stop editing the VM Storage Policy.
2. Create a new storage capability profile.
3. Modify the required VM Storage Policy.

VASA Provider status shows as “Offline” in vCenter Server GUI

The status of VASA Provider for ONTAP might appear as “Offline” in the vCenter Server GUI after you restart the VASA Provider service.

Workaround

1. Check the status of VASA Provider from the virtual appliance for Virtual Storage Console (VSC), VASA Provider, and Storage Replication Adapter (SRA), and ensure that VASA Provider is active.
2. In the VSC page of vCenter Server, verify that VASA Provider is enabled by navigating to **Configuration- > Manage Extensions**.
3. On the vCenter Server, check the `/var/log/vmware/vmware-sps/sps.log` file for any connection errors with VASA Provider.
4. If there are any errors, restart the “vmware-sps” service.

Error while accessing the VSC Summary page of virtual appliance

The error message `/opt/netapp/vscserver/etc/vsc/performance.json (No such file or directory)` might be displayed when you try to access the VSC Summary page after you

deploy the virtual appliance for Virtual Storage Console (VSC), VASA Provider, and Storage Replication Adapter (SRA).

Description

When you try to access the VSC dashboard after the deployment of the virtual appliance for VSC, VASA Provider, and SRA, you might encounter an error because the scheduler initialization process is not complete.

Workaround

You must wait for a few seconds after the deployment of the virtual appliance for the performance scheduler initialization process to complete, and then click the  button to get the latest data.

Error deleting a datastore after network settings are changed

Issue

After changing the IP address of the virtual appliance for VSC, VASA Provider, and SRA, an error is displayed while using the VSC interface to perform certain operations. For example, deleting a datastore or trying to access VASA Provider server on ESXi host.

Cause

The vCenter Server does not use the updated IP address and continues to use the old IP address to make calls to VASA Provider.

Corrective action

When IP address of the virtual appliance for VSC, VASA Provider, and SRA changes, you should perform the following:

1. Unregister VSC from vCenter Server.
2. Access `https://<vcenter_ip>/mob`.
3. Click **Content** > **Extension Manager** > **Unregister Extension** > **Unregister all com.netapp.* extensions**.
4. Log in to the vCenter Server as root using putty.
5. Change to the vsphere-client-serenity directory using: `cd /etc/vmware/vsphere-client/vc-packages/vsphere-client-serenity`.
6. Stop the vSphere Client: service using `vsphere-client stop`.
7. Remove the directories containing the UI extensions: `rm -rf com.netapp*`
8. Start the vSphere Client: service using `vsphere-client start`.
   This operation can take several minutes for the vSphere Client to restart and initialize correctly.
9. Change to the vsphere-ui serenity directory using: `/etc/vmware/vsphere-ui/vc-packages/vsphere-client-serenity/`.
10. Stop the vSphere UI: service using `vsphere-ui stop`.
11. Remove the directories containing the UI extensions: `rm -rf com.netapp*`

12. Start the vSphere UI using: `service-control --start vsphere-ui`.

Virtual machine provisioning fails with an undefined error

Virtual machine provisioning operations such as Create, Clone, Power on, Power off, Suspend, Migrate, and update VM Storage Profile on VVol datastore might fail with a generic error message in task manager that does not indicate whether the issue is with VASA Provider or VMware.

Issue

You receive error messages in task manager such as `No suitable volume was found amongst the candidate volumes for the specified requirements.`

Cause

The error might occur due to issues with VMware, VASA Provider, or ONTAP storage. The error message might not specify the exact reason for failure. The issue might also be due to large storage systems with a large number of storage virtual machines (SVMs), volumes, and LUNs in the environment. The periodic discovery operations running in the background on such storage systems take time and might cause the timeout of virtual machine provisioning operations if these operations are triggered simultaneously.

Corrective action

1. Verify whether the issue is with VASA Provider or ONTAP storage by examining the `/opt/netapp/vpserver/logs/error.log`, `vvolvp.log`, and `zapi_error.log` log files.

   - If errors such as `NaException com.netapp.offtap3.ontap.ApiFailedException: No suitable volume was found amongst the candidate volumes for the specified requirements. Details: Vvol Placement: Type: place Candidate Volumes: Vvol_nfs_pb2, Vvol_nfs_pb1 Performance: Greatest IOPS Size: 4GB Space Guaranteed: false Volumes with insufficient unpromised IOPS: Vvol_nfs_pb1, Vvol_nfs_pb2 Result: success (errno=13001)` are reported, then you should take corrective action, such as increasing IOPS on storage with the help of the storage administrator.
   - You must run provisioning operations only when there is no discovery operation running in the background.

   If the errors reported in the VASA Provider log files are not specific, then you should follow up with technical support to resolve the issue.

2. If no specific errors are reported in the VASA Provider log files, examine the `sps.log` log file to verify whether the issue is with VMware, and then take suitable corrective action based on the errors reported.

   If the errors reported in the `sps.log` log file are not specific, then you should follow up with a VMware administrator to resolve the issue.

Thick provisioning of VVols fails for ONTAP 9.4 storage systems

Thick provisioning of virtual volumes (VVols) fails when the VVol datastore does not contain thick-provisioned FlexVol volumes on an ONTAP 9.4 storage system.

Issue

You might receive error messages such as the following while provisioning the VVol:

```
com.netapp.vasa.vvol.exceptions.OutOfResourceException: Unable to find a
location
for a vvol of size 4,096 in storage container vvol_nfs_new - Checked 1
places.
Specific reasons were vvol_nfs_new | Final Score: 0 | 100 -> 0 : FlexVol
of
vvol_nfs_new does not support required storage profile, details
[FlexVolume with
name vvol_nfs_new is not thick provisioned]
```

Cause

This error occurs if you do not have any thick-provisioned FlexVol volumes on the VVol.

Solution

1. Add a new FlexVol volume that has storage capability with thick provisioning enabled for the VVol.
2. Create a new virtual machine by using the FlexVol volume.

Datastore inaccessible when volume status is changed to offline

Issue

When a volume of a datastore is made offline, the datastore is inaccessible. Even if you bring the volume online, VSC fails to discover the datastore. On the vSphere Client, if your right-click the datastore, no VSC actions are available.

Cause

When volume is made offline from the cluster, the volume is unmounted first and then made offline or restricted. The junction path is removed when the volume is made offline and the datastore becomes inaccessible. If the volume is made online, the junction path is not available and not mounted on the by default. This is the ONTAP behavior.

Corrective action

You should bring the volume online and then manually mount the volume with the same junction path as before. You can run the storage discovery to view that the datastore is discovered and actions for the datastore are available.

Adding storage system with IPv4 results in authentication error with IPv6 status in storage system grid

Issue

The storage system grid displays authentication failure status with IPv6 address for a storage system even though the storage system is added with IPv4 address.

Cause

When you have a dual stack storage system with IPv4 and IPv6 LIFs and you add a storage system with IPv4 LIF, then during the periodic discovery process, VSC can discover the IPv6 LIF too. This IPv6 discovery fails with authentication error as the IPv6 LIF is not added explicitly. This error does not have any impact on any of the operations performed for the storage system.

Corrective action

You must perform the following:

1. In the VSC home page, click **Storage Systems**.
2. Click the storage system that has unknown status with IPv6 address.
3. Change the IP address to IPv4 using the set default credentials.
4. Click **Back to listing**, and then click **REDISCOVER ALL**.
   The stale IPv6 entry from the storage systems list is deleted and storage system is discovered without authentication errors.

File creation error while provisioning virtual machines on VVol datastores

Issue

Cannot create virtual machine using the default storage virtual machine (SVM) or any mixed storage virtual machine (SVM) that has both IPv6 and IPv4 data LIFS configured.

Cause

The issue occurs because the default vs0 has both IPv6 and IPv4 data LIFs, and is not a purely IPv4 datastore.

Corrective action

You can provision a virtual machine with vs0 using the following steps:

1. Use System Manager application to disable all the IPv6 LIFs .
2. Rediscover the cluster.
3. Provision a virtual machine on the VVol datastore on which the provisioning was failing.
   The virtual machine is successfully provisioned.

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