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

Workflow Guide for 7.1 release

∏ NetApp®

Contents

Deciding whether to use this guide

TheVirtual Storage Console (VSC), VASA Provider, and Storage Replication Adapter (SRA) Workflow Guide describes the workflows that can be executed based on the applications that you have deployed in your vCenter Server.
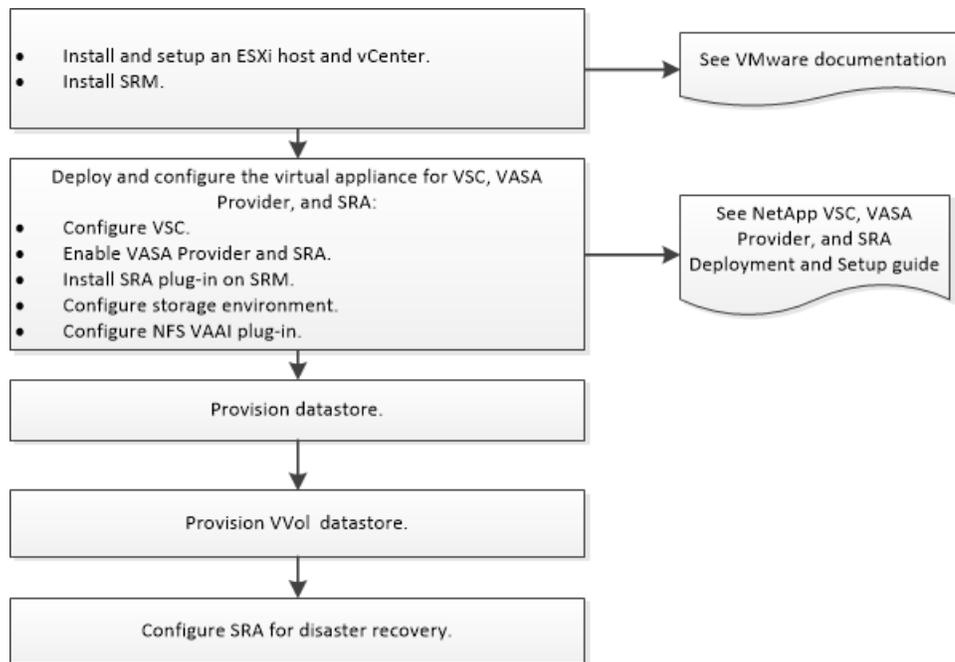
After you deploy the virtual appliance for VSC, VASA Provider, and SRA, VSC is installed, and then you can enable VASA Provider or SRA individually or both together depending on the tasks that you want to perform.

Your vCenter Server setup must meet certain requirements, before you can use this document as a reference to execute the vCenter Server tasks.

Workflow for deploying and configuring VSC, VASA Provider, and SRA

You can manage and monitor traditional datastores, virtual datastores, and the disaster recovery setup by using the virtual appliance for Virtual Storage Console (VSC), VASA Provider, and Storage Replication Adapter (SRA).

```
• Install and setup an ESXi host and vCenter.     →  See VMware documentation
• Install SRM.

Deploy and configure the virtual appliance for VSC, VASA
            Provider, and SRA:                    →  See NetApp VSC, VASA
• Configure VSC.                                      Provider, and SRA
• Enable VASA Provider and SRA.                       Deployment and Setup guide
• Install SRA plug-in on SRM.
• Configure storage environment.
• Configure NFS VAAI plug-in.

            Provision datastore.

            Provision VVol datastore.

            Configure SRA for disaster recovery.
```

Steps

1. *Provisioning datastores* on page 9

2. *Configuring virtual volume datastores* on page 12

3. *Configuring SRA for disaster recovery* on page 24

Workflow for deploying and configuring VSC and VASA Provider

You can manage and monitor traditional datastores and virtual datastores by using the virtual appliance for Virtual Storage Console (VSC), VASA Provider, and Storage Replication Adapter (SRA). You must have deployed VSC and enabled VASA Provider to perform the tasks represented in the workflow.

Steps

1. *Provisioning datastores* on page 9

2. *Configuring virtual volume datastores* on page 12

Workflow for deploying and configuring VSC and SRA

You can manage and monitor traditional datastores and the disaster recovery setup by using the virtual appliance for Virtual Storage Console (VSC)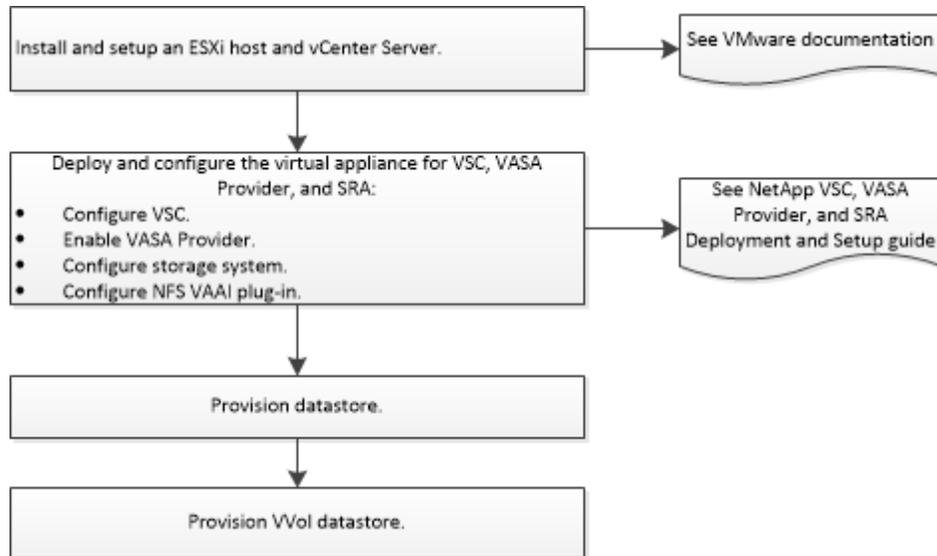, VASA Provider, and Storage Replication Adapter (SRA). You must have deployed VSC and enabled SRA to perform the tasks in the workflow.
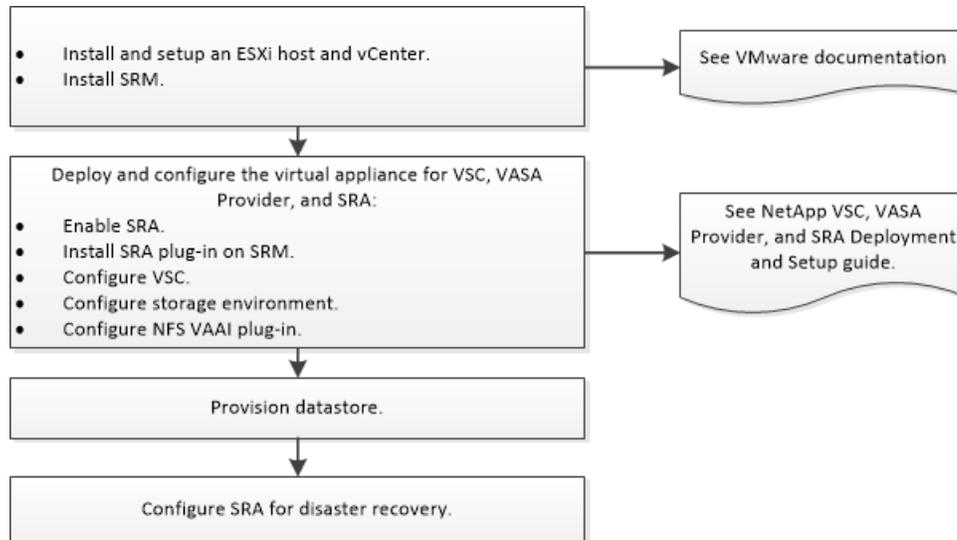
Steps

1. *Provisioning datastores* on page 9

2. *Configuring SRA for disaster recovery* on page 24

Workflow for deploying and configuring VSC

You can manage and monitor traditional datastores by using the virtual appliance for Virtual Storage Console (VSC), VASA Provider, and Storage Replication Adapter (SRA). You must have VSC deployed to perform the tasks in the workflow.

Step

1. *Provisioning datastores* on page 9
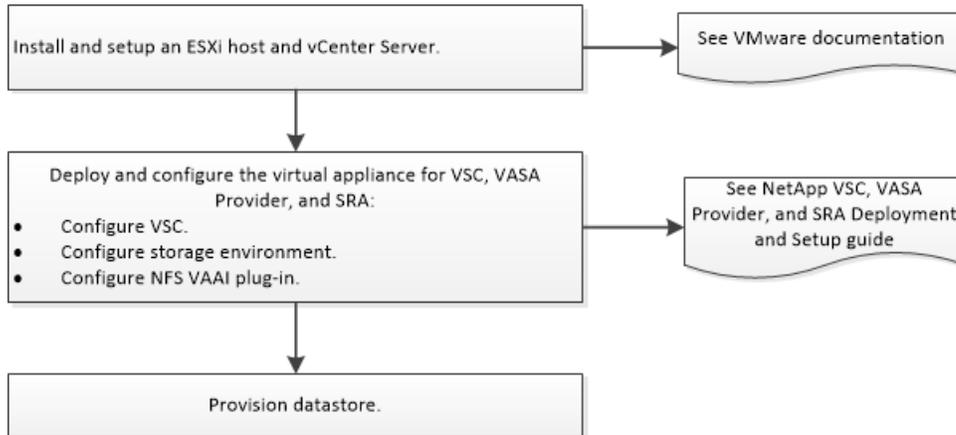
Configuring datastores

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, which enables you to easily monitor and manage these datastores and virtual machines.

Steps

1. Provisioning datastores on page 9
   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.

2. Mounting datastores on hosts on page 11
   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.

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 VSC preferences file must include the ESXi host subnet masks.
  This is also applicable to virtual datastore creation.

- 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 creates a datastore on 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.
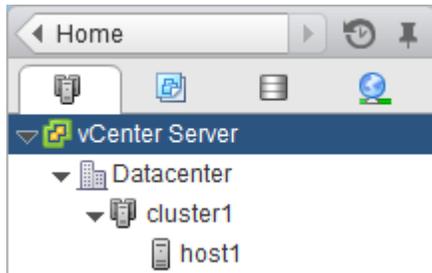
3. Specify the hosts on which you want to mount the datastore.

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. You should not mix datastores with varying offsets in the same cluster and do not mix optimized and non-optimized datastores.
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 eithera 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. |

Field	Description
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**.
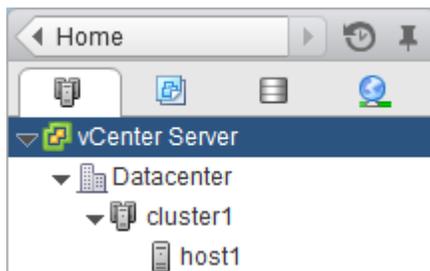
Mounting datastores on hosts

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**.

Result

VSC mounts the datastores on the host.

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).

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 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 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. Creating and editing storage capability profiles on page 13
   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.

2.
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. You can also change the storage capability profile that is associated with a datastore.

3.
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.

4.
You can increase the available storage by using the Add Storage wizard to add FlexVol volumes to an existing virtual volume (VVol) datastore.

5.
When you use virtual volumes (VVols), you have the option of using VM Storage Policies and storage capability profiles. Before you can set up any VM Storage Policies, you must enable them for each host and cluster that is associated with the VVols.

6.
You can mount a virtual volume (VVol) datastore to one or more additional hosts by using the Mount VVOL Datastore dialog box.

7.
VASA Provider for ONTAP enables you to set alarms to notify you when volume thresholds and aggregate thresholds reach certain limits.

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.
Edit an existing profile	Select the profile that you want to modify on the Objects page, and then either choose the ✎ Edit 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.
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.

Consideration	Explanation
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.

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. You can also change the storage capability profile that is associated with a datastore.

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

VASA Provider does *not* display any virtual volume (VVol) datastores on this page. All the datastores that are referred to in this task are traditional datastores.

Steps

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

2. Select **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. VASA Provider does not support 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

3. 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**.

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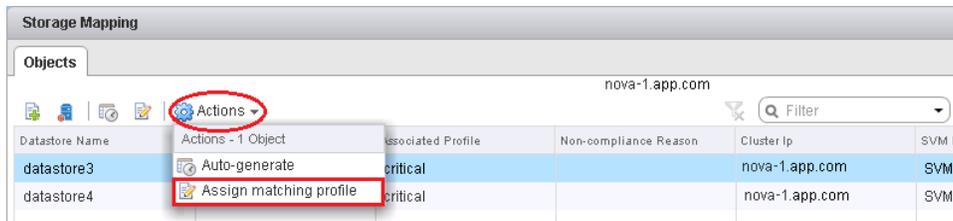
5. Select the profile that you want map to the datastore from the list of matching profiles that is provided in the **Assign profile to datastore** dialogue box, and click **OK** to map the selected profile to the datastore.
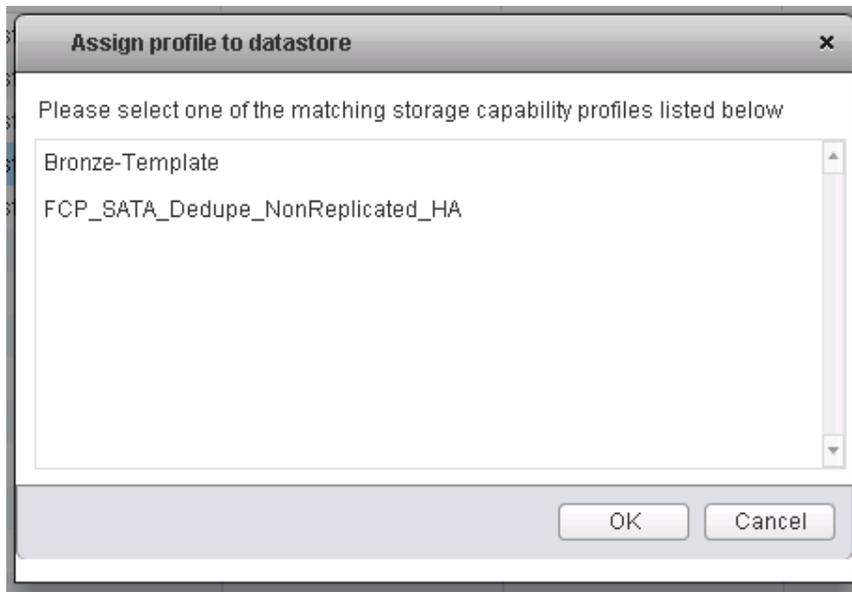
6. Refresh the screen to verify the new assignment.

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.

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 virtual volume (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 Web Client Home page, click **Hosts and Clusters**.

2. Right-click the datastore, and then select **VASA Provider for ONTAP > Add Storage to VVOL Datastore**.

3. Complete the pages in the **Add Storage** wizard.

    You can either add an existing FlexVol volume to the VVol datastore or create a new FlexVol volume to add to the database.

    Reminder: All FlexVol volumes in a VVol datastore must be from the same Storage Virtual Machine (SVM).
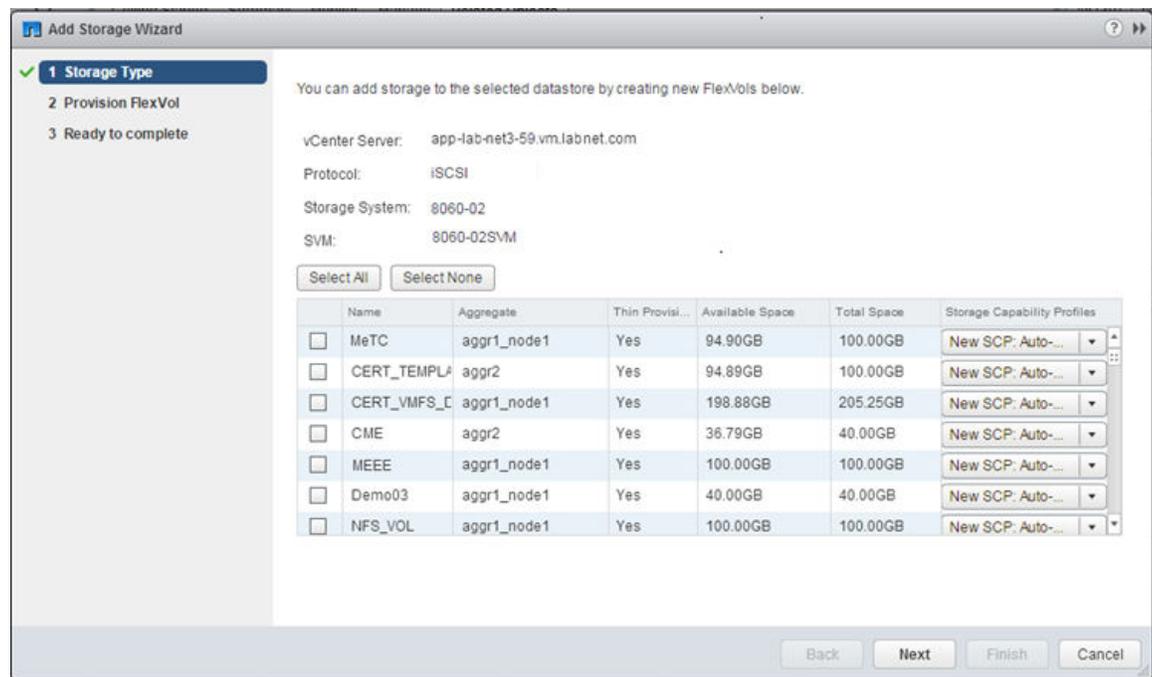
    a. Storage Type page
    Select the FlexVol volumes that you want to add to the VVol datastore.
    In the Storage Capability Profile column, use the drop-down list to either create a new profile based on the FlexVol volumes or select one of the existing profiles. The auto-generate feature creates a profile based the storage capabilities, such as disk type, high availability, disaster recovery, performance features, and deduplication, that are associated with that FlexVol volume.

   b. Provision FlexVol page

   Create new FlexVol volumes by clicking the **Add** button, and then filling out the information in the dialog box that appears. If the storage capability profile does not have the auto grow feature enabled, that section of the dialog box is disabled.

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

   c. Ready to complete page

   Review the information that you supplied for the VVol datastore. If it is correct, select **Finish**. If the information is not correct, return to the appropriate page and fix it.

4. Click **Finish**.

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

   Note: The 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 your storage container.

Enabling VM Storage Policies

When you use virtual volumes (VVols), you have the option of using VM Storage Policies and storage capability profiles. Before you can set up any VM Storage Policies, you must enable them for each host and cluster that is associated with the VVols.

Before you begin

Each host and cluster must have a VM Storage Policies license. For more information, see your VMware vSphere documentation.

About this task

   Note: You do not have to use VM Storage Policies if you are using vCenter Server 6.5.

Steps

1. From the vSphere Web Client **Home** page, click **VM Storage Policies**.

2. On the **VM Storage Policies** page, click the **Enable VM Storage Policies** icon ( ).

   The Enable VM Storage Policies dialog box appears. This box displays information about the ESXi hosts and clusters, including whether they are licensed for VM Storage Policies or whether their status is "Unknown".

3. Select the ESXi host or cluster with a status of "Unknown" for which you want to enable VM Storage Policies.

   Note: If you have a multiple vCenter Server environment, you must specify the vCenter Server first.

4. Click **Enable**.

5. Repeat Steps *3* on page 21 through *4* on page 21 until each ESXi host and cluster that is associated with the VVol has VM Storage Policies enabled, and then click **Close**.

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**.

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.

Configuring SRA for disaster recovery

After completing the initial Storage Replication Adapter (SRA) configuration, you must set up disaster recovery workflows that can be executed.

To configure disaster recovery workflows, you must create protection groups, and then create a recovery plan.

> **Note:** During disaster recovery, SRA checks for existing export policies for the selected volumes. If an existing export policy is associated with the storage object, then that policy is used. In the absence of an export policy, SRA creates an export policy to be used for the volume.

Steps

1. Configuring protected and recovery site resources on page 24
   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.

2. Pairing protected and recovery sites on page 27
   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.

3. Configuring array manager on page 27
   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).

4. Creating protection groups on page 29
   You must create protection groups to protect a group of virtual machines on the protected site.

5. Creating a recovery plan on page 29
   You must create a recovery plan to define the protection groups that must be recovered simultaneously.

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] 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.

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.

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.

Creating protection groups

You must create protection groups to protect a group of virtual machines on the protected site.

Before you begin

- You must have installed Storage Replication Adapter (SRA) and Site Recovery Manager (SRM) in your vCenter Server environment.

- You must have configured SRA and performed a replication operation for the protected site. Each replicated virtual machine must be assigned to an existing resource pool, folder, and network on the recovery site using inventory mappings.

Steps

1. Log in to your vCenter Server, and click **Site Recovery > Protection Groups**.

2. In the **Protection Groups** pane, click **Objects >** .

3. In the **Create Protection Group** wizard, specify the following information:

   a. Specify a name and description for the protection group, and then click **Next**.

   b. In the Protection group type field, select the protected site, select array-based replication (ABR) as the protection group type, and then click **Next**.

   c. In the Datastore groups tab, select the required datastore groups, and then click **Next**.

      All of the virtual machines on the selected datastore are added to the protection group.

   d. In the **Ready to complete** tab, review the details of the protection group that you created, and then click **Finish**.

Result

The protection group is created. You can repeat steps 2 and 3 to create more protection groups.

Creating a recovery plan

You must create a recovery plan to define the protection groups that must be recovered simultaneously.

Before you begin

- You must have configured your storage system.

- You must have installed Storage Replication Adapter (SRA) and Site Recovery Manager (SRM).

- You must have created protection groups.

About this task

You can include multiple protection groups in a single recovery plan, or you can include a single protection group in multiple recovery plans.

Steps

1. Log in to your vCenter Server, and click **Site Recovery > Sites**.

2. In the **Related Objects** tab, select **Recovery Plans**, and then click the icon.

3. In the **Create Recovery Plan** wizard, specify the following details:

    a. In the **Name and location** tab, specify a name and description for the recovery plan, and then click **Next**.

    b. In the **Recovery site** tab, select the recovery site, and then click **Next**.

    c. In the **Protection groups** tab, select the protection groups for the recovery plan, and then click **Next**.

    d. In the **Test networks**, select the test networks that are to be used for running a test recovery operation, and then click **Next**.

    e. In the **Ready to complete** tab, review the details of the recovery plan, and then click **Finish**.

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