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

Administration Guide for 7.1 release

n NetApp®

Contents

Overview of the virtual appliance for VSC, VASA Provider, and SRA

The virtual appliance for Virtual Storage Console (VSC), VASA Provider, and Storage Replication Adapter (SRA) is a product suite that includes the capabilities of VSC, VASA Provider, and SRA. You can deploy this product suite as a virtual appliance which reduces your effort of installing and registering each product separately with the vCenter Server.

The product suite includes SRA and VASA Provider as plug-ins for vCenter Server, which provide end-to-end lifecycle management for VMware virtual server environments running on NetApp storage and the VMware vSphere Web Client. The virtual appliance for VSC, VASA Provider, and SRA integrates smoothly with the VMware vSphere Web Client and enables you to use single sign-on (SSO) services. In an environment with multiple vCenter Server instances, each vCenter Server instance that you want to manage must have its own registered instance of VSC. The VSC dashboard page enables you to quickly check the overall status of your datastores and virtual machines.

Note: The NetApp blue "N" icon in the screens and portlets enables you to easily distinguish the NetApp features from the VMware features.

By running the virtual appliance for VSC, VASA Provider, and SRA, you can perform the following tasks:

- **Using VSC to manage storage and to configure the ESXi host**

  ◦ You can add storage controllers to VSC that both SRA and VASA Provider can leverage.
    For VASA Provider, you can add storage only in clusters. You can add, remove, and assign credentials, and set up permissions for storage controllers within your VMware environment. In addition, you can manage the ESXi servers that are connected to NetApp storage. You can set values for host timeouts, NAS, and multipathing. You can also view storage details and collect diagnostic information.

  ◦ You can monitor the performance of the datastores and virtual machines in your vCenter Server environment by using the Summary and Reports page of the VSC GUI.
    Any issues with storage systems and host systems are displayed on the dashboard. The predefined reports provide performance details about the datastores and virtual machines that are managed by VSC.

- **Using VASA Provider to create storage capability profiles and virtual datastores, and to set alarms**
  VASA Provider for ONTAP is registered with vCenter Server as soon as you enable the VASA Provider extension. You can create and use storage capability profiles and virtual datastores. You can also set alarms to warn you when volumes and aggregates are approaching the threshold limits. You can monitor the performance of virtual machines disks (VMDKs) and the virtual machines that are created on virtual datastores.

- **Using SRA for disaster recovery**
  You can use SRA to configure protected sites and recovery sites in your environment for disaster recovery in the event of a failure.

You can configure and use VSC, VASA Provider, and SRA in the following combinations:

- VSC only (default configuration)

- VSC and VASA Provider

- VSC and SRA

- VSC, VASA Provider, and SRA

The configuration that you select depends on which tasks you want to perform by using VSC, VASA Provider, and SRA.

To enable administrators to control access to the vCenter Server objects and to secure the system, VSC supports role-based access control (RBAC) at two levels:

- vSphere objects, such as virtual machines and datastores
  These objects are managed by using vCenter Server RBAC.

- ONTAP storage
  The storage systems are managed by using ONTAP RBAC.

If access control is not an issue, you can log in as an administrator and access all of the features that VSC provides.

Tip: VSC has a "View" privilege that is available after the virtual appliance for VSC, VASA Provider, and SRA is installed. You can add the "View" privilege to the vCenter Server roles. You require the "View" privilege if you want to view VSC in the VMware vSphere Web Client.

Supported plug-ins for VSC

Virtual Storage Console for VMware vSphere (VSC) supports optional plug-ins to enhance the capabilities such as the NFS Plug-in for VAAI and VASA Provider for ONTAP. You can also enable the Storage Replication Adapter (SRA) extension to configure disaster recovery for your vCenter Server instance.

VSC provisioning operations benefit from using the NFS Plug-in for VMware VAAI. The plug-in integrates with VMware Virtual Disk Libraries to provide VMware vStorage APIs for Array Integration (VAAI) features, including copy offload and space reservations.

VASA Provider is a virtual appliance that improves storage management and supports virtual volumes (VVols). It provides information to the vCenter Server instance about the NetApp storage systems that are being used in the VMware environment. Integrating VASA Provider with the vCenter Server instance enables you to make more informed decisions. For example, you can create storage capability profiles that define different storage service level objectives (SLOs) for your environment. You can then use these SLOs to select a datastore with the correct storage attributes when provisioning virtual machines. You can also set up alarms to notify you when a volume or an aggregate is nearing full capacity or when a datastore is no longer in compliance with its associated SLO.

When SRA is enabled and used in conjunction with VMware Site Recovery Manager (SRM), you can recover the vCenter Server datastores and virtual machines in the event of a failure.

VSC provides a dashboard that enables you to monitor all of the datastores and virtual machines that are managed by VSC. You can view the performance of the datastores and virtual machines in your vCenter Server environment by using the predefined VSC reports.

Overview of the NFS plug-in for VAAI

The NetApp Plug-in for VMware vStorage APIs for Array Integration (VAAI) is a software library that integrates the VMware Virtual Disk Libraries that are installed on the ESXi host. The VMware VAAI package enables the offloading of certain tasks from the physical hosts to the storage array.

You can perform tasks such as thin provisioning and hardware acceleration at the array level to reduce the workload on the ESXi hosts. The copy offload feature and space reservation feature improve the performance of Virtual Storage Console (VSC) operations. The NetApp NFS Plug-in for VAAI is not shipped with VSC. You can download the plug-in installation package and obtain the instructions for installing the plug-in from the NetApp Support Site.

mysupport.netapp.com

You can complete your installation from the VSC **Tools > NFS VAAI** page .

See the NetApp Interoperability Matrix Tool (IMT) for the supported versions of ESXi, vSphere, and ONTAP.

NetApp Interoperability Matrix Tool

Architecture of the virtual appliance for VSC, VASA Provider, and SRA

The architecture of the virtual appliance for Virtual Storage Console (VSC), VASA Provider, and Storage Replication Adapter (SRA) involves the storage system running ONTAP, the vCenter Server, the VMware vSphere Web Client, and the ESXi hosts.

The virtual appliance for VSC, VASA Provider, and SRA uses VMware-recommended, web-based architecture. The virtual appliance consists of two major components:

- A graphical user interface (GUI) web application that is displayed as a plug-in within the vSphere Web Client to provide a single management console for virtual environments

- A server component that is controlled by the VSC service and that hosts Java servlets to handle the GUI and API calls to the storage systems and the ESXi hosts

You can use the VMware vSphere Web Client to access VSC. Each VSC instance and VASA Provider instance must be registered with only one vCenter Server instance. Each SRA instance must be registered with Site Recovery Manager (SRM), which must be registered with vCenter Server.

The vSphere Web Client and any plug-in applications that are deployed in the vCenter Server use the HTTPS protocol to communicate with each other.

The vCenter Server instance communicates with the physical servers where the ESXi hosts are running. You can have multiple virtual machines running on the ESXi hosts. Each virtual machine can run an operating system and applications. The ESXi hosts then communicate with the storage systems. You can use the virtual appliance for VSC, VASA Provider, and SRA to enable the VASA Provider extension and the SRA extension. If you want to configure virtual volumes (VVols), then you must enable the VASA Provider extension. If you want to configure disaster recovery for your vCenter Server environment, you must enable the SRA extension. While configuring the disaster recovery setup, you must install the SRA plug-in on the SRM instance that is installed in your vCenter Server. Depending on what tasks you want to perform, you can enable or disable the required extensions by using the interface of the virtual appliance for VSC, VASA Provider, and SRA.

Managing datastores

You can use the provisioning capability of Virtual Storage Console (VSC) to provision, mount, resize, and manage datastores.

Provisioning datastores

Provisioning a datastore creates a logical container for your virtual machines and their 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 by using the NetApp Datastore Provisioning Wizard.

Before you begin

*   To provision a datastore on a storage virtual machine (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.

*   If you use NFS or iSCSI and the subnet is different between your ESXi hosts and your storage system, the NFS or iSCSI settings in the kaminoprefs preferences file must include the ESXi host subnet masks.
    This preference file is also applicable to virtual datastore creation.
    https://kb.netapp.com/app/answers/answer_view/a_id/1031984/

*   If you have enabled VASA Provider and you want to specify storage capability profiles for your NFS datastores or VMFS datastores, then you must create one or more storage capability profiles.

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.

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.

Steps

1. From the vSphere Web Client **Home** page, click **Hosts and Clusters**.

2. In the navigation pane, select the datacenter where you want to provision the datastore.
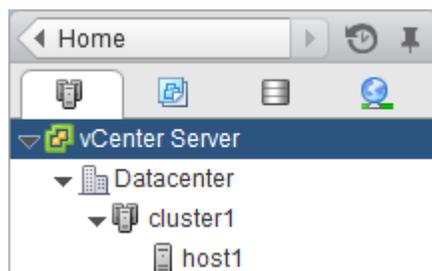
3. Specify the hosts on which you want to mount the datastore.

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

4. Complete the pages in the **NetApp Datastore Provisioning Wizard** to create the datastore.

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

| Field	Description
Aggregate	Defines the aggregate on which you want to create a new volume. If you selected an SVM that is directly connected to VSC, striped aggregates appear as available; however, they are not supported. Provisioning to a striped aggregate will fail.
Auto grow	(NFS only) Automatically expands the datastore by the specified increment when space is needed, up to the size limit. The size limit that you specify must be larger than the existing datastore.
Datastore cluster	Adds the datastore to a cluster if the Storage Distributed Resource Scheduler (SDRS) feature is enabled on the vCenter Server.
Storage capability profile	(Recommended) Specifies an existing storage capability profile that the wizard will use when defining the type of storage that you require for your virtual machines. The storage capability profile determines the following storage features: availability, disaster recovery, performance, protocol, and space efficiency. Storage capability profiles are available only if you installed and registered VASA Provider for ONTAP. You can select either a default storage capability profile that ships with VASA Provider, a profile that you created, or a profile that was auto-generated. To provision a datastore without a storage capability profile, you should select **None**.
Thin provision	Allocates space on the volume when data is written, which allows you to provision more storage than is currently available. If disabled, space is reserved immediately.
	You must closely monitor the available space in the containing aggregate because thin provisioning can oversubscribe the available space. In an NFS configuration, you can enable auto grow to automatically expand the datastore when space is needed. Ensure that the value you specify for auto grow is larger than the size of the datastore.
Volume	Specifies the volume on which you want to create the datastore. For ONTAP, you should not create a datastore in the SVM root volume.

5. In the **Ready to complete** page, review the summary of your selections, and then click **Finish**.

Mounting datastores on 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.

Steps

1. From the vSphere Web Client **Home** page, click **Hosts and Clusters**.

2. In the navigation pane, select the datacenter that contains the host.
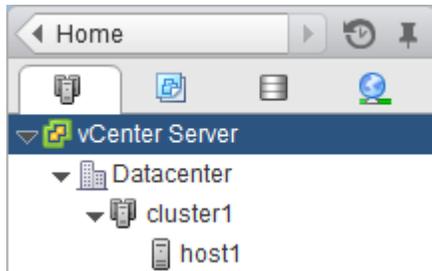
3. Right-click the host and select **NetApp VSC > Mount Datastores**.

4. Select the datastores that you want to mount, and then click **OK**.

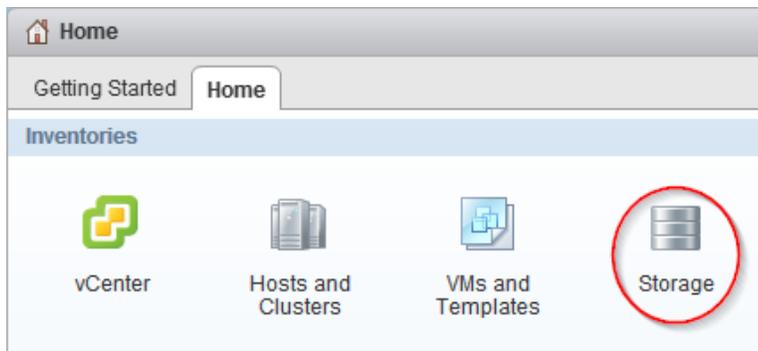# Resizing datastores

You might need to change the size of a datastore as your infrastructure requirements change.
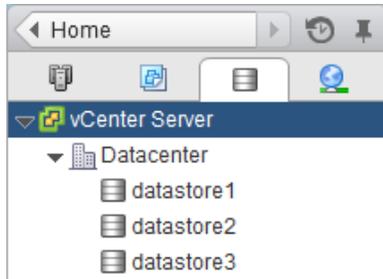
About this task

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 Web Client **Home** page, click **Storage**.

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 click **OK**.

Destroying datastores

You might need to destroy a datastore when you decommission your virtual machines.

About this task

When you destroy a datastore, the virtual machines within that datastore are also destroyed. Virtual Storage Console for VMware vSphere displays a list of the affected virtual machines before you destroy the datastore.

Steps

1. From the vSphere Web Client **Home** page, click **Storage**.
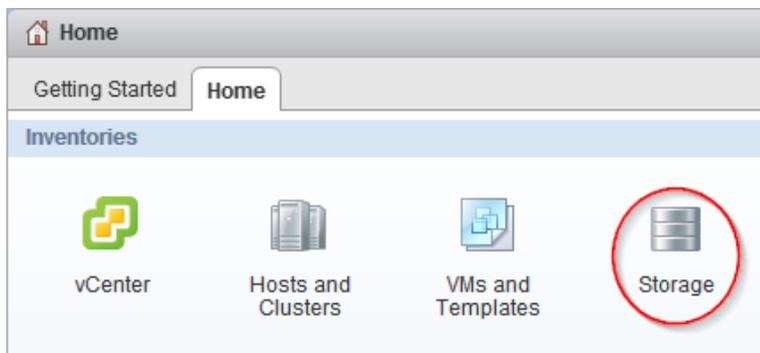
2. In the navigator pane, right-click the datastore and select **NetApp VSC > Destroy**.

3. Click **OK**.

Host configuration and performance monitoring using the VSC dashboard

The Virtual Storage Console dashboard of the virtual appliance for Virtual Storage Console (VSC), VASA Provider, and Storage Replication Adapter (SRA) provides an overview of the storage systems, ESXi host systems, datastores, and virtual machines in your vCenter Server environment. You can monitor the performance of datastores and virtual machines. The dashboard also reports any issues with storage and ESXi hosts.

The VSC dashboard displays IOPS, space utilized, latency, and committed capacity metrics that are obtained from your vCenter Server. ONTAP provides 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 data that is provided in the

dashboard helps vCenter Server administrators and storage administrators in analyzing the datastore usage and to take corrective action to prevent the virtual machines from running into space-related constraints.

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 modify 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, an alert is displayed in the Host Systems portlet of the dashboard. You can click the alert to view the host name or the IP address of the ESXi host that has an alert.

Steps

1. Click **Home > Virtual Storage Console** from your vSphere Web Client.

2. Modify the ESXi host settings.

If you want to use the...	Do this...
Alert	a. Click ⚠ in the Host Systems portlet. b. Click the ESXi host name for which you want to modify the settings. c. Right-click the ESXi host name, and then click **NetApp VSC > Set Recommended Values**. d. Modify the required settings, and then click **OK**.
Edit settings button	a. Click **Edit settings**. b. Modify the required settings for the ESXi host in the Set Recommended Settings dialog box. c. Click **OK**.

Viewing the ESXi host settings using alerts

You can view the details of the ESXi hosts for which an alert is displayed in the Host Systems portlet of the dashboard of the virtual appliance for Virtual Storage Console (VSC), VASA Provider, and Storage Replication Adapter (SRA).

Before you begin

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

Steps

1. Log in to your vCenter Server instance.

2. Click **Home > Virtual Storage Console** from your vSphere Web Client.

3. Click ⚠ in the **Host Systems** portlet, and then click on the ESXi host for which an alert is displayed.

   The IP address of the host systems that have alerts are listed in the NFS settings dialog box.

4. Right-click the ESXi host name, and then click **NetApp VSC > Show Details**.

   The ESX Host Details dialog box provides information about the status, timeout settings, and mount paths for the ESXi host. You can view the current values and recommended values corresponding to the NFS settings for the selected ESXi host.

Monitoring datastores by using the VSC dashboard of the virtual appliance for VSC, VASA Provider, and SRA

You can monitor the performance and view details about storage that has critical issues by using the Datastores portlet of the Virtual Storage Console dashboard of the virtual appliance for Virtual Storage Console (VSC), VASA Provider, and Storage Replication Adapter (SRA). The dashboard lists the top five datastores in your vCenter Server instance.

The Datastores portlet provides the following details:

- The number of traditional datastores that are managed by VSC in your vCenter Server instance
  You can view all of the datastores that are configured in your vCenter Server along with their performance metrics.

- The top five datastores based on resource usage and performance parameters
  You can view the top five datastores in your vCenter Server along with their performance parameters and modify these datastores, if required.

You can list the top five datastores according to the space utilized, IOPS, or latency in one of the following orders:

- High to Low

- Low to High

  Note: To view the IOPS for a datastore, you must enable Storage I/O Control as detailed in the VMware documentation.

  - *https://docs.vmware.com/en/VMware-vSphere/6.0/com.vmware.vsphere.resmgmt.doc/GUID-BB5D9BAB-9E0E-4204-A76A-54634CD8AD51.html*

  - *https://docs.vmware.com/en/VMware-vSphere/6.5/com.vmware.vsphere.resmgmt.doc/GUID-BB5D9BAB-9E0E-4204-A76A-54634CD8AD51.html*

The VSC dashboard of the virtual appliance for VSC, VASA Provider, and SRA enables you to view either NFS datastores or VMFS datastores. You can click on 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.

In the VMware vCenter Server linked-mode setup, you may have multiple instances of vCenter Servers. When you navigate from the VSC dashboard of one vCenter Server to any other page (for example, the datastore performance page), and then you navigate back to the VSC dashboard by using the Back button, data is displayed for the first vCenter Server instance in the vCenter Server drop-down menu. You must manually select the required vCenter Server instance for which you want information in the vCenter Server drop-down menu. The Reports page behaves in a similar manner.

Unrecognized storage systems issue

The VSC dashboard of the virtual appliance for Virtual Storage Console (VSC), VASA Provider, and Storage Replication Adapter (SRA) displays alerts about unrecognized storage systems if authentication fails for any storage system or if any storage system is not configured in the vCenter Server.

About this task

This issue might be caused if the storage system credentials or the storage systems are updated in ONTAP, but are not updated in the vCenter Server. When NFS datastores are mounted over a private network or on any non-NetApp storage system in the vCenter Server, VSC discovery lists the datastores as unknown.

Storage systems with IPv6 IP addresses are also listed as unrecognized.

Steps

1. Access the VSC dashboard of the virtual appliance for VSC, VASA Provider, and SRA.

2. Click ⚠ .

3. Click the link for the storage system for which an alert is displayed.

If the storage system...	Do this...
Has an authentication failure	**a.** Right-click the storage system with the authentication failure, and then click **Modify**. If the storage system credentials are not updated in the vCenter Server, you must add the credentials to your vCenter Server. **b.** Enter the appropriate credentials in the Modify Storage Systems dialog box, and then click **OK**.
Has an unknown error	**a.** Right-click the storage system with "unknown" status, and identify the error. If the alert is displayed because the storage system is not added to your vCenter Server, then you must add the storage system to your vCenter Server. **b.** Click 🔲 Add , and then add the required details of the storage system in the Add Storage System dialog box. **c.** Click **OK**.

Monitoring virtual machines using the VSC dashboard

The Virtual Storage Console dashboard of the virtual appliance for Virtual Storage Console (VSC), VASA Provider, and Storage Replication Adapter (SRA) lists the top five virtual machines in your vCenter Server based on the selected parameters.

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.

You can customize how the top five virtual machines are listed in the dashboard. The top five virtual machines can be listed in one of the following order:

- High to Low

- Low to High

You can further categorize the top five virtual machines by committed capacity, latency, and uptime. You can click on a virtual machine to navigate to the details view provided by the vCenter Server.

Managing VVol datastores by using VASA Provider

You can use VASA Provider for ONTAP to create and manage virtual volume (VVol) datastores. You can provision a VVol datastore, edit a VVol datastore, add and remove storage, mount a VVol datastore, and delete a VVol datastore.

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).

The Provision VVOL Datastore wizard that is provided by VASA Provider automatically sets up the VVol datastore. 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. Because FlexVol volumes have LUN count restrictions that limit the number of virtual machines, including multiple FlexVol volumes can increase performance.

As part of the setup process, the wizard prompts you to specify a storage capability profile for the VVol datastore that you are creating. You must select one or more VASA Provider storage capability profiles for a VVol datastore. The profiles specify the FlexVol volume attributes. Using these profiles enables you to perform policy-based management within a datastore instead of using policy-based management only for datastore selection.

The wizard also prompts you to 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 VM Provisioning or VMDK creation, as required.

- **Config**
  VMware vSphere uses this VVol 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 datastore.

- **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 memory snapshot is selected when running 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.

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 availability, capacity, and performance (storage service level) for the storage object that is associated with the storage capability.

VASA Provider generates a storage capability that defines the storage service level for each LUN or volume that matches the vCenter Server list of registered objects that are attached to an ESXi host, and sends the storage capability to the vCenter Server. Storage capabilities can be either system-defined, which are generated by VASA Provider, or user-defined, which you can manually create in the vCenter Server.

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.

Note:

- The storage capabilities list that is displayed in the vCenter Server includes the datastore type (NFS or VMFS) that is associated with each of the capabilities.

- VASA Provider does not check the state of the SnapMirror relationship or SnapVault relationship while generating a storage capability.

VASA Provider generates the following storage capabilities:

Name	Description	Characteristics
Hybrid	Hybrid storage	Storage using SSD and any other disk type
Hybrid; Replication	Replicated hybrid storage	Hybrid and SnapMirror storage or SnapVault storage
Value	Storage on cost-efficient disks	Storage using only SATA disks
Value; Replication	Replicated storage on cost-efficient disks	Value and SnapMirror storage or SnapVault storage
Performance	Storage using high-performance disks	Storage using non-SATA disks or non-hybrid disks
Performance; Replication	High-performance disks and replicated storage	Performance and SnapMirror storage or SnapVault storage

If you have the 7.1 virtual appliance for Virtual Storage Console (VSC), VASA Provider, and Storage Replication Adapter (SRA), then you can configure every VVol datastore with new storage capability profile that supports provisioning of virtual machines with varying IOPS requirement on the same VVol datastore. While executing the VM provisioning workflow with IOPS requirement, all VVol datastores will be listed under compatible datastore list.

> **Note:** If you upgrade from existing VSC to the 7.1 version of virtual appliance for vCenter Server versions earlier to 6.5, and try provisioning or modifying virtual machines, only VVol datastores containing storage capability profiles with exact match for "MAX_IOPS" are listed under compatible datastore list. The remaining VVol datastores are listed under incompatible datastore list. But you can ignore this classification and select any required VVol datastore from the incompatible datastore list to provision or modify virtual machine successfully.

Creating and editing storage capability profiles

You have several options for using VASA Provider for ONTAP to create new storage capability profiles. You can create a profile manually, you can auto-generate a profile based on the capabilities of a datastore, or you can modify the profile to meet your requirements. After setting up a profile, you can edit the profile as required.

Before you begin

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

About this task

You could configure "MaxThroughput IOPS" and "MaxThroughput MBPS" QoS metrics for performance capability in the earlier release of virtual appliance for Virtual Storage Console (VSC), VASA Provider, and Storage Replication Adapter (SRA). However, with the 7.1 version of the virtual appliance, you can configure only "Max IOPS". For traditional datastore provisioning, you can configure the QoS metric for "Max IOPS" at the FlexVol volume level. However, for virtual datastores, the QoS metric is set at the VVol level. This capability provides greater flexibility in assigning varied QoS metrics for different VMDKs of same virtual machine provisioned on a virtual datastore.

After upgrading from an earlier release to the 7.1 version of the virtual appliance for VSC, VASA Provider, and SRA, the legacy storage capability profiles are retained for backward compatibility. The legacy storage capability profiles are available for existing provisioned datastores and virtual machines. 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. The legacy storage capability profiles are displayed as read-only in the storage capability profile menu.

If any of your default templates (Gold, Silver, Bronze) are in use, then while upgrading to 7.1, the legacy templates are retained, and new templates are created with the "-1" suffix. If the default templates are not in use, then during the upgrade to the 7.1 version of the virtual appliance for VSC, VASA Provider, and SRA, the existing templates are over-ridden and reflect the new QoS metric under Performance capability of storage capability profiles.

You can configure the "Min IOPS" attribute for performance by using ONTAP 9.3, but you cannot collate the data for this attribute. The 7.1 version of the virtual appliance for VSC, VASA Provider, and SRA supports the configuration of only the "Max IOPS" attribute for which ONTAP allows the collection of metrics.

Steps

1. From the Virtual Storage Console (VSC) **Home** page, click **VASA Provider for ONTAP** to go to the VASA Provider section of the VSC GUI.

2. Select **Storage Capability Profiles**.

3. Create a profile or edit an existing profile, as required:

If you want to...	Do this...
Create a profile	Click the [Create icon] icon.
Edit an existing profile	Select the profile that you want to modify on the Objects page, and then either choose the [Edit icon] icon or click **Edit** from the **Actions** menu.

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.

- Any existing storage capability profiles from earlier release cannot be modified.

4. 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 majority of the fields allow you to select a value from a drop-down list. As you run the wizard, here are some points to keep in mind:

Consideration	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.
	Having 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 containing resources that support higher performance, good disaster recovery, and long retention. Enabling these features on datastores can be costly.
	If the datastores are required only for basic applications, you might be able to reduce cost by creating a more moderate profile.

Consideration	Explanation
Any value will do for a field	If you do not require a specific value for a resource, you can select the **Any** value. VASA Provider then ignores that field while searching for a matching profile. **Note:** VASA Provider does not support storage capability profiles for which all of the fields have the value set to Any. You can set this value for multiple fields, but you must also specify one or more specific values for the profile. VASA Provider uses the values that you specify while creating a filter to locate available datastores. VASA Provider displays these datastores when you view them in the Storage Mapping page or when you use storage capability profiles to provision storage. For example, if on the Space Efficiency page, you select **Yes** as the value for Autogrow, VASA Provider matches the profile to a datastore only if the volume has Autogrow enabled and the storage capability profile of the datastore matches the other profile values. If you select **No**, then Autogrow must be disabled for that profile to be considered. However, if you select **Any** as the value, VASA Provider ignores that feature while checking whether the datastore matches the profile.
Quality of service functionality	**Max IOPS** is the measurement on the Performance tab that enables you to use the QoS functionality. When applied for traditional datastore, a QoS policy with mentioned MAX IOPS value is created and assigned to FlexVol. When applied for virtual datastore, a QoS policy with mentioned MAX IOPS value is created for each Data VVol.

5. After selecting the required features, click **OK**.

After you finish

After you create a profile, you can return to the VASA Provider for ONTAP page, and select **Storage Mapping** to view which profiles match which datastores.

Automatically generating storage capability profiles

VASA Provider for ONTAP enables you to automatically generate storage capability profiles from existing datastores. When you select a datastore from the Storage Mapping page and click **Auto-**

generate, VASA Provider creates a profile that contains the capabilities that are used by that datastore.

Before you begin

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

- Virtual Storage Console (VSC) must have discovered your storage.

About this task

Automatically generated profiles contain only information about the following capabilities:

- High availability

- Protocol

- Disk Type

- Flash Accelerated

- Deduplication

- Replication

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 Virtual Storage Console **Home** page, click **VASA Provider for ONTAP** to go to the VASA Provider GUI.

2. Select **Storage Mapping**.

3. From the list on the **Objects** page, select a datastore.

4. From the Actions menu, select **Auto-generate**.
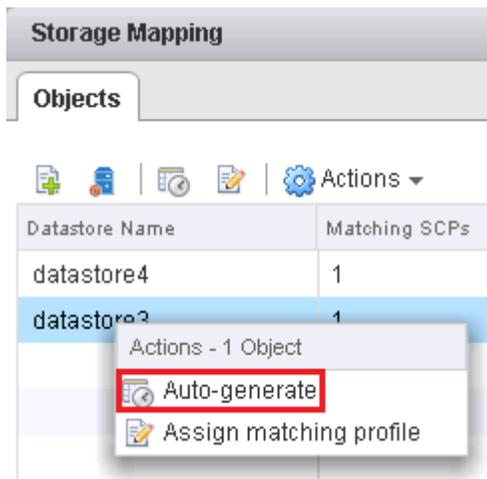
5. When the auto-generate process finishes, refresh the screen to view information about the new profile.

VASA Provider places the new profile in the Associated profile column. The name of the new profile is based on the resources in the profile. For example, a profile named "FCP_SATA_NoDedupe_NonReplicated_HA" has the following configuration:

- FCP protocol

- SATA disk

- No deduplication

- No replication

- High Availability enabled

You can rename the profile, if required.

Checking for datastore compliance with the mapped storage capability profile

You can quickly check to see whether your datastores are still compliant with the storage capability profiles mapped to them.

Before you begin

- You must have registered your VASA Provider with Virtual Storage Console for VMware vSphere before you perform these steps.

- VSC must have already discovered your storage.

Steps

1. From the Virtual Storage Console **Home** page, click **VASA Provider for ONTAP** to go to the VASA Provider GUI.

2. Select **Storage Mapping**.

3. Look at the column **Non-compliance Reason**.

   Note: You can also click the Compliance check icon; however, doing that tells VSC to perform a rediscovery operation for all the storage, which can take a long time.

   If a datastore is no longer compliant with its profile, this column lists the reason. For example, a profile might require Flash Pool, but that setting has been changed on the underlying storage so that Flash Pool is no longer used.

After you finish

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

To modify the settings go to the VASA Provider Storage Capability Profile page.

Setting alarm thresholds in VASA Provider for ONTAP

VASA Provider for ONTAP enables you to set alarms to notify you when volume thresholds and aggregate thresholds reach certain limits.

Before you begin

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

About this task

Aggregate-level alarms affect all of the volumes in an aggregate. Volume-level alarms affect all of the LUNs in a volume.

> **Note:** You can set alarm thresholds only for NFS datastores or VMFS datastores.

VASA Provider displays a yellow alarm when a volume or an aggregate reaches the "Nearly full" threshold limit and a red alarm when a volume or an aggregate reaches the "Full" threshold limit. The default values for the threshold alarms are 80 percent for "Nearly full" and 90 percent for "Full".

If you are using space reservations, VASA Provider does not display an alarm, even if an aggregate is 99-percent full. VASA Provider displays alarms only when a volume is at a specified threshold limit and cann3ot expand its capacity; space reservations enable volumes to expand.

You can view the alarms that are raised by VASA Provider for NFS datastores or VMFS datastores and the description of the alarms in your vCenter Server instance by navigating to the required datastore, and then accessing Tasks & Events on the Monitor tab.

Threshold alarms take precedence over alarms that notify you about noncompliance between datastores and profiles. If there is a yellow threshold alarm or a red threshold alarm, VASA Provider does not report noncompliance issues for any associated datastores.

You cannot provision virtual machines on a traditional datastore that displays a red alarm.

Steps

1. From the Virtual Storage Console **Home** page, click **VASA Provider for ONTAP** to go to the VASA Provider section of the VSC GUI.

2. Select **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 values.

  ◦ You can slide the arrows on the bar below the values to adjust the 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 the volume alarm and the aggregate alarm.

Provisioning VVol datastores

You can use VASA Provider for ONTAP to create virtual volume (VVol) datastores. The Provision VVOL Datastore wizard performs all of the necessary storage-side setup processes such as creating export policies, creating initiator groups, and mapping LUNs.

Before you begin

- You must have ONTAP 9.3 or later version for your storage system.
  FlexVol volumes that are used as backing storage will be displayed by the VASA Provider dashboard only if they are running ONTAP 9.3 or later.

About this task

The VVol datastores that you configure must be in the active state or accessible state. You must not use the vCenter Server New Datastore wizard to create VVol datastores for NetApp storage. The vCenter Server New Datastore wizard does not perform the storage-side setup processes that the VASA Provider Provision VVOL Datastore wizard does. You should use the vCenter Server New Datastore wizard only when a storage container and associated storage objects have already been created for storage.

- Provisioning of VVol datastores fails when the vCenter Server version is 6.5.

- You must use cluster credentials to create VVol datastores.
  You cannot use storage virtual machine (SVM) credentials to create VVol datastores.

See the troubleshooting section of the virtual appliance for *Virtual Storage Console (VSC), VASA Provider, and Storage Replication Adapter (SRA) for VMware vSphere Deployment and Setup Guide* to work around this issue.

Virtual Storage Console, VASA Provider, and Storage Replication Adapter for VMware vSphere Deployment and Setup Guide for 7.1 release

Steps

1. From the vSphere Web Client **Home** page, click **Hosts and Clusters**.

2. In the navigation pane, right-click the datacenter on which you want to provision the datastore, and then select **VASA Provider for ONTAP > Provision VVol Datastore**.

   You can choose to make the datastore available to all of the hosts in a datacenter, to all of the hosts in a cluster, or to a single host.

3. Complete the pages in the **Provision VVOL Datastore** wizard to create the datastore.
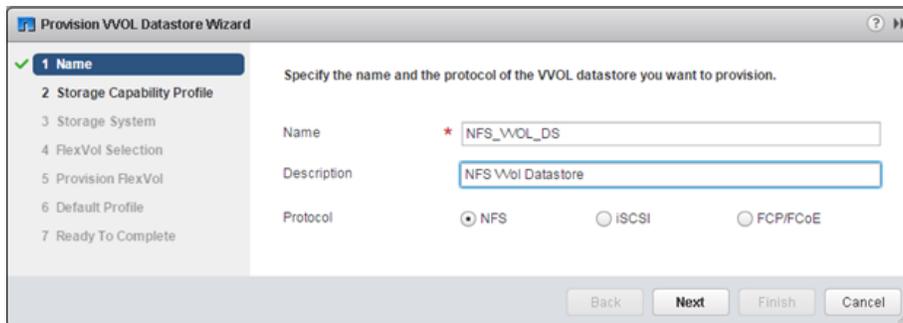
   a. Name page
      You should specify a name and protocol for the new VVol datastore. It is a good practice to enter a description for the new datastore and to select a protocol.

   b. Storage Capability Profile page
      You should select the profiles that you want to be available to the VVol datastore when the storage is provisioned. You can select multiple profiles.

      Note: You can create storage capability profiles from the VASA Provider GUI, which you can access from the VSC GUI.

   c. Storage System page
      From the drop-down list, you should select the storage system and storage virtual machine (SVM) where the VVol datastore will be created.
      This Storage System list displays only the storage systems and SVMs that match the storage capability profiles that you specified on the previous screen.
      This page also includes a list of the storage systems that you cannot use and the errors that are associated with them.

   d. FlexVol Selection page
      If you want to use existing FlexVol volumes, you should select the FlexVol volumes that you want to use.

      Note:

- You can either use existing FlexVol volumes or create new ones; you cannot do both.

- You must have a minimum of one FlexVol per Storage Capability Profile (SCP) of minimum size 4 GB for every VVol datastore that you create.

e. Provision FlexVol page

If you want to create a new FlexVol volume, you should click the **Add** button, and complete the information for the new FlexVol volume. If the storage capability profile does not have the auto grow feature enabled, that section of the dialog box is disabled. All of the FlexVol volumes in a VVol datastore must be from the same SVM.

After you create a new FlexVol volume, you can edit it by selecting the **Modify** button. You can also delete the FlexVol volume if required.

Recommendation: When you are working with SAN VVol datastores, it is a good practice to store no more than 30 virtual machines on one FlexVol volume and to provision your VVol datastores accordingly. This is because ONTAP FlexVol volumes support a limited number of LUNs per FlexVol volume. A single virtual machine takes up multiple LUNs based on the number of disks, number of Snapshot copies, and so on. NFS VVol datastores do not have this constraint.

f. Default Profile page

You should specify the storage capability profile that is used for virtual machines that do not specify a specific storage capability. This happens when the virtual machine is automatically provisioned for datastores. These include configuration VVols that are used by vSphere to hold configuration information, data VVols that contain operating system information and user files, and swap VVols.

g. Ready to Complete page

You should review the information that you have supplied for the VVol datastore. If the information is correct, you can proceed to next step.

If the information is incorrect, you should return to the appropriate page, and correct the information.

4. Click **Finish**.

The wizard creates the VVol datastore. You can track the status of the VVol datastore provisioning process by verifying the "NetApp datastore allocation" task and the "NetApp Mount Datastores" task in the Recent Tasks tab of vSphere Web Client.

Result

You might notice a delay (15 to 30 minutes) in getting performance metrics on the VASA Provider dashboard for the newly provisioned VVol datastore when you have registered OnCommand API Services for the first time.

Related references

VASA Provider dashboard data requirements

You must verify some important requirements of the VASA Provider dashboard to display dynamic details of the virtual volume (VVol) datastores and virtual machines. You must refer to the following table if the metrics are not displayed in VASA Provider dashboard.

The following table presents an overview of what you should verify if the VASA Provider 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. • 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.

Editing a VVol datastore

You can edit an existing virtual volume (VVol) datastore to change the default storage capability profile.

Steps

1. From the vSphere Web Client Home page, click **Hosts and Clusters**.

2. Right-click the datastore and select **VASA Provider for ONTAP > Edit VVol Datastore**.

   The Edit VVol Datastore dialog box appears.

3. Make the necessary changes.

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

   Note: You cannot change the vCenter Server where the VVol datastore is located.

Edit VVOL Datastore - ISCSI_VVOL

vCenter Server:	app-lab-net3-59.vm.labnet.com
Name	* ISCSI_VVOL
Description	
Default Storage Capability Profile	* CompA ▾

OK   Cancel

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.

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

Steps

1. From theVMware vSphere Web Client **Home** page, click **Hosts and Clusters**.

2. Right-click the VVol datastore that you want to modify, and then select **VASA Provider for ONTAP > Decrease Storage from VVol Datastore**.

   The Decrease Storage from VVol Datastore dialog box appears.

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.

Steps

1. From the vSphere Web Client **Home** page, click **Hosts and Clusters**.

2. Right-click the datastore that you want to mount, and then select **VASA Provider for ONTAP > Mount VVOL Datastore**.

The VASA Provider 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 any 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.

> **Note:** Even though the vSphere Web 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 click **OK**.

Migrating traditional virtual machines to VVol datastores

You can migrate traditional datastores to virtual volume (VVol) datastores to manage and provision multiple LUNs and datastores. VVol datastores enable you to scale to meet increased workload requirements.

Before you begin

You must ensure 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. In addition, you will lose access to all of the VVol datastores because VASA Provider will not be able to boot.

About this task

When you migrate from a standard datastore to a VVol datastore, the vCenter Server instance does not use vStorage APIs for Array Integration (VAAI) offloads. 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 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 7.1 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 the newer "Max IOPS" QoS metrics of the 7.1 version of the virtual appliance.

About this task

With the 7.1 version, you can configure QoS metrics for each virtual machine or virtual machine disk (VMDK). The QoS metrics were earlier applied at the ONTAP FlexVol level and were shared by all virtual machines or VMDKs that were provisioned on that FlexVol.

With the 7.1 version of the virtual appliance, the QoS metrics of one virtual machine is not shared with other virtual machines.

> **Note:** You should not modify the existing VM Storage Policy as this may result in the virtual machines being non-compliant.

Steps

1. Create new VVol datastores by using new storage capability profile with the required "Max IOPS" value.

2. Create a new VM Storage Policy, and map it with the new storage capability profile.

3. Perform storage vMotion of existing virtual machines to the newly created VVol datastores using VM Storage Policy.

Monitoring VVol datastores by using the VASA Provider for ONTAP dashboard

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

The VVol Datastores portlet provides the following information:

- 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 list the top five VVol datastores according to space utilized, IOPS, or latency in one of the following orders:

- You must enable OnCommand API Services 2.1 or later from the NetApp Support Site.

- You must be using ONTAP 9.3 for your storage system.

  > **Note:** To view the IOPS for a VVol datastore:

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 VASA Provider dashboard.

- High to Low

- Low to High

You can click a VVol datastore name to navigate to the details view that is provided by the vCenter Server instance. The linked-mode of vCenter Server is not supported by VASA Provider.

> **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 the icon to update the dashboard view with the latest available data.
>
> - If you have added, modified, or deleted a storage system from your vCenter Server, 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 Read IOPS and Write IOPS.

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

Monitoring virtual machines by using the VASA Provider for ONTAP dashboard

The VASA Provider for ONTAP dashboard of the virtual appliance for Virtual Storage Console (VSC), VASA Provider, and Storage Replication Adapter (SRA) lists the top five virtual machines that are provisioned on a virtual volume (VVol) datastore in your vCenter Server based on the selected parameters.

The Virtual Machines portlet of the VASA Provider for ONTAP dashboard provides the following information:

- The number of virtual machines that are using NetApp VVol datastores in your vCenter Server

- The 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 VASA Provider dashboard. The top five virtual machines can be listed according to committed capacity, IOPS, throughput, logical space, latency, or uptime in one of the following orders:

- High to Low

- Low to High

You can click on the name of a virtual machine to navigate to the details view for the selected virtual machine in your vCenter Server.

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).

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 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 array manager

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

Before you begin

- The protected and recovery sites must already be paired in SRM.

- SnapMirror relationships between the protected and recovery sites must already be configured and replicated.

About this task

SRA 7.0 supports cluster-level management and SVM-level management. You must enable SVM management LIFs to enable multitenancy.

Steps

1. In SRM, click **Array Managers**, and then click **Add Array Manager**.

2. Enter the following information to describe the array in Site Recovery Manager:

   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, enter the cluster management LIF.

      - If you are connecting directly to an SVM, enter the IP address of the SVM.

      > **Note:** You can add either the SVM management IP using the SRA server web CLI `vserver add` command or the cluster management IP using the `cluster add`.

      You must have configured your storage before configuring array manager.

   d. If you are connecting to a cluster, enter the name of the SVM in **SVM name**; otherwise, leave this field blank.

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

      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 fields and *dst_vol1* in the recovery site fields.

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

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 a string in the volume name.

Example

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

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

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

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.

Pairing protected and recovery sites

You must pair the protected and recovery sites created using your vSphere web 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.

Steps

1. Double-click **Site Recovery** on the vSphere web client, 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.

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".

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

If you encounter unexpected behavior during the installation or configuration 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 VSC, VASA Provider, and SRA virtual appliance log files

You can use the GUI of Virtual Storage Console (VSC), VASA Provider, and Storage Replication Adapter (SRA) virtual appliance of your vCenter Server to collect the log files. Technical support might ask you to collect the log files to help troubleshoot a problem.

Steps

1. Open the vSphere Client and log into your vCenter Server.

2. Click **Virtual Storage Console** icon from the **Inventories** panel, and then click the **Configuration**.

3. Select **Export VSC Logs**, and then click **Submit**.

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

After you finish

Send the .zip file to technical support.

Editing VM Storage Policies after upgrade throws error message

When you attempt to edit existing "VM Storage Policy" after upgrade from 7.0 version of virtual appliance for VSC, VASA Provider, and SRA to 7.1 version and prior to configuring any new storage capability profiles, you may get an error `There are incorrect or missing values below`.

Description

You may 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 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.

VASA Provider known issues and limitations

VASA Provider does not support vCenter Server instances in linked mode.

VASA Provider has the following issues when vCenter Server instances are in linked mode:

• While creating a virtual volume (VVol) datastore on a vCenter Server instance other than the first vCenter Server instance, VASA Provider displays the error message `Unable to create a vvol datastore due to insufficient privileges.`

• The storage capability profile that is created for one vCenter Server instance is displayed on the other vCenter Server instances in linked mode.

VVol datastore provisioning fails with vCenter Server 6.5

The provisioning of virtual volume (VVol) datastores might fail with the error message `Unable to complete mount VVol datastore on all hosts`. You can work around this issue to complete the VVol datastore provisioning process.

Steps

1. Restart the vCenter Server "sps" service:

If vCenter Server is deployed...	Do this...
As an appliance	a. Stop the vCenter Server "sps" service: **service-control --stop vmware-sps** b. Start the vCenter Server "sps" service: **service-control --start vmwarep-sps**
On a Windows system	At the command prompt: a. Access the required directory **cd C:\Program Files\VMware\vCenter Server\bin** b. Stop the vCenter Server "sps" service: **service-control --stop vimPBSM** c. Start the vCenter Server "sps" service: **service-control --start vimPBSM**

2. From the vSphere Web Client **Home** page, click **Hosts and Clusters**.

3. Select the datacenter where you want to provision the datastore.

4. Right-click the datastore or cluster, and then select **Storage > New Datastore**.

5. Select **VVol** as the type of the datastore, and then click **Next**.

6. In the **Name and container selection** field, enter a name for the datastore.

   NetApp storage containers are listed in the Backup storage container section.

7. Select the required backing storage container, and click **Next** to complete the creation of the VVol datastore.

Copyright information

Trademark information

NETAPP, the NETAPP logo, and the marks listed on the NetApp Trademarks page are trademarks of NetApp, Inc. Other company and product names may be trademarks of their respective owners.

http://www.netapp.com/us/legal/netapptmlist.aspx

How to send comments about documentation and receive update notifications

You can help us to improve the quality of our documentation by sending us your feedback. You can receive automatic notification when production-level (GA/FCS) documentation is initially released or important changes are made to existing production-level documents.

If you have suggestions for improving this document, send us your comments by email.

doccomments@netapp.com

To help us direct your comments to the correct division, include in the subject line the product name, version, and operating system.

If you want to be notified automatically when production-level documentation is released or important changes are made to existing production-level documents, follow Twitter account @NetAppDoc.

You can also contact us in the following ways:

* NetApp, Inc., 495 East Java Drive, Sunnyvale, CA 94089 U.S.

* Telephone: +1 (408) 822-6000

* Fax: +1 (408) 822-4501

* Support telephone: +1 (888) 463-8277

Index