

Hitachi Storage Provider for VMware vCenter

Virtual Storage Platform G series, F series, VSP, HUS VM

Deployment Guide

v03.5.4

This manual provides information for the Storage Provider for VMware vCenter (for Block Storage) Deployment Guide.

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Preface

This deployment guide provides information to help your site implement VMware VASA features with Hitachi Virtual Storage Platform G series, F series, VSP, and HUS VM.

Intended audience

This document is intended for:

- vSphere™ system administrators
- Systems engineers

Readers of this document should be familiar with the basic operation of the following:

- Hitachi Virtual Storage Platform (VSP)
- Hitachi Unified Storage VM (HUS VM)
- Hitachi Virtual Storage Platform G series (VSP G series)
- Hitachi Virtual Storage Platform F series (VSP F series)
- VMware vSphere 6.5/6.7
- Oracle Linux 7.4

Product version

This document describes Hitachi Storage Provider for VMware vCenter (VASA Provider) Deployment v03.5.4.

Release notes

Read the release notes before installing and using this product. They may contain requirements or restrictions that are not fully described in this document or updates or corrections to this document. Release notes are available on Hitachi Vantara Support Connect: <https://knowledge.hitachivantara.com/Documents>.

Referenced documents

The documents below are either referenced by this document, or supply more information related to this product's features.

- *Provisioning Guide for Open Systems, MK-92RD8014*
- *Provisioning Guide for Open Systems, MK-94HM8014*
- *System Administrator Guide, MK-92RD8016*
- *System Administrator Guide, MK-94HM8016*
- *Provisioning Guide or Virtual Storage Platform Provisioning Guide , MK-90RD7022*

Document conventions

This document uses the following typographic conventions:

Convention	Description
Bold	<ul style="list-style-type: none"> ▪ Indicates text in a window, including window titles, menus, menu options, buttons, fields, and labels. Example: Click OK. ▪ Indicates emphasized words in list items.
<i>Italic</i>	<ul style="list-style-type: none"> ▪ Indicates a document title or emphasized words in text. ▪ Indicates a variable, which is a placeholder for actual text provided by the user or for output by the system. Example: <code>pairdisplay -g group</code> <p>(For exceptions to this convention for variables, see the entry for angle brackets.)</p>
Monospace	Indicates text that is displayed on screen or entered by the user. Example: <code>pairdisplay -g oradb</code>
< > angle brackets	Indicates variables in the following scenarios: <ul style="list-style-type: none"> ▪ Variables are not clearly separated from the surrounding text or from other variables. Example: <code>Status-<report-name><file-version>.csv</code> ▪ Variables in headings.
[] square brackets	Indicates optional values. Example: [a b] indicates that you can choose a, b, or nothing.

Convention	Description
{ } braces	Indicates required or expected values. Example: { a b } indicates that you must choose either a or b.
vertical bar	Indicates that you have a choice between two or more options or arguments. Examples: [a b] indicates that you can choose a, b, or nothing. { a b } indicates that you must choose either a or b.

This document uses the following icons to draw attention to information:

Icon	Label	Description
	Note	Calls attention to important or additional information.
	Tip	Provides helpful information, guidelines, or suggestions for performing tasks more effectively.
	Caution	Warns the user of adverse conditions and/or consequences (for example, disruptive operations, data loss, or a system crash).
	WARNING	Warns the user of a hazardous situation which, if not avoided, could result in death or serious injury.

Conventions for storage capacity values

Physical storage capacity values (for example, disk drive capacity) are calculated based on the following values:

Physical capacity unit	Value
1 kilobyte (KB)	1,000 (10 ³) bytes
1 megabyte (MB)	1,000 KB or 1,000 ² bytes
1 gigabyte (GB)	1,000 MB or 1,000 ³ bytes
1 terabyte (TB)	1,000 GB or 1,000 ⁴ bytes
1 petabyte (PB)	1,000 TB or 1,000 ⁵ bytes
1 exabyte (EB)	1,000 PB or 1,000 ⁶ bytes

Logical capacity values (for example, logical device capacity, cache memory capacity) are calculated based on the following values:

Logical capacity unit	Value
1 block	512 bytes
1 cylinder	Mainframe: 870 KB Open-systems: <ul style="list-style-type: none"> ▪ OPEN-V: 960 KB ▪ Others: 720 KB
1 KB	1,024 (2 ¹⁰) bytes
1 MB	1,024 KB or 1,024 ² bytes
1 GB	1,024 MB or 1,024 ³ bytes
1 TB	1,024 GB or 1,024 ⁴ bytes
1 PB	1,024 TB or 1,024 ⁵ bytes
1 EB	1,024 PB or 1,024 ⁶ bytes

Accessing product documentation

Product user documentation is available on Hitachi Vantara Support Connect: <https://knowledge.hitachivantara.com/Documents>. Check this site for the most current documentation, including important updates that may have been made after the release of the product.

Getting help

[Hitachi Vantara Support Connect](https://support.hitachivantara.com/en-us/contact-us.html) is the destination for technical support of products and solutions sold by Hitachi Vantara. To contact technical support, log on to Hitachi Vantara Support Connect for contact information: <https://support.hitachivantara.com/en-us/contact-us.html>.

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Thank you!

Chapter 1: Overview

Hitachi Storage Provider for VMware vCenter is a VMware VASA Provider which allows VASA features to be used with supported Hitachi storage systems.

About the VASA Provider

Hitachi Storage Provider for VMware vCenter (a VASA Provider) allows VMware VASA features to be used with Hitachi storage systems.

1. VMware vSphere Virtual Volumes (VVols)

This function constitutes the VP (VASA Provider) component of VMware Virtual Volumes, which allows VVols to be used with supported Hitachi storage systems.

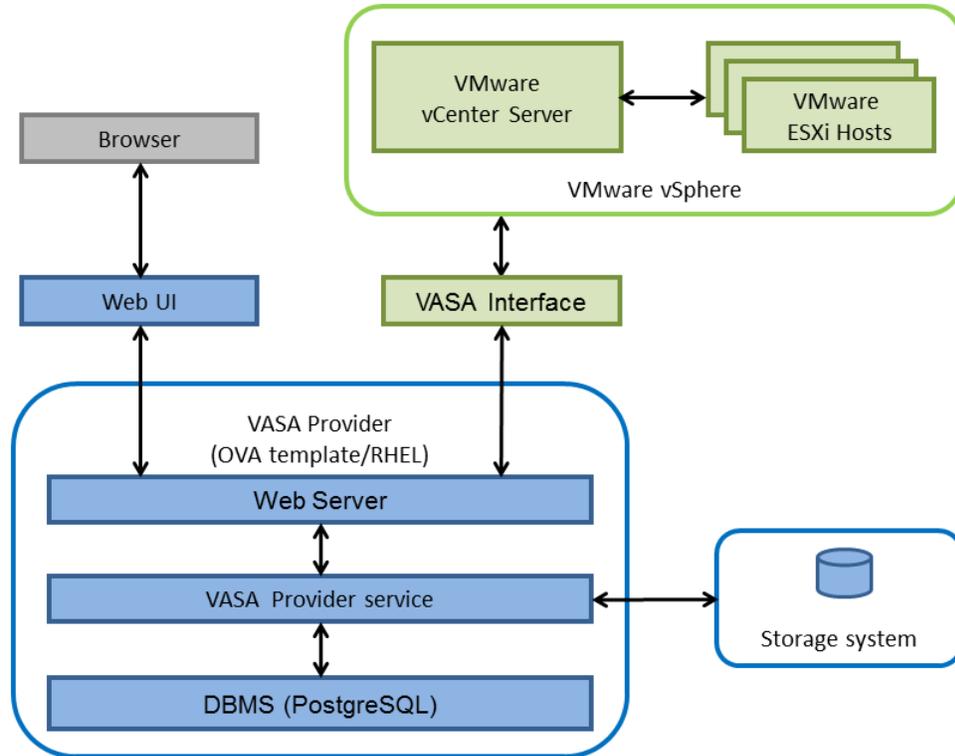
2. VMware Virtual Machine File System (VMFS)

- a. Storage capability information and alert notifications related to VMFS filesystems are generated automatically and displayed in vCenter Server. For example, an alert will appear in vSphere Web Client when an LDEV's used capacity threshold's exceeded.
- b. VMware SPBM tags for devices backing VMFS filesystems are provided, which associate the VMFS filesystems with storage profiles. These profiles allow storage policies to be configured in vSphere for VMFS filesystems in addition to VMware VVols. For example, in vCenter, a datastore can be assigned tags, such as "Encryption: Yes", which indicate various capabilities.

See VMware documentation for more VASA Provider information.

VASA Provider deployment architecture

The following diagram shows how the VASA Provider functions.



Key terms and concepts

Term	Description
ALU	Administrative Logical Unit An ALU is the volume that provides the access point to the virtual machine. To use a VVol, an ALU must be assigned to the ESXi host. ALU is called protocol endpoint in vSphere.
Block	Block storage refers to storage accessed using FC or iSCSI (instead of a NAS protocol like NFS)
OVF	Open Virtualization Format. This product includes an OVF file containing a VM with a guest operating system and the VASA Provider pre-installed.
PE	Protocol Endpoint

Term	Description
SLU	<p>Subsidiary Logical Unit</p> <p>An SLU is the destination volume where virtual machine data is stored. When a virtual machine is created, SLUs are created from a DP pool or Hitachi Thin Image pool and bound to an ALU (assigned a path). SLUs are called VVols on the virtual machine.</p>
SPBM	Storage Policy-Based Management
Storage Container	<p>A storage container is where resources such as DP pools and Hitachi Thin Image pools are collected for creating virtual machines, snapshots, and clones. DP pools and Hitachi Thin Image pools are added to resource groups and then made available to vSphere administrators by creating storage containers. There is a one-to-one relationship between a storage container and a resource group. DP pools are used to create virtual machines while DP pools or Hitachi Thin Image pools are used to create snapshots or clones. Storage containers are viewed from virtual machines as datastores.</p>
VASA	<p>Abbreviation for VMware vSphere Storage APIs for Storage Awareness. This function indicates the overall storage management functions of vSphere.</p>
VMFS	VMware Virtual Machine File System
VVols	VMware vSphere Virtual Volumes

Chapter 2: System requirements

Hardware requirements

Component	Requirement
VSP (VVols not supported)	70-06 or later
HUS VM (VVols not supported)	73-03 or later
Virtual Storage Platform G1000	80-03 or later
VSP G200, G400, G600, G800	83-02 or later
VSP F400, F600, F800	83-02 or later
VSP G1500	80-05 or later
VSP G350, G370, G700, G900	88-01 or later
VSP F350, F370, F700, F900	88-01 or later
VSP F1500	80-05 or later
Host bus adapter	HBAs must support the Secondary LUNID feature to use VVols
VMware ESXi 6.5/6.7 resource requirements to deploy the VASA Provider VM	<ul style="list-style-type: none">▪ CPU: vCPU (4)▪ Main memory: 8 GB▪ HDD capacity: 100 GB▪ Ethernet: 1 Gbps or more is recommended
Display for Web UI	<ul style="list-style-type: none">▪ Display resolution: 1,600 x 900 or higher (recommended)▪ Color depth: 24 bit or higher (recommended)

Software requirements

Software	Requirements
VMware	VMware vCenter Server 6.5/6.5 (Update 1 and 2) VMware ESXi 6.5/6.5 (Update 1 and 2) VMware vCenter Server 6.7 VMware ESXi 6.7
Multipath software	Native VMware NMP or Dynamic Link Manager (8.2.0-01 or later)
Browser	Microsoft Internet Explorer 10.0.19 and later Mozilla Firefox 34 and later Google Chrome 39 and later
VASA Provider	PostgreSQL 9.3 Oracle Linux 7.4 (This is the pre-installed guest operating system in this product's OVF file, and is only relevant if the OVF file deployment method is chosen. When the RHEL installer deployment method's chosen instead, this guest operating system is not used. If problems occur within the guest operating system, contact Oracle for assistance. It may be necessary to purchase support from Oracle. Once a VM has been deployed from the OVF file, updating the guest operating system (Oracle Linux) is not recommended.) Red Hat Enterprise Linux 6.8 or 7.2 (when using the RHEL installer instead of the OVF file)
Storage Management Software (Optional)	Hitachi Configuration Manager 8.6.0 and later (SVP or CM REST APT Server is available for VASA Provider with VSP G350, G370, G700, G900 or VSP F350, F370, F700, F900. VVols is not supported for CM REST API Server.)



Note: The VASA Provider supports vCenter Server Linked Mode, however, you must register with each vCenter Server.

Supported protocols

The VASA Provider supports both iSCSI and FC connections between ESXi hosts and storage arrays.

Restrictions and considerations for VVol Environments

Cancelling a Storage vMotion migration task	Attempting to cancel a running Storage vMotion task may fail, though the VM data residing at the Storage vMotion source will remain intact.
Cancelling creating a VM snapshot	Once a snapshot process starts, do not attempt to cancel the task. Instead, delete the snapshot data after the task completes.
Cancelling reverting to a VM snapshot	Attempting to cancel a running VM snapshot revert task may fail. Retry the operation and make certain the task completes properly.
Expanding the volume after cloning	If the volume is unable to expand immediately after cloning a VM residing in a Virtual Datastore, please wait for a couple of minutes and retry.
Fastclone operations	VMware Horizon View and VMware vRealize Automation deployments using Linked cloned operations (fastclone) are not supported in this release. These functions will return an error indicating it is unsupported. Instead, use VMware vRealize Automation's option for creating non-linked clone VMs.
File upload to VVol Datastore	File upload to the VVol Datastore using VMware vSphere is not recommended.
LDEVs and SLU attribute	Creating and deleting LDEVs with the SLU attribute can only be managed using VMware vCenter Server. Attempting such an operation without using VMware vCenter Server can disrupt the storage system configuration.
Modifying VM Storage Policy	When you have multiple Pools and policies in one storage container, moving VM (VVol) with the modified VM Storage Policy among those Pools are not supported. For more information, see Cannot modify VM storage policy (on page 71) .
Restarting the VASA Provider	Storage array failures may prevent VMs residing on Virtual Datastores from being accessible. Wait for a while after the failure recovery and, if re-scanning the VASA Provider does not restore access, restart the VASA Provider. After restarting the VASA Provider, it may take a while for VMs to become accessible again.
SLU deletion	After changing the operating system time, it may be necessary to restart the VASA Provider. Otherwise, the SLU may remain on the storage system after VVol-based virtual machines have been deleted.

Storage vMotion of VMs with hierarchical (branched) snapshots	Storage vMotion of VMs with hierarchical (branched) snapshots may fail, though the VM data residing at the Storage vMotion source will remain intact. It may be necessary to consolidate or remove a VM's hierarchical snapshots before using Storage vMotion.
VM disk format	Only VMs with VMware virtual disks using the VMware Thin Provision format are supported. If a VM has VMware virtual disks configured using either Thick Provision Lazy Zeroed or Thick Provision Eager Zeroed, the VM's data will still reside on the storage array using the VMware Thin Provision format.

Changing the IP address (for VVols/VMFS)

- The VASA Provider server must be configured with a static IP address; it doesn't support DHCP.
- Should it become necessary to change the VASA Provider server's IP address, first change the address, then follow the steps below:
 1. Re-create the SSL authentication files.
 2. Restart the VASA Provider.
 3. Re-register the VASA Provider in VMware vSphere.

Multiple VASA Providers (for VVols/VMFS)

You can register multiple VASA Providers in vCenter Server. However, registering the same storage system in multiple VASA Providers is not supported.

A tag-based storage policy can be used with only one vCenter Server.

Chapter 3: Installing the VASA Provider

Installation overview

The VASA Provider is distributed as an Open Virtualization Format (OVF) file and is deployed on VMware vSphere as a packaged virtual machine (VM) which includes the VASA Provider and all the dependencies.

Obtaining the VASA Provider

The VASA Provider OVF can be obtained from the following sources:

- The VASA Provider distribution media
- Download from VMware Marketplace
- Download from Support Portal

Deploying the VASA Provider

Deploying the OVF creates a VM pre-installed with the VASA Provider and all of its prerequisites. Use these steps to deploy the OVF.

Before you begin

- Confirm that the OVF package is available.
- Confirm that the vSphere environment is installed and running.
- Confirm that software version requirements are met for vSphere Web Client. Using the required versions can help to ensure stable vSphere Web Client operation.
- You will need a VMFS/NFS/vSAN datastore provisioned. The VASA Provider VM will reside on this datastore.
- You will need the FQDN or IP address of the ESXi host on which the OVF is to be deployed.
- Confirm that reverse DNS lookup is available for DNS server.

To check whether reverse DNS lookup is available, specify an IP address for the `nslookup` command.

Procedure

1. Locate the OVF package files to a storage location that is local to the client system on which you want to launch the Web browser and log in to vCenter Server.



Note: Referencing the files from another location may be possible, but if the client is transferring the file over the network, then the install time can be severely impacted.

2. Launch a browser and log in to vSphere Web Client.
3. In the **Navigator** pane at the left side of the screen, perform the following steps:
 - a. Select **vCenter Home > vCenter Inventory Lists**.
 - b. Select **Virtual Machines**.
 - c. In the **Virtual Machines** pane at the right side of the screen, click the **Deploy OVF template** icon ().
4. In the **Select source** screen, browse to the location where the OVF is located, then click **Next**.
5. In the **Review details** screen, verify the OVF template details, then click **Next**.
6. In the **Select name and folder** screen, perform the following steps:
 - a. Enter a name for the appliance.
 - b. Select a datacenter location for the appliance.
 - c. Click **Next**.
7. In the **Select a resource** screen, select the host or cluster on which to deploy the OVF, then click **Next**.
8. In the **Select storage** screen, perform the following steps:
 - a. From the **Select virtual disk format** drop-down list, select the applicable disk format.
 - b. From the **VM Storage Policy** drop-down list, select **Datastore Default**.
 - c. In the table of datastores, select the datastore on which you want the OVF to deploy.



Note: This datastore is typically the VMFS/NFS/vSAN datastore you previously provisioned.

- d. Click **Next**.
9. In the **Setup networks** screen, from the **Destination** drop-down list, select the network that you want the deployment to use, then click **Next**.
 10. In the **Customize template** screens, perform the following steps:



Important: Complete all of the properties fields or the deploy operation may fail.

- a. Enter a value for each deployment property.
- b. Click **Next**.
- c. Click the Systems Configuration drop-down icon to see the three settings.

11. In the **Ready to Complete** screen, confirm your settings, then click **Finish**.
vCenter deploys the OVF template and installs the VASA Provider.

Installing the VASA Provider using the RHEL installer

If you are unable to use the OVF to deploy the Hitachi VASA provider, you can instead use the Red Hat Enterprise Linux (RHEL) installer to manually deploy the provider. When you install the VASA Provider for RHEL, you must use the RHEL installer.

Before you begin

This procedure describes the entire process of installation on RHEL.

1. Prepare a RHEL host.
2. Install and configure the VASA Provider's prerequisites.
3. Install the VASA Provider.

The software packages listed here must be installed and configured as described before installing the VASA Provider.

Prerequisite software installation and configuration:

Item	Description
OpenJDK 1.8	<ul style="list-style-type: none"> ▪ Installation command example: # yum install java-1.8.0-openjdk-devel ▪ Run the following command to configure RHEL to use the Java version you just installed: alternatives --config java alternatives --config javac ▪ Edit /etc/profile and add two lines to the bottom of the file: JAVA_HOME=/usr/lib/jvm/java-1.8.0-openjdk-1.8.0.65-3.b17.el7.x86_64 export JAVA_HOME ▪ Use the command # source /etc/profile to reflect environmental variable.
PostgreSQL 9.3	<ul style="list-style-type: none"> ▪ Download the RPM for RHEL from the PostgreSQL Web site. For RHEL 6: http://yum.postgresql.org/9.3/redhat/rhel-6-x86_64/repoview/postgresqlserver93.group.html For RHEL 7: http://yum.postgresql.org/9.3/redhat/rhel-7-x86_64/repoview/postgresqlserver93.group.html ▪ The file names will be similar: For RHEL 7: postgresql93-9.3.14-1PGDG.rhel7.x86_64.rpm postgresql93-libs-9.3.14-1PGDG.rhel7.x86_64.rpm postgresql93-server-9.3.14-1PGDG.rhel7.x86_64.rpm For RHEL 6: postgresql93-9.3.14-1PGDG.rhel6.x86_64.rpm postgresql93-libs-9.3.14-1PGDG.rhel6.x86_64.rpm postgresql93-server-9.3.14-1PGDG.rhel6.x86_64.rpm rpm command examples: # rpm -ivh postgresql93-libs-9.3.14-1PGDG.rhel7.x86_64.rpm # rpm -ivh postgresql93-9.3.14-1PGDG.rhel7.x86_64.rpm

Item	Description
	# rpm -ivh postgresql93-server-9.3.14-1PGDG.rhel7.x86_64.rpm

Configuration

Item	Description
sudo	<p>The VASA Provider uses the sudo command during re-installation. Use the visudo command to edit /etc/sudoers to prepare for the reinstallation function.</p> <ul style="list-style-type: none"> Adding a user <p><Before the change></p> <pre>Defaults requiretty</pre> <p><After the change></p> <pre># Defaults requiretty Defaults:vptomcat !requiretty</pre> Setting authority <p><After noting></p> <pre>## Allow root to run any commands anywhere root ALL=(ALL) ALL vptomcat ALL=(ALL) NOPASSWD: ALL</pre>

External communication settings

Item	Description
Port numbers	<ul style="list-style-type: none"> Tomcat HTTP connection port: 50000 (TCP) Tomcat HTTPS connection port: 50001 (TCP) Tomcat shutdown port: 50004 (TCP) PostgreSQL connection port: 50003 (TCP)
Host name resolution	<p>To enable host name resolution, edit the /etc/hosts file as in this example:</p> <p>127.0.0.1 <HostName>.<DomainName></p> <p>The VASA Provider may not function properly if the loopback address does not resolve.</p>

Procedure

1. Log in to the VASA Provider server as root.
2. Copy the installer's tar archive file to the VASA Provider server and extract it.
3. Move to the extracted folder and start the installer using the command line:


```
# ./StorageProviderforVMwarevCenter_Linux_install.sh
```
4. Enter **y** or **Y** when the confirmation message is displayed.
5. Create an SSL certificate.
 - a. Open the SSL certificate settings file (`/usr/local/hitachivp-b/openssl.cnf`) with a text editor, and then change the value 0.0.0.0 to the IP address of the VASA Provider server.
 - b. At the command prompt, enter the following:


```
# cd /usr/local/hitachivp-b
# ./createCertifications.sh
```
6. Restart the VASA Provider's VM.

Upgrading the VASA Provider

This section describes how to upgrade the OVF.

Upgrading the VASA Provider (v2.6.x or earlier)

Follow the procedure listed below to upgrade the OVF v2.6.x or earlier.

Before you begin

- OVF file for the new VASA Provider version is available
- vSphere 6.5 or 6.7 is installed and running

Procedure

1. Remove the previous version of the VASA Provider from VMware vSphere.
2. Stop the VM associated with the previous VASA Provider.
3. Deploy the new OVF and configure the VASA Provider.
4. Configure the VASA Provider settings using the Setup Web UI. (You must re-register the storage systems that were associated with the previous version of the VASA Provider.)
5. Register the new VASA Provider in VMware vSphere.

Upgrading the VASA Provider (v3.1.x or v3.2.x)

You can migrate virtual machines to the new VASA Provider by using a temporary VMFS datastore. During the upgrade, the virtual machines remain online.

Before you begin

Prepare a VMFS datastore of the same capacity as the VVol datastore.

If you cannot prepare a VMFS datastore of the same capacity as the VVol datastore, create an LDEV in a pool used by the VVol datastore, and then use that LDEV as a VMFS datastore.



Note:

Note that, if you back up virtual machines to a VMFS datastore, some capacity might be consumed for each virtual machine.

Procedure

1. Prepare a VMFS datastore.
2. Migrate the virtual machines from the VVol datastore to the VMFS datastore by using Storage vMotion.
 - a. Log in to the vSphere Web Client.
 - b. In the Navigator area, click **Home**.
 - c. Click **Storage**.
 - d. Select the datastores managed by VASA Provider v3.1.x or v3.2.x.
 - e. Click the **Related Objects** tab, and then click the **Virtual machine** menu.
 - f. Select the virtual machines managed by VASA Provider v3.1.x or v3.2.x.



Tip:

You can select multiple virtual machines on the vSphere Web Client (vSphere Client).

- g. Right-click the selected virtual machines, and then click **Migrate** from the **Action** menu.
- h. Select **Change storage only**.
- i. Select the VMFS datastore, and then click **Next**.
- j. Make sure the information is correct, and then click **Finish**.



Note:

If you are using vCenter Server 6.0 or ESXi 6.0, this step might take a long time depending on the size of the virtual machines or depending on Storage vMotion. This issue has been improved in vCenter Server 6.5 and ESXi 6.5.

3. Remove VASA Provider v3.1.x or v3.2.x from vCenter Server.
 - a. Log in to the vSphere Web Client.
 - b. In the Navigator area, click **Home**.
 - c. Click **vCenter Inventory Lists**.
 - d. On the **Resources** tab, click **vCenter Servers**.
 - e. Select **vCenter Server > Manage > Storage Providers**.
 - f. Select VASA Provider v3.1.x or v3.2.x, and then click the removal icon (x).
4. Unmount the datastores managed by VASA Provider v3.1.x or v3.2.x.

- a. Log in to the vSphere Web Client.
 - b. In the Navigator area, click **Home**.
 - c. Click **Storage**.
 - d. Select the datastores managed by VASA Provider v3.1.x or v3.2.x.
 - e. Right-click the selected datastores, and then click **Unmount Datastore** from the **Action** menu.
5. Deploy the latest version of VASA provider. For more information, see [Deploying the VASA Provider \(on page 19\)](#).
 6. Register and set up, in the latest version of VASA Provider, the storage systems that were previously used in VASA Provider v3.1.x or v3.2.x. For more information, see [Registering storage systems in the VASA Provider \(on page 31\)](#).
 7. Create a storage container. Be sure to select the same resource group that was used by VASA Provider v3.1.x or v3.2.x.
 8. Register the latest version of VASA Provider. For more information, see [Registering the VASA Provider in VMware vSphere \(on page 57\)](#).
 9. Create a VVol datastore according to the procedure described in [Deploying a VVol datastore \(on page 59\)](#). Be sure to select the same storage container used by the previous version of the VASA Provider.
 10. Migrate the virtual machines from the VMFS datastore in step 2 to the new VVol datastore.

**Caution:**

After the migration of the virtual machines is finished, run `unmap` to release unused areas. (For more information, go to: <https://kb.vmware.com/articleview?docid=2048466>)

Upgrading the VASA Provider (v3.3.x to v3.4.0)

To upgrade from v3.3.x, install 3.4.0 and transfer the VASA Provider database.

Before you begin:

v3.4.0 is deployed. For more information, see [Installing the VASA Provider \(on page 19\)](#).

Procedure

1. Remove the registration of the VASA Provider that is the source of the data migration from VMware vSphere. In the VASA Provider Registration window, select the VASA Provider, click the **x** icon in the middle of the window, then click **Yes**.
2. As the root account, log in to the virtual machine of the VASA Provider (v3.3.x) that is the migration source.

3. Export the data with the following commands:

```
# mkdir /root/HCSwork
# cd /opt/HiCommand/Base64/bin
# ./hcnds64dbtrans -export -workpath /root/HCSwork -file /root/
db_dump.zip
# /opt/HiCommand/Base64/bin/hcnds64srv -stop
```

- 4.** Register and set up the storage systems used by the previous VASA Provider with the new VASA Provider. For more information, see [Registering storage systems in the VASA Provider \(on page 31\)](#).
- 5.** Copy the resulting data file (db_dump.zip) to the destination VASA Provider (v3.4.x) virtual machine.
- 6.** As the root account, log in to the destination VASA Provider (3.4.x).
- 7.** Stop the VASA Provider using the following command.

```
# /etc/init.d/tomcat_vp_b stop
```

- 8.** Import the exported data to the new VASA Provider (3.4.x) using the following command.

```
# /usr/local/hitachivp-b/
StorageProviderforVMwarevCenter_Linux_data_migration.sh /root/
db_dump.zip
```

- 9.** Register the new VASA Provider. See, [Registering the VASA Provider in VMware vSphere \(on page 57\)](#).
- 10.** Refresh the VASA Provider in the management screen of vCenter Server.

Upgrading the VASA Provider (v3.4.0 or later)

Use the VASA Storage Provider Web UI to update the VASA Storage Provider software or the Web UI software as needed.

**Caution:**

- If you like to deter all data from previous upgrade, obtain DB dump by following [VASA Provider migration \(on page 45\)](#).
- Clearing cash might be necessary when display is not updated.
- If the upgrading fails and the VASA Provider stop working, please contact Support.
- Functions based on version 1.0 of VMware's VASA API are not available by default in v03.4.1 and newer versions of this product, even if updates are performed. To use functions based on the VASA 1.0 API, either manually change optional function settings to make them valid, or use non-VVOL SPBM functionality.

Before you begin

This procedure only applies to VASA Provider versions 3.4.0 or later.

 **Note:** Proceed only when there are no running tasks.

The software file name resembles `file_name_xxx.tar.gz`

Verify the version number.

Procedure

1. To remove the VASA Provider, see [Setting up the VASA Provider \(on page 30\)](#).
2. Select the **Update Software** option.
3. Browse to the software to update.
4. Select the `.tar.gz` file.
 - a. Browse to the location where you want to upload the file.
 - b. Transfer the file to the VASA Provider.

 **Important:** Do not close or refresh your browser during the data transfer.

- c. After the upload is complete, click **Apply**.

 **Important:**
When you upgrade from v.3.4.x to v.3.5.0 or later, please set Single Sign-On domain name by following [Setting up vCenter Single Sign-On Server \(on page 47\)](#).

If **Set** is disabled even though the settings specified during setup were correct, clear the cache of the web browser you are using. Then, restart the web browser and specify the settings again.

5. To register the VASA Provider, see [Setting up the VASA Provider \(on page 30\)](#).
6. Refresh storage information by following, [Updating storage system information \(on page 31\)](#).

Verifying the installation

This section explains how to verify that Hitachi Storage Provider for VMware vCenter was successfully installed.

Starting the VM

After successful OVF deployment, a new VM is automatically created based on the configuration you provided during the deployment process.

 **Important:** You must start the newly created VM before you can log in.

Procedure

1. In vSphere Web Client, start the newly created VM.

2. Follow the procedure below to verify that you can log in to the VM and that the VASA Provider is running.
 - a. Log in to vSphere Web Client.
 - b. Navigate to **vCenter Inventory Lists > Virtual Machines**.
 - c. Select **Open console**.
 - d. Log in to the VASA Provider VM's guest operating system as root (root/password).

Logging in to the Web UI

After installing the VASA Provider, start a browser and enter the URL of the VASA Provider server to verify that you can log in.

Procedure

1. In a browser, enter the following URL:
`https://VASA-Provider-IP-Address:50001/`
2. In the Web UI window, enter the **vCenter SSO** account and **password** (or **system** and **manager**) and click **Login**.

The VASA Provider information is displayed on the Web UI's main window.



Caution: When you use SPBM tag, **Tagging Admin** must be available in the vCenter SSO account.

Item	Description
Service Name	Service name of the VASA Provider
Service Port Number	Port number used for communication between VMware vSphere and the VASA Provider
Database Port Number	Port number used for communication between PostgreSQL and the VASA Provider
Service Version	VASA Provider version
VASA Version	VASA API version
Supported Model	A list of supported storage system models



Note: It is important that vCenter Server, ESXi, and the VASA Provider are synchronized to the same NTP server, or you may have difficulty registering. It is recommended that you configure the NTP server during OVA deployment.

Chapter 4: Setting up the VASA Provider

Overview of VASA Provider Setup

After deploying the VASA Provider, set up the VASA Provider by performing the following operations:

1. Register one or more storage systems
2. Register the VASA Provider in VMware vSphere
3. Create storage containers for VVols, or setting storage policies for VMFS

You can use the Web UI to configure the VASA Provider settings described in the following table.

Operation	Function	Description
Management	Manage Storage Systems	Add, delete or display storage systems. Display or configure VMFS datastore LDEVs.
	Manage Storage Containers	Add, delete, or display storage containers.
	Capability Schema	Display available storage capability values.
	Change Credentials	Change the maintenance account password. The default account is system, and the default password is password .
	Update Software	Update the VASA Provider.
Maintenance	Single Sign-On Setting	Registers or updates vCenter Single Sign-On information.
	Download Logs	Downloads log files generated by the VASA Provider.
	Update Certificate	Updates the SSL certificate file for vCenter Server.
	Restart Service	Restarts the VASA Provider.
	Troubleshooting Guide	Displays the Troubleshooting Guide.

Related references

- [Setting up VVol environments \(on page 52\)](#)

For details on the VASA Provider and its various functions, see the VASA Provider documentation provided by VMware Inc.

Managing storage systems

This section describes how to register, view and remove storage systems.

Accessing the Manage Storage Containers screen

Access the Manage Storage Containers screen to add, delete, or verify storage containers.

Procedure

1. Go to `https://VASA-Provider-IP-Address:50001/`
2. Enter the vCenter SSO credentials following [Logging in to the Web UI \(on page 29\)](#), then click **Login**.
3. Click **Manage Storage Containers**.

Registering storage systems in the VASA Provider

You must register storage systems in the VASA Provider to pass information to VMware vSphere.

Procedure

1. Click **Manage Storage Systems**.
2. Click **Add Storage Systems**.
3. Enter storage system information.
For VSP/HUS VM/VSP G1000/G1500/F1500, click **OK**. For VSP G200, G400, G600, G800 or VSP F400, F600, F800, click **Discover**. For VSP G350, G370, G700, G900 or VSP F350, F370, F700, F900, select **SVP** or **Configuration manager REST API**, then select **Discover**. For VVols, select **SVP**.
4. Select the storage system to register, then click **OK**.
To register Storage Systems, use the user from **Administrator User Group**.



Note: You must create an account for exclusive use by the VASA Provider. When non-VASA Provider accounts log in to a storage system during VVol operations, VVol performance may be affected.

Updating storage system information

If the configuration of a storage system has changed, you must update the storage system information in the VASA Provider.

Procedure

1. Click **Manage Storage Systems**.
2. Click **Refresh Storage Systems**.
3. Click **OK**.



Note: Storage system information updates automatically every 20 minutes; therefore, any PEs or resource groups that you create or modify on a storage system may not appear right away. The procedure shown above causes the storage system information update process to begin immediately, instead of waiting for the next automatic update.

Removing storage systems managed by the VASA Provider

Before you begin, verify that previous VVols and storage containers used by VMware vSphere have been deleted.

Procedure

1. Open the Storage System Administration screen.
2. Click **Remove Storage Systems**.
3. Click **OK**.

**Caution:**

- a. If you unregister the storage system, the VVols and the storage profile information will be deleted.
- b. VVols and storage containers must be deleted before unregistering the storage system.

Managing storage containers (for VVols)

A storage container is a logical pool, defined by the storage administrator, that stores VVols. The storage container is used when creating VVol datastore in vCenter Server.

Accessing the Manage Storage Containers screen

Access the Manage Storage Containers screen to add, delete, or verify storage containers.

Procedure

1. Go to `https://VASA-Provider-IP-Address:50001/`
2. Enter the vCenter SSO credentials following [Logging in to the Web UI \(on page 29\)](#), then click **Login**.
3. Click **Manage Storage Containers**.

Creating a storage container

Before you begin

Prepare resource groups for storing the VVols in a storage system. For resource group requirements to use VVols, verify the setting of **Storage System Resource** or **Resource Group**.

Procedure

1. Click **Manage Storage Containers**.
2. Click **Create Storage Container**.
3. Enter the information.
4. Set a capability profile for each DP pool by selecting a DP pool, then selecting **Define Profile**. Click **OK** after setting the capability profile.
To see a list of available capability profile values, click **Capability Schema**. Define a capability profile for each DP pool: select a DP pool, click **Define Profile**, then click **OK**.



Caution: If you plan to change VM Storage Policy among pools, it's recommended to set separate Storage Container per policy. If you set different profiles to multiple pools in one Storage Container, VM cannot be transferred among the pools. See VVols limitation requires modifying VM storage policy in [Restrictions and considerations for VVol Environments \(on page 17\)](#).

5. Click **Submit**.



Note: Tag-based storage policy profiles will be automatically set for any VMFS datastores backed by LDEVs residing in the available pool. User Defined Capabilities apply only to profiles associated with a Tag-based Storage Capability.

Displaying storage container information

You can view storage container profiles and related VVol information.

Procedure

1. Click **Manage Storage Containers**.
2. Select a storage container.
3. Click a tab to view specific information about the storage container.
 - **Capability Profile** tab: view capability profile information
 - **Default Profile** tab: view default profile information
 - **VVols** tab: view SLUs and bound ALUs managed by the storage container

Updating a storage container

Procedure

1. Click **Manage Storage Containers**.
2. Click **Edit Storage Container**.
3. Modify the storage container information. For more information, see [Creating a storage container \(on page 33\)](#).
4. Click **Submit**.

Deleting a storage container

Before you begin

Verify that all VVols residing in the storage container have been deleted.

Procedure

1. Click **Manage Storage Containers**.
2. Click **Delete Storage Container**.



Caution: Deleting a storage container also deletes its constituent VVols and storage profile information. Before deleting a storage container, first delete or migrate the VMs residing on its VVol datastore, then delete the VVol datastore itself. Otherwise, VVol data may remain in the storage system.

3. Click **Submit**.



Note: Resource groups will remain even after deleting a storage container. For information of how to delete resource groups, see referenced documents for a manual corresponding to your storage system model.

Managing LDEVs for VMFS

You can manage tag-based policy LDEVs (datastores) that are visible to VMware ESXi. You can also set Tag-based Storage Policy values for LDEVs.

Note that an LDEV will inherit the capabilities of its underlying pool if that pool has been assigned a storage capability profile. You can further customize tags at an LDEV level by performing the following procedure.

Accessing the LU Administration screen

Procedure

1. Click **Manage Storage Systems**.
2. Click the **LDEVs** for a storage system.

Creating an LDEV storage profile

Before you begin

Before defining an LDEV's storage profile, a VMFS datastore backed by the LDEV must appear in the vCenter instance associated with the VASA Provider.

Procedure

1. Open the **LU Administration** screen.
2. Select an LDEV, then click **Define Profile**.
3. Click **OK** after setting the capability profile. To see a list of available capability profile values, click **Capability Schema**.



Note:

- Storage profiles reside in the same vCenter Server instance used by the VASA Provider for Single-Sign On authentication.
- It may take up to five minutes for the Tag-based Storage Policy to be reflected in vCenter Server.
- To set the storage profile for each pool, create a storage container and then set a storage profile for the pool. The profile will be applied to all LDEVs used for VMFS datastores which reside in the pool.

Updating an LDEV storage profile

Procedure

1. Open the **LU Administration** screen.
2. Select an LDEV, then click **Define Profile**.
3. Modify the **Capability Profile** value, and click **OK**.



Note: It may take up to five minutes for updated Tag-based Storage Policy information to appear in vCenter Server.

Deleting an LDEV storage profile

Procedure

1. Open the **LU Administration** screen.
2. Select an LDEV, then click **Define Profile**.
3. Deselect all set values, and click **OK**.



Note: It may take up to five minutes for updated Tag-based Storage Policy information to appear in vCenter Server.

Displaying Storage System Pool Information

This displays a list of pools on the storage system for reference when using VVols.

Procedure

1. Click **Manage Storage Systems**.
2. Click the Pools for the Storage system.

Managing the Capability Schema

The Capability Schema is a list of settings you can set to create a Capability Profile.

Procedure

1. Go to `https://VASA-Provider-IP-Address:50001/`
2. Enter the vCenter SSO credentials following [Logging in to the Web UI \(on page 29\)](#), then click **Login**.
3. Click **Capability Schema**.

Displaying the Capability Schema

The Capability Schema is a list of settings you can set to create a Capability Profile.

Procedure

1. Go to `https://VASA-Provider-IP-Address:50001/`
2. Enter the vCenter SSO credentials following [Logging in to the Web UI \(on page 29\)](#), then click **Login**.
3. Click **Capability Schema**.



Note: User Defined capabilities, Compression and Duplication are only accessible when using Tag-based Storage Capability. Hitachi SVOS compression is enabled when the Compression value is Yes. Hitachi FMD accelerated compression is enabled when the Compression value is Accelerated.

Creating a Custom Capability

Procedure

1. Open the **Capability Schema** screen.
2. Select **Manage Capabilities**.
3. Select **Create Capability**.
4. In the first screen, enter a Name and Description for the Capability.

5. In the second screen, enter a Capability value.
 - a. To create new value, select **Add Value**.
 - b. To change an existing value, click the value, then select **Edit Value**.
 - c. To delete an existing value, click the value, then select **Delete Values**.
6. Click **Submit**.

Editing a Custom Capability

Procedure

1. Open the **Capability Schema** screen.
2. Select **Manage Capabilities**.
3. Select the Capability, then click **Edit Capability**.
4. To edit Name and Description values for the Capability, go to the first screen.
5. To enter a Capability value, go to the second screen.
 - a. To create new value, select **Add Value**.
 - b. To change an existing value, click the value, then select **Edit Value**.
 - c. To delete an existing value, click the value, then select **Delete Values**.
6. Click **Submit**.

Deleting a Custom Capability

Procedure

1. Open the **Capability Schema** screen.
2. Select **Manage Capabilities**.
3. Select the Capability, then click **Delete Capability**.
4. Click **Submit**.



Caution: Before deleting a Custom Capability, verify that it is not included in any Storage Profile configurations. It may be necessary to re-configure a number of Storage Profile settings prior to deleting the Custom Capability.

Enabling VVol Policy Compliance

If you enable VVol Policy Compliance, VVols (SLUs) are automatically stored in the appropriate tiers based on the user-specified storage capabilities. To check the correspondence between storage capabilities and the tiers in which datastores are stored, check VM Policy in the table for the Enable VVol Policy Compliance check box on the Capability Schema screen.

For information about operating procedures when this function is enabled, see [Using VVol Policy Compliance \(on page 60\)](#).

Before you begin

- The storage system is a storage system in the VSP G series or the VSP F series.
- Hitachi Dynamic Tiering is enabled.
- Active flash is enabled (optional).

Procedure

1. Open the **Capability Schema** screen.
2. Select the **Enable VVol Policy Compliance** check box.

Enabling VMFS Policy Compliance

If you enable VMFS Policy Compliance, VMFS datastores are automatically stored in the appropriate tiers based on the user-specified storage capabilities. To check the correspondence between storage capabilities and the tiers in which datastores are stored, check VM Policy in the table for the Enable VMFS Policy Compliance check box on the Capability Schema screen.

For information about operating procedures when this function is enabled, see [Using VMFS Policy Compliance \(on page 65\)](#).

Before you begin

- The storage system is a storage system in the VSP G series or the VSP F series.
- The configuration uses an SVP.
- Hitachi Dynamic Tiering is enabled.
- Active flash is enabled (optional).
- Tiering policy IDs 29, 30, and 31 are not being used.

When you enable VMFS Policy Compliance, tiering policies are created with the tiering policy IDs 29, 30, and 31.

Procedure

1. Open the **Capability Schema** screen.
2. Select the **Enable VMFS Policy Compliance** check box.

Setting Multi-vCenter

Follow the procedure listed below to register the VASA Provider on multiple vCenter Server instances. If the VASA Provider has not already been registered with any of the vCenter Server instances, perform steps 2-3 only. If the VASA Provider has already been registered with one or more of the vCenter Server instances, perform all of the steps.



Note: The tag-based storage policy for VMFS does not support multiple vCenter Server instances.

Procedure

1. Delete any VASA Provider registrations within vCenter Server.
2. Log in to the VASA Provider server using the root account.
3. Open the `VasaProvider.properties` file with a text editor, then set the value for `multipleVcSupport` to **true**. The `VasaProvider.properties` file is located in the directory: `/usr/local/hitachivp-b/tomcat/webapps/VasaProvider/META-INF/`
4. Run the `createCertifications.sh` script, which is located in the directory: `/usr/local/hitachivp-b/`
5. Restart the VASA Provider by rebooting the VM's guest operating system.
6. Register the VASA Provider with vCenter Server.



Note: Whenever you change the value of a property, you must restart the VASA Provider.

Setting up High Availability

This section describes how to set up High Availability and monitor a virtual machine and application.

Setting up High Availability

The VASA Provider supports high availability through the VMware vSphere High Availability (vSphere HA) or VMware vSphere Fault Tolerance (vSphere FT) functions. Since the VVol/VASA environment may become unavailable if an error occurs with the VASA Provider, we recommend that you create a high availability setup.



Note:

- When normal recovery is prevented by an unexpected error occurring in the VASA Provider, you will need to recover the VASA Provider by using periodic backup. See [Setting up database resiliency \(on page 40\)](#)
- The use of vSphere FT may cause a reduction in performance. Subsequently, if an error occurs, adjust the environment using the following procedure provided by VMware.
- Lower the number of run operations in the VVol environment.
- Migrate the VASA Provider VM to an ESXi host with better performance.

For details on the VASA Provider and its various functions, see the VASA Provider documentation provided by VMware Inc.

Monitoring a virtual machine and application

The VASA Provider supports application-level monitoring using vSphere HA. Once this configuration is complete, should the VASA Provider service unexpectedly stop running, vSphere HA will automatically restart the VASA Provider VM.

Before you begin

- VMware Tools have been installed in the VASA Provider VM's guest operating system.
- vSphere HA has been configured.

Procedure

1. Log in to the VASA Provider server as root.
2. Open the `VasaProvider.properties` file with a text editor, and then set the value of the `vasaprovider.highavailability.isEnabledApplicationMonitoring` property to `true`.

The `VasaProvider.properties` file is located in the following directory:

```
/usr/local/hitachivp-b/tomcat/webapps/VasaProvider/META-INF/
```



Note: Whenever you change the value of a property, you must restart the VASA Provider.

For details on the VASA Provider and its various functions, see the VASA Provider documentation provided by VMware Inc.

Setting up database resiliency

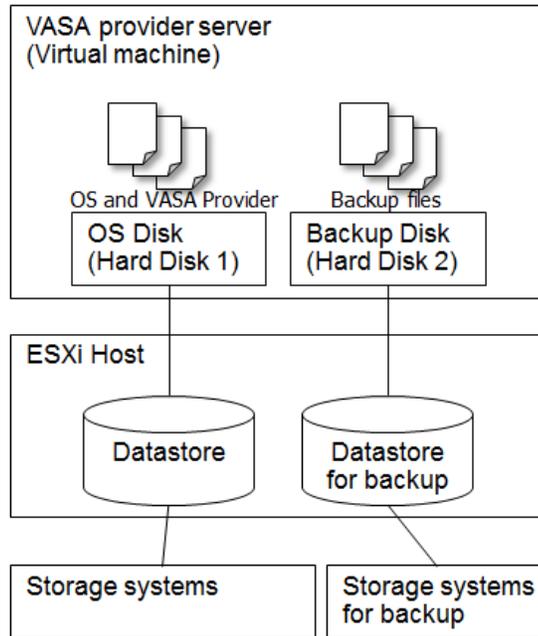
The VASA Provider stores VVol information in its database (which is located on a VMDK in the storage system) via an assigned VMFS/NFS or vSAN datastore.

The VASA Provider creates a backup daily for up to 14 days. You can revert back to any time up to 14 days prior.

By default, these backup files are also stored in the VASA Provider VM's guest operating system, on a filesystem located on a second virtual disk. We recommend to keep the database VMDK and the backup VMDK on different storage systems to mitigate the risk of a single point of failure. You can set up this configuration during installation.

If both the database and its backups are lost, it will not be possible to recover the associated VVol environment. To mitigate this risk, follow the installation best practices to configure separate storage for backup.

By configuring the VASA Provider VM with a virtual disk backed by a separate storage system, and configuring its backups to reside there, this single point of failure is eliminated.



Follow the procedure listed below to configure database resiliency.

Procedure

1. Prepare a datastore on a storage system that is separate from the storage system used to back the VASA Provider VM itself.
2. Relocate the backup destination to the new datastore.
For the OVA VASA Provider version: After deployment, relocate the VASA Provider VM's second virtual disk (used for backups) to a datastore residing on a separate storage system.



Caution: The OVF VASA Provider may limit the backup disk volume when the number of VVol VMs is greater than 1,000. When running more than 1,000 VMs, expand the capacity of the backup disk using the formula listed below.

```
Required volume (MB) = ((number of VMs x 0.01) / 16) x 1,260  
+ 49,000
```

Be sure the backup disk has sufficient available capacity, otherwise backups may fail.

For installer version:

After installing the VASA Provider, configure backups to reside on a datastore backed by a separate storage system.

For vSphere Web Client operation:

See VMware manuals.

For OS operation:

See Red Hat Enterprise Linux/Oracle Linux manuals.

Relocating the backup disk to a datastore on a separate storage system (OVF version)

Before you begin

- Prepare a datastore on a separate storage system for backup disk storage.
- Deploy the VASA Provider.
- Power off the VASA Provider virtual machine.

Procedure

1. Log in to vSphere Web Client.
2. Select **VMs** and **Templates**.
3. Right-click on the VASA Provider VM, select **Migrate**.
4. In the Migrate wizard, select **Change Storage only**, click **Next**.
5. Click **Advanced**.
6. Change **Storage** for **Hard Disk 2** to the datastore on the separate storage system. Click **Next**.
7. Verify the settings, click **Finish**.
8. After relocating the virtual disk, restart the VASA Provider.

Relocating the backup disk to a datastore on a separate storage system (Installer version)

Relocating the backup disk to a datastore on a separate storage system (Installer version)

Procedure

1. Add a second virtual disk for backups to the VASA Provider VM.
2. Specify the second virtual disk's location so that it's on a datastore backed by a separate storage system.
3. Within the VASA Provider VM's guest operating system, create and mount a filesystem on the second virtual disk.
4. Create a directory for storing backup files in the new filesystem.
Example: `/vdisk2/VVolDataBackup`
5. In the folder you created for backups, create the directories listed, and configure their owner and group values as shown.

Directory Name	Owner/Group	Command example
wal	postgres/postgres	<code>#chown postgres:postgres / VVolDataBackup/wal</code>
backup_files	vptomcat/vptomcat	<code>#chown vptomcat:vptomcat / VVolDataBackup/ backup_files</code>
work	vptomcat/vptomcat	<code>#chown vptomcat:vptomcat / VVolDataBackup/work</code>

6. Stop the VASA Provider service.
`# /etc/init.d/tomcat_vp_b stop`
7. Stop the PostgreSQL service.
For RHEL 7: `# systemctl stop postgresql-9.3.service`
For RHEL 6: `# /etc/init.d/postgresql-9.3 stop`
8. Set the backup file destination for the VASA Provider.
 - a. Open the file below using a text editor.
`/usr/local/hitachivp-b/tomcat/webapps/VasaProvider/META-INF/vvoladapter.properties`
 - b. Set the `server.dispatcher.daemon.vasa.backup.dir` value to the directory for the backups you just created.
Example: `server.dispatcher.daemon.vasa.backup.dir=/vdisk2/VVolDataBackup/`
 - c. Save the file and close the text editor.
9. Set the backup file destination for PostgreSQL.
 - a. Open the file below using a text editor.
`/vpdata/postgresql.conf`

- b. Change the `archive_command` parameter to the storage destination directory name.

Example: `archive_command = 'cp%p/vdisk2/VVolDataBackup/wal/%f;chmod777/vdisk2/VVolDataBackup/wal/%f'`

10. Restart PostgreSQL.

For RHEL 7: `# systemctl start postgresql-9.3.service`

For RHEL 6: `# /etc/init.d/postgresql-9.3 start`

11. Restart the VASA Provider.

`# /etc/init.d/tomcat_vp_b start`

Restoring the backup file

Before you begin

- Verify that you have a backup corresponding to the existing VVol environment.
- Prepare a VASA Provider that is the same version as the VASA Provider used when the problem occurred. The items listed below must be the same as the original.
 - OS (installer version only)
 - Time zone
 - IP address and host name
 - Time
- Power off the VASA Provider virtual machine.

Procedure

1. Log in to vSphere Web Client.
2. Select **VMs and Templates**.
3. Right-click on the VASA Provider VM, select **Edit Settings**.
4. Hover your mouse pointer over **Hard Disk 2**. Select the **X** that appears to delete the disk.
5. Click **OK**, close the **Edit Settings** window.
6. When vSphere has finished reconfiguring the VASA Provider VM, right-click on it again, and select **Edit Settings**.
7. Select **Existing Hard Disk** from the **New device** list, click **Add**.
8. In the **Select File** window, select the backup disk (VMDK file) for the VASA Provider that had the problem, click **OK**.
9. Click **OK** to close the **Edit Settings** window.
10. Restart the VASA Provider.
11. Log in to the VASA Provider as root.
12. Stop the VASA Provider service with the following command:


```
# /etc/init.d/tomcat_vp_b stop
```

13. Restore the database from a backup. Enter a date and time zone to revert the system to a specific time. The time zone must be set to the same time zone as set in the VASA Provider VM's guest operating system.

To revert to the current time or to a specific time:

```
#!/usr/local/hitachivp-b/  
StorageProviderforVMwarevCenter_Linux_restore.sh
```

To revert to a specific time:

```
For example (2017-02-27 07:05:18 UTC): #/usr/local/hitachivp/  
StorageProviderforVMwarevCenter_Linux_restore.sh 2017-02-27  
07:05:18 UTC
```

```
# /usr/local/hitachivp-b/  
StorageProviderforVMwarevCenter_Linux_restore.sh <YYYY>-<MM>-<DD>  
<hh>:<mm>:<ss> <timezone>
```

14. Start the VASA Provider.

```
# /etc/init.d/tomcat_vp_b start
```



Note: The VASA Provider creates a backup daily for up to 14 days. You can revert back to any time up to 14 days prior.

Virtual machine backup

The VASA Provider's database can be protected by backing up the entire virtual machine.

Please see the following articles at <https://Knowledge.HitachiVantara.com>

Related documents

- Hitachi Data Instance Director (HDID) for VM backup/recovery:

VASA Provider migration

If you migrate or reconfigure a VASA Provider server, you must migrate the data containing VVol information. Follow the procedure described below to migrate the data.



Caution:

- The versions of the migration-source and migration-destination VASA Provider servers must be the same.
- Do not operate the VM during VASA Provider data migration. Though the VM will remain online throughout the migration, it may not function normally until the migration's complete.

Procedure

1. Unregister the source VASA Provider instance from VMware vSphere. See [Removing the VASA Provider from VMware vSphere \(on page 59\)](#).

2. Log in to the source VASA Provider instance VM's guest operating system as root.
3. Stop the VASA Provider.


```
# /etc/init.d/tomcat_vp_b stop
```
4. Export the data with the following command:


```
# pg_dumpall -c -p 50003 -U postgres -f pg_dumpall_vpdata.sql
```
5. Copy the exported data (`pg_dumpall_vpdata.sql`) to the destination VASA Provider VM's guest operating system.
6. Log in to the destination VASA Provider instance VM's guest operating system as root.
7. Stop the VASA Provider.


```
# /etc/init.d/tomcat_vp_b stop
```
8. Import the data with the following command:


```
# psql -f pg_dumpall_vpdata.sql -U postgres -p 50003
```
9. Start the VASA Provider.


```
# /etc/init.d/tomcat_vp_b start
```
10. Register the new VASA Provider. See [Registering the VASA Provider in VMware vSphere \(on page 57\)](#).
11. Update the VASA Provider in the administration screen.

Changing VASA Provider credentials

Before you begin

The maximum number of characters for credentials is 255. The supported characters are:

A-Z a-z 0-9 ! # \$ % & ' { } * + - . = @ ^ | ~ / ? `

You can change the account name and password used to register the VASA Provider with VMware vSphere.

Procedure

1. Go to `https://VASA-Provider-IP-Address:50001/`.
2. In the **Web UI Login** window, enter **system** and **manager** and click **Login**.
3. In the Web UI main window, click **Change Credentials**.
4. Provide the following information:
 - Current account name and password (currently logged in)
 - New account name and password
 - New password confirmation
5. Click **Change Credentials**.

Setting up vCenter Single Sign-On Server

VASA Provider uses vCenter Single Sign-On for user authentication. To change the vCenter Single Sign-On server specified at deployment, follow the procedure below.

Procedure

1. Go to <https://VASA-Provider-IP-Address:50001/>.
2. In the Web UI window, enter the vCenter SSO credentials following [Logging in to the Web UI \(on page 29\)](#) and **password/system** and **manager**, and click **Login**.
3. Select **Single Sign-on Setting** from the Maintenance menu.
4. Enter `Network IP Address` or `FQDN`.
5. Enter `Port Number`.
6. Enter Single Sign-On domain name.
Use the same domain name of vCenter Server or PSC (Platform Services Controller).
Default domain name: `vsphere.local`
7. Click **Set**.



Important:

If **Set** is disabled, reconfigure the settings after clearing the browser cache and restarting the browser.

Renewing an SSL certificate

SSL certificates have an expiration date. When this expiration date is reached, it is necessary to create a new certificate. There are two ways to create the certificate: by using the Web UI, or by using a supplied script.



Caution: Unregister the VASA Provider from vCenter Server, when you create SSL certificates. VMs will not be effected during unregistration, however, start, stop and copy functions will be disabled until unregistration is complete.

Renewing an SSL certificate using the Web UI

Procedure

1. Follow the procedure in [Removing the VASA Provider from VMware vSphere \(on page 59\)](#).
2. Go to:
`https://VASA-Provider-IP-Address:50001/`
3. Enter the vCenter SSO credentials following [Logging in to the Web UI \(on page 29\)](#), then click **Login**.
4. Click **Update Certificate** on the Web UI's main page.
5. Select IP address or enter FQDN, then click **Update**.

6. Click **OK** when prompted for verification. The VASA Provider will restart.
7. Follow the procedure in [Registering the VASA Provider in VMware vSphere \(on page 57\)](#).

Renewing an SSL certificate using the supplied script

Procedure

1. Follow the procedure in [Removing the VASA Provider from VMware vSphere \(on page 59\)](#).
2. Log in to the VASA Provider server as root (root/password).
3. At the root prompt, enter the following commands:

```
cd /usr/local/hitachivp-b
./createCertifications.sh
```
4. Restart the VASA Provider.
5. Follow the procedure in [Registering the VASA Provider in VMware vSphere \(on page 57\)](#).

Restarting the VASA Provider service

It may be necessary to restart the VASA Provider in some cases, such as after a certificate is renewed.

Procedure

1. Go to `https://VASA-Provider-IP-Address:50001/`.
2. In the **Web UI** window, enter the vCenter SSO credentials following [Logging in to the Web UI \(on page 29\)](#) and **password** or **system** and **manager**, and click **Login**. The VASA Provider information is displayed on the Web UI's main window.
3. Select **Restart Service** from the Maintenance menu.
4. Click **Restart**.
5. Click **OK** to confirm. The VASA Provider service will restart. You can access the Web UI after it restarts.

Configuring for meta resources

When using storage containers, follow the procedure below to enable or disable the use of meta resource groups as storage containers.

Procedure

1. Log in to the VASA Provider server as root.
2. Open the `VasaProvider.properties` file with a text editor, then set the value of `vasaprovider.meta.resource.sc.enable` to **true**. The `VasaProvider.properties` file is located in the following directory:

- Restart the VASA Provider service; see [Restarting the VASA Provider service \(on page 48\)](#).



Caution: If you use meta resources, verify that none of the VVol SLUs will be used by other users or software. For other information relating to resource groups, see Storage system resources or Setting up resources and resource groups.

Configuring log output settings

To prevent logs from consuming excessive disk space, the VASA Provider automatically rotates them when they reach a configurable maximum size. It's possible to change both the maximum log file size, and the number of old log files to retain.

Log files subject to rotation include the VASA Provider's (`StorageProvider.log`) and the VASA Provider Web UI's (`VasaWebUi.log`).

Before you begin

- The VASA Provider is installed.
- The VM is powered on.
- Network settings is configured.
- SSL certificates is created.

Procedure

- Log in to the VASA Provider server as root.
- Edit the `hilogger.config` file as desired to change the following parameters.

Item	Description
<code>MaxBackupIndex</code>	Indicates the maximum number of log files to retain. Range: 1-255. Default value: 20. Any value outside of the range is treated as the default.
<code>MaxFileSize</code>	Indicates the maximum log file size. Range: 1-100. Default value: 50 MB. Any value outside of the range is treated as the default.

The `hilogger.config` file is located in the following:

For the VASA Provider

```
/usr/local/hitachivp-b/tomcat/webapps/VasaProvider/WEB-INF/
conf
```

For the VASA Provider WebUI

```
/usr/local/hitachivp-b/tomcat/webapps/VasaProviderWebUi/WEB-
INF/conf
```

For the VASA Provider Common Landing Page

```
/usr/local/hitachivp-common/tomcat/webapps/
CommonLandingPage/WEB-INF/conf
```

Refer to [Downloading the VASA Provider log \(on page 66\)](#) for a description of the log files.

3. Restart the VASA Provider.

Activating/deactivating the VASA 1.0 function

Procedure

1. Log in to the VASA Provider server as root.
2. Open the `VasaProvider.properties` file with text editor, then set the value for `vasaprovider.vasa1.isEnabled` to true or false. The `VasaProvider.properties` file is located in the following directory:

```
/usr/local/hitachivp-b/tomcat/webapps/VasaProvider/META-INF
```
3. Restart the VASA Provider service.



Note: Functions which rely on the VMware API version VASA 1.0 are disabled in the VASA Provider v03.4.0 and later.

Using multiple networks with the VASA Provider

This procedure applies to situations where vCenter Server and one or more storage system SVPs reside on separate networks. If the VASA Provider's unable to access a storage system SVP using the same network interface used to access vCenter Server, add a second network interface to the VASA Provider for SVP access.

Procedure

1. Install the VASA Provider.
2. Choose network settings which will allow the VASA Provider to access vCenter Server.
3. In the VASA Provider VM, add a second vNIC associated with a vSwitch that's uplinked to a network with access to storage system SVPs.

For more information, see documentation provided by VMware, Inc.

4. Log in to the VASA Provider VM's guest operating system as root.
5. Within the VASA Provider VM's guest operating system, configure TCP/IP on the VM's second vNIC with settings which will allow access to storage system SVPs. For more information, see documentation provided by Oracle Corporation or Red Hat, Inc.
6. Restart the VASA Provider VM.
7. Register the storage system. See [Registering storage systems in the VASA Provider \(on page 31\)](#).



Caution: After changing the network settings used by the VASA Provider to connect vCenter Server, it may be necessary to create a new SSL certificate.

- a. Log in to the VASA Provider server as root.
- b. Open `/usr/local/hitachivp-b/openssl.cnf` with a text editor, and edit the file to include the IP address or the FQDN of the VASA provider server.

Example of adding the IP address:

```
IP.1 = 192.168.86.133
```

Example of adding the FQDN:

```
DNS.1 = vasaprovider.local.local1
```

- c. Run the script as shown, to create a new SSL certificate:

```
# /usr/local/hitachivp-b/createCertifications.sh
```

Chapter 5: Setting up VVol environments

This chapter introduces additional configuration steps necessary to implement VMware Virtual Volumes (VVol) in your environment.

Overview of VVol environment

The required tasks and setting locations for configuring VVol environments are listed in the table below.

Task	Setting location
Setting up VAAI (VMware vStorage APIs for Array Integration)	VMware ESXi host
Configuring the protocol endpoint	Storage system
Configuring storage system resources/ resource groups	Storage system
Registering a storage system	VASA Provider
Configuring a storage container	VASA Provider
Registering the VASA Provider in VMware vSphere	vSphere Web Client
Deploying a VVol datastore	vSphere Web Client
Storage policy-based management	vSphere Web Client

Setting up the VAAI (VMware vStorage APIs for Array Integration)

Within the VVol environment, offload VMware ESXi host processing to the storage system using VAAI (VMware vStorage APIs for Array Integration). Perform the following settings to enable VAAI.

Before you begin

- A host with VMware ESXi 6.5/6.7 is available.
- vSphere CLI is installed or SSH access to VMware ESXi is available.

Procedure

1. Log in to VMware ESXi and access its command line interface.
See VMware documentation for more information.
2. On the ESXi console, perform the following procedure to disable the VAAI plugin.
 - a. Verify the VAAI_FILTER claimrule:

```
# esxcli storage core claimrule list --claimrule-class=Filter |
grep HITACHI
Filter 65434 runtime vendor VAAI_FILTER vendor=HITACHI model=*
false false 0
Filter 65434 file vendor VAAI_FILTER vendor=HITACHI model=* false
false 0
```

- b. Delete the VAAI_FILTER claimrule:

```
# esxcli storage core claimrule remove --claimrule-class=Filter --
rule=65434
```

- c. Verify the VAAI claimrule:

```
# esxcli storage core claimrule list --claimrule-class=VAAI | grep
HITACHI
VAAI 65434 runtime vendor VMW_VAAIP_HDS vendor=HITACHI model=*
false false 0
VAAI 65434 file vendor VMW_VAAIP_HDS vendor=HITACHI model=* false
false 0
```

- d. Delete the VAAI claimrule:

```
# esxcli storage core claimrule remove --claimrule-class=VAAI --
rule=65434
```

3. Restart the VMware ESXi host.

Configuring the protocol endpoint (ALU)

The protocol endpoint (a VVol term) is an LDEV used by an ESXi host to access a storage system. On the storage system, the protocol endpoint is known as the assigned logical unit, or ALU. A protocol endpoint (ALU) must be assigned to an ESXi host in order to use VVols. Creating protocol endpoints and assigning them to a VMware ESXi host is done using Device Manager - Storage Navigator.

**Note:**

- If you modify the protocol endpoint (ALU) or host group settings on the storage system, you must also update the VASA Provider's storage system information.
- If you use an FC switch, we recommend that you specify single-initiator zoning or single-initiator-single-target zoning for the zoning setting.

Configuring storage system resources and resource groups

You must configure the required storage system resources and resource groups before you can use VVols.

VVols use DP pools to store virtual machine data, and they use Hitachi Thin Image pools to store snapshot data. A VVol virtual machine configuration file uses multiple LDEV IDs in order to create a 1:1 correspondence with the LUNs. These resources are collected and made available as a single logical resource group. VVols can also use meta resources on the storage system. If you use meta resources, you must configure the VASA Provider. See [Configuring for meta resources \(on page 48\)](#).

There is a one-to-one correspondence between a resource group on the storage system and a VASA Provider storage container. When you create a virtual machine, use the resource group as the VVol datastore.

Use Device Manager - Storage Navigator to create DP pools, Hitachi Thin Image pools, and resource groups, and to set up LDEV IDs. For details on these operations, see the documentation listed in [Referenced documents \(on page 8\)](#).



Note: To make snapshots available without creating Hitachi Thin Image pools, ensure that microcode version 80-05-44-00 and later (VSP G1x00 and VSP F1500) or newer version 83-04-44-x0/00 and later (VSP Gx00/Fx00) is being used, and that DP pools are not multi-tiered. Use Hitachi Thin Image pools if they are already created.

For resources used by VVols, please check the following:

- If you use a meta resource, verify the notes listed in [Configuring for meta resources \(on page 48\)](#).
- If you modify a resource or resource group on the storage system, try [Updating storage system information \(on page 31\)](#).
- When expanding the capacity of a Hitachi Thin Image pool, do not operate VMs using the pool until the expansion is finished.
- Use an available LDEV ID for the SLU during registration.
- Pay particular attention to the number of LDEV IDs if you manage VMFS datastore LDEVs in a resource group used by VVols.
- If you must move a VVol VM, do not move it directly on the storage system; use vMotion instead.
- When using multiple VASA Provider instances, do not share resource groups among them.



Caution:

- Provide enough capacity for the DP pool/Hitachi Thin Image pool. If the capacity is insufficient, VMs may fail to operate. Setting a threshold is recommended.
- Ensure that sufficient free LDEV IDs exist to accommodate those used by SLUs. If the number of free LDEV IDs is insufficient, VMs may fail to operate.
- While a VVol VM is running, do not delete any storage objects it depends on; otherwise, the VM may stop running. This includes the resource group containing its SLU(s) (VVols), the LDEV IDs being used by its SLU(s), and the DP pool used to store its SLU(s).

The table below shows an example of how to register a resource group for use with a VVol.

Use	Resource	Description
DP Pool	LDEV ID	Register the desired DP pool volume.
Hitachi Thin Image Pool	LDEV ID	Register the desired Hitachi Thin Image pool volume.
SLU	LDEV ID	Register LDEV IDs for SLU assignments. For VVols, use multiple LDEV IDs per VM. See Note to verify the number of required LDEV IDs that must be registered.
DP Pool (reserve)	LDEV ID	VVols can utilize multiple DP Pools, if necessary. When creating storage containers, create a capability profile for each DP Pool to mark them for specific uses.

The table below shows the number of LDEV IDs used per VVol VM.

LDEV ID use	Number required
Configuration management	1
Data	Number of VM hard disks
VM initialization	1
VM snapshot acquisition	Number of VM memory snapshot acquisitions
VM suspension	1

Linking with Hitachi Dynamic Tiering and active flash

If VASA Provider is linked with Hitachi Dynamic Tiering and active flash, VVols (SLUs) are automatically stored in the appropriate tiers based on the user-specified storage capabilities.

To use this function, enable Multi-Tier Pool for the pools to be registered in the resource group. In addition, configure tiers and set the default schedule according to the storage configuration to be used.

For information about operating procedures when this function is enabled, see [Using VVol Policy Compliance \(on page 60\)](#). For information on how to specify settings for Hitachi Dynamic Tiering and active flash, see the manuals for the storage system.

How to add a DP/Hitachi Thin Image pool to a resource group

DP pools and Hitachi Thin Image pools are represented by LDEV IDs on the Resource Group screen in Storage Navigator; therefore, when adding a DP pool or Hitachi Thin Image pool to a resource group, add it by selecting an LDEV ID corresponding to an LDEV in the intended pool.

Procedure

1. On the **Administration** tab, select **Resource Group**, then click **Create Resource Group**.
2. In the **Create Resource Group** dialog, select the **LDEV ID** tab. Click **Add LDEV ID**.
3. In the **Pool Name (ID)** column, look for an LDEV ID that is associated with the intended DP pool or Hitachi Thin Image pool.
4. Select an LDEV ID, then click **OK**. This will automatically add all other LDEV IDs associated with the same pool to the resource group.

Registering storage systems

Storage systems used for VVols should be registered with the VASA Provider. See [Managing storage systems \(on page 31\)](#).

Setting up a storage container

Each VVol storage container corresponds to a storage system resource group (containing both DP pools and Hitachi Thin Image pools and LDEV IDs).

To use VVols, you must create a storage container corresponding to the storage system's resource group, and set capability profiles for each DP pool in the group. See [Managing storage containers \(for VVols\) \(on page 32\)](#).

Registering and removing the VASA Provider in VMware vSphere

Registering the VASA Provider in VMware vSphere

Use vSphere Web Client to register the VASA Provider with vCenter Server.



Note: If you cannot register the VASA provider with vCenter Server, the certificate may have expired. Verify the expiration date of the vCenter Server certificate.

Procedure

1. Log in to vSphere Web Client, and perform the following steps:
 - a. In the Navigator area, select **Storage**.
 - b. In the right pane, select the **Configure** tab, then **Storage Providers**.
2. Click the + icon to register a new storage provider.
3. In the **New Storage Provider** dialog, enter values for the fields shown below.
4. Click **OK**. If a Security Alert window appears, click **Yes**.

Item	Description
Name	Any name (example: VASA Provider for block)
URL	<p>The VASA Provider URL</p> <p>If an FQDN was not supplied, go to https://VASA-Provider-IP-Address:50001/version.xml.</p> <p>If an FQDN was supplied, go to https://VASA-Provider-FQDN:50001/version.xml.</p>
User name	<p>vCenter SSO account name</p> <p>(example: vsphere.local\Administrator)</p> <div style="background-color: #fff9c4; padding: 5px; border: 1px solid #ccc;"> <p> Caution: When you use SPBM tag, Tagging Admin must be available in the vCenter SSO account.</p> </div>
Password	vCenter SSO Password



Note: When the VASA Provider is registered for the first time, the following error is displayed by VMware vSphere:

A problem was encountered while registering the provider.
The certificate is not trusted.

If the VASA Provider registration completes and goes online, the message can be ignored.

5. Confirm that the registration was successful by viewing the following:
 - The Storage Providers section in the vSphere Web Client displays the newly added Storage Provider.
 - The Storage Provider indicates the storage system name with which it is communicating.

Next steps

The system is now ready for VVol datastore creation and VM provisioning.

Removing the VASA Provider from VMware vSphere

Use vSphere Web Client to remove the VASA Provider from vCenter Server.

Procedure

1. In the Storage Providers screen, select the VASA Provider and click the **x** icon located in the middle of the window.
2. In the confirmation window, click **Yes**.

Deploying a VVol datastore

After you have successfully registered the VASA Provider, you can deploy a VVol datastore.

Before you begin

- Have a storage container already available on the storage system.

Procedure

1. Log in to vSphere Web Client and select **Home** in the Navigator area.
2. Under the Inventory List, select the datacenter where you want to deploy the VVol datastore.
3. In the action pane at the right side, click **Actions**, and then right-click **Storage > New Datastore**.
The New Datastore screen shows the location of the datastore you selected.
4. In the **Location** screen, click **Next**.
5. In the **Type** screen, select **VVol** and then click **Next**.
6. In the **Name and container selection** screen, select your datastore from those listed in the Backing Storage section, and then click **Next**.
7. In the **Select hosts accessibility** screen, select the check boxes to add the hosts that you want to associate with your datastore, and then click **Next**.
8. In the **Ready to complete** screen, review your settings, and then click **Finish**.
You are returned to the **Home** screen, where the new VVol datastore now displays under your datacenter in the Inventory List.

Storage Policy Based Management

One of the prerequisites for configuring a VMware VVol environment involves defining Storage Policy Based Management (SPBM). SPBM is a structure defined by a VM storage policy.

A capability profile defines capabilities of a storage container (for example, IOPS, Latency, Availability). Afterward, both the storage container and its associated capability profile can be disclosed to the VM administrator.

The following steps outline the general task workflow for creating an SPBM structure. The tasks that apply to the VMware vSphere administrator (VM administrator) are noted in parenthesis.

Procedure

1. **Define capability profiles:** Set the capability profile of the storage container for each DP pool.
2. **Define VM Storage Policies** (applies to the VM administrator): Create virtual machine storage policies based on the contents of the capability schema.
3. **Check storage policy compatibility** (applies to the VM administrator): vCenter reports whether storage containers exist that meet the policy criteria. This is done by comparing the capability profiles and VM storage policies.
4. **Create a VVol** (applies to the VM administrator).

Using VVol Policy Compliance

If you enable VVol Policy Compliance, VVols (SLUs) are automatically stored in the appropriate tiers based on the user-specified storage capabilities.

Before you begin

- VVol datastores that include pools for which Multi-Tier Pool is enabled have been created.
- VVol Policy Compliance is enabled.

Procedure

1. Create a capability profile.

For details about the procedure, see [Creating a storage container \(on page 33\)](#).

To check the correspondence between storage capabilities and the tiers in which datastores are stored, check **VM Policy** in the table for the **Enable VVol Policy Compliance** check box on the **Capability Schema** screen.

2. Create a VM storage policy in vCenter Server.
In the VM storage policy, include the storage capabilities you specified when you created the capability profile.
3. Assign the created VM storage policy to a VM.



Note:

This function is not used when you create or clone a VM or execute vMotion for a VM. This function is used only when you change a VM storage policy. To create or clone a VM or to execute vMotion for a VM, select the default policy, and then change the VM storage policy.

Chapter 6: Setting up VMFS environments

This chapter explains how to use the VASA Provider in traditional VMFS environments.

Overview of VMFS environment

The VASA Provider must be registered with vCenter Server prior to using its VMFS (non-VVol) features. See [Registering the VASA Provider in VMware vSphere \(on page 57\)](#).

The required tasks and setting locations for configuring VMFS environments are listed in the table below.

Task	Setting location
Configure storage system resources and LDEVs	Storage system
Set host groups	Storage system
Create VMFS datastore	vSphere Web Client
Verify a storage policy for VASA 1.0	VASA Provider
Create Tag-based Storage Policy (SPBM for VMFS)	VASA Provider
Register the VASA Provider in VMware vSphere	vSphere Web Client
Storage Policy Based Management for VMFS datastore	vSphere Web Client

Configuring storage system resources and LDEVs

LDEVs for VMFS datastores must be created on the storage system. The VASA Provider only supports DP pool LDEVs (Hitachi virtual volumes); therefore, prepare the DP pool before creating the LDEVs.

See Referenced documents for more information on storage system configuration.

Linking with Hitachi Dynamic Tiering and active flash

If VASA Provider is linked with Hitachi Dynamic Tiering and active flash, VMFS datastores are automatically stored in the appropriate tiers based on the user-specified storage capabilities.

To use this function, enable Multi-Tier Pool for the pools to be registered in the resource group. In addition, configure tiers and set the default schedule according to the storage configuration to be used.

For information about operating procedures when this function is enabled, see [Using VMFS Policy Compliance \(on page 65\)](#). For information on how to specify settings for Hitachi Dynamic Tiering and active flash, see the manuals for the storage system.

Set host groups

To make LDEVs available to ESXi hosts, storage system host groups must be configured. See Referenced documents for more information on storage system configuration.



Note: VAAI must be configured for both traditional VMFS and VVol datastores.

Related tasks

- [Setting up the VAAI \(VMware vStorage APIs for Array Integration\) \(on page 52\)](#)

Create VMFS datastores

To create VMFS datastores, see documentation provided by VMware Inc.

Verifying automatic storage capability detection

Once storage systems and LDEVs have been registered with the VASA Provider, storage alert and capability information is automatically detected and sent to VMware vSphere. The VASA Provider uses version 1.0 of VASA (the VMware API itself) to implement this feature. For information on storage capabilities, see documentation provided by VMware Inc.

Though it is not necessary to manually configure storage capability information, automatically detected capabilities can be verified by following the procedure below.

Procedure

1. Login to vSphere Web Client.
2. Select **Storage**.
3. Select a datastore.
4. Select **Configure** on the **Manage** tab. Click **Capability sets**.

Creating Tag-based Storage Policy configurations

Tag-based Storage Policy configurations provide the same functions for VMFS datastores as Storage Policy Based Management (SPBM) configurations do for VVols.

Procedure

1. Open the **LU Administration** screen.
2. Select an LDEV, then click **Define Profile**.
3. Click **OK** after setting the capability profile. To see a list of available capability profile values, click **Capability Schema**.
 - Storage profiles reside in the same vCenter Server instance used by the VASA Provider for Single-Sign On authentication.
 - It may take up to five minutes for the Tag-based Storage Policy to be reflected in vCenter Server.
 - To set the storage profile for each pool, create a storage container and then set a storage profile for the pool. The profile will be applied to all datastore LUNs in the pool being used.



Note: Once a storage policy has been configured for an LDEV in the VASA Provider, the LDEV's capabilities will appear in vCenter Server as tags. To use SPBM in this environment, configure VM Storage Profile settings with these tags.

Related references

- For creating a storage profile, see [Creating an LDEV storage profile \(on page 35\)](#).
- For setting SPBM, see [Storage Policy Based Management \(on page 59\)](#).
- For registering the VASA Provider, see [Registering the VASA Provider in VMware vSphere \(on page 57\)](#).

Creating an Storage Policy Based Management (SPBM) for VMFS datastores

SPBM is a structure defined by a VM storage policy.

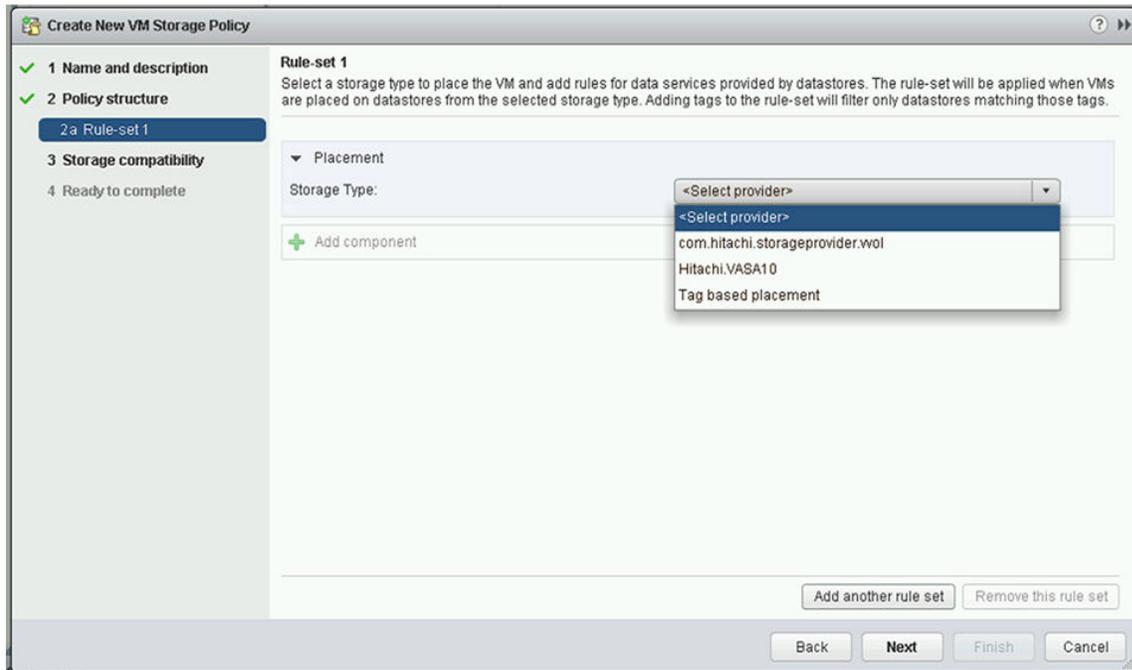
One of the prerequisites for configuring a VMFS environment involves configuring Storage Policy Based Management (SPBM).

The tasks that apply to the VMware vSphere administrator (VM administrator) are noted in parenthesis:

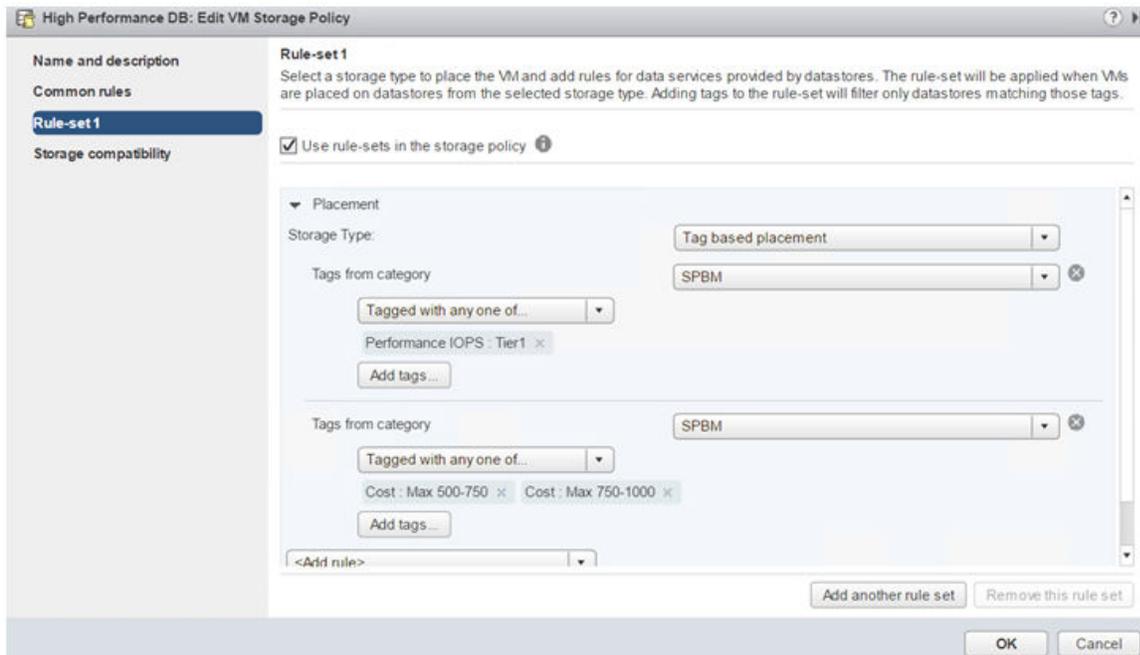
Procedure

1. **Define capability profiles:** Set the capability profile of the storage container for each DP pool.
2. **Define VM Storage Policies** (applies to the VM administrator): Create virtual machine storage policies based on the contents of the capability schema.
For SPBM for VMFS: Go to **Storage Type** under **Placement**. Select **Tag based placement** under **Select provider** for Rule setting.

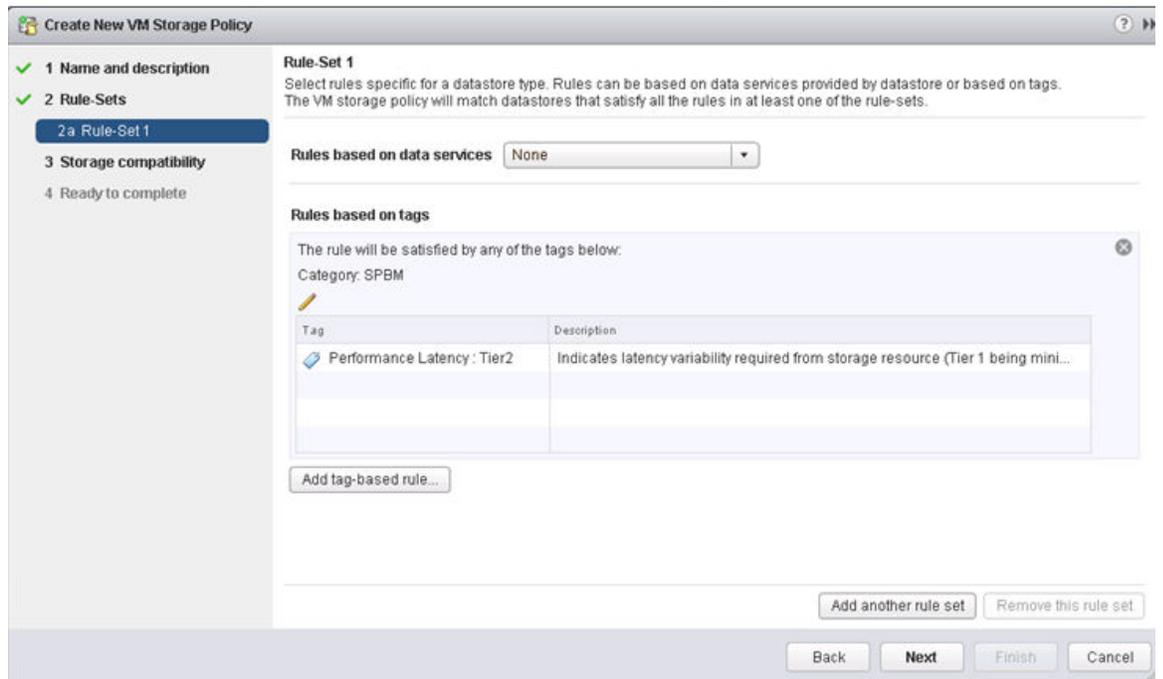
For automatic capability and alert information (based on VASA 1.0): Go to **Storage Type** under **Placement**. Select **Hitachi.VASA10** under **Select provider** for Rule setting.



In **Rule-set1**, select **Tag based placement** from **Storage Type**, and select **SPBM** from Tags from category.



For Tag Category, select **SPBM**, then set the tags.



3. **Check storage policy compliance** (applies to the VM administrator): vCenter reports whether VMs reside on storage with capabilities that satisfy VM storage policies. This is done by comparing the capability profiles and VM storage policies.

Using VMFS Policy Compliance

If you enable VMFS Policy Compliance, VMFS datastores are automatically stored in the appropriate tiers based on the user-specified storage capabilities.

Before you begin

- Datastores have been created from LDEVs in pools for which Multi-Tier Pool is enabled.
- VMFS Policy Compliance is enabled.

Procedure

1. Create a capability profile.

For details about the procedure, see [Creating an LDEV storage profile \(on page 35\)](#).

To check the correspondence between storage capabilities and the tiers in which datastores are stored, check **VM Policy** in the table for the **Enable VMFS Policy Compliance** check box on the **Capability Schema** screen.



Note:

This function is intended for datastores. Even if you change the VM storage policy in vCenter Server, this function will not be used.

Chapter 7: VASA Provider Troubleshooting

This chapter describes how to troubleshoot symptoms that may arise while using the VASA Provider.

Collecting logs

Logs from the following components should be collected before contacting support personnel.

- The VASA Provider
- Pertinent storage systems
- VMware vCenter Server and ESXi

For log file collection methods, see the respective documentation.

Component	Document	Topic
VASA Provider (block)	-	Downloading the VASA Provider log (on page 66)
vCenter/ESXi	Please see documentation published by VMware, Inc.	-
Storage system	Please see Referenced documents.	Collect Dump/Log (see the Maintenance Manual corresponding to your storage system model.)

Downloading the VASA Provider log

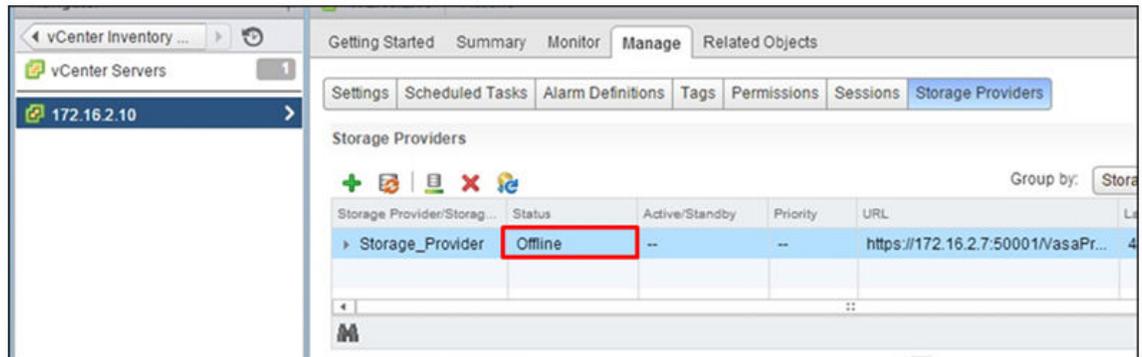
The VASA Provider allows its logs to be downloaded as ZIP files.

Procedure

1. Go to <https://VASA-Provider-IP-Address:50001/>.
2. In the **Login** window, enter credentials (the default is **system** and **manager**) and click **Login**.
3. In the main Web UI window, click **Download Logs**.
4. Download the log files according to the instructions in your browser.

The Storage Provider's status is Offline

The connection with the Storage Provider may have failed.

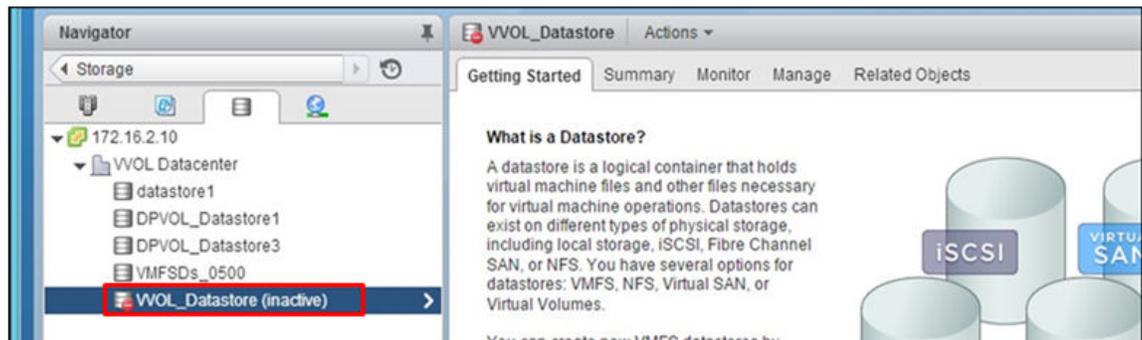


Check the following:

- Refresh the Storage Provider to verify its status.
- Verify that the VASA Provider and vCenter Server have synchronized clocks.
- Update the Storage Provider's SSL certificate, then verify its status.
- Verify that the storage systems are registered in the storage management software.
- If no related hardware or software problems are found outside of the VASA Provider itself, collect the VASA Provider's logs. If any ERROR type log messages are found, look for the error message IDs in the Messages chapter.
- If no problems are found, wait a while and try again; in some circumstances, vCenter Server may take a while to display current information.

A VVol datastore appears inactive

If a VVol datastore becomes inactive, it may not function normally until corrective action is taken.

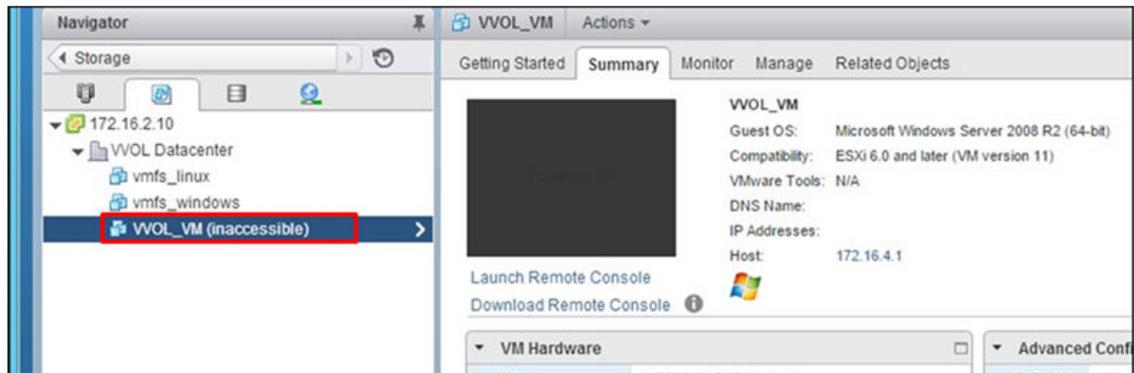


Check the following:

- Verify the Protocol Endpoint information in the storage container's summary. If the summary is not displayed, a problem may have occurred with the connection between an ESXi host and the storage system.
- Rescan the SAN, then check to see if the status has returned to normal.
- Restart the VASA Provider, then check to see if the status has returned to normal.
- Verify that the storage systems and the storage management software for the VASA Provider are not suspended and that an error has not occurred.
- If there are no issues with any related hardware or software, check the VASA Provider log. If an error has occurred, follow the recommended action for that error ID.
- If no problems are found, wait a while and try again; in some circumstances, vCenter Server may take a while to display current information.

VM appears with (inaccessible) by its name

Once a VM appears with (inaccessible) next to its name, it may no longer function until corrective action is taken.



Check the following:

- Rescan the SAN, then check to see if the VM has returned to normal.
- Refresh the VASA Provider, then check to see if the VM has returned to normal.
- Verify that the storage systems and the storage management software for the VASA Provider are not suspended and that an error has not occurred.
- Restart the VASA Provider's VM, then check to see if the inaccessible VM has returned to normal.
- If there are no issues with any related hardware or software, check the VASA Provider log. If an error has occurred, follow the recommended action for that error ID.
- If no problems are found, wait a while and try again; in some circumstances, vCenter Server may take a while to display current information.

Cannot create VM or VM snapshot through vCenter Server

Check the following:

- An inconsistency may have occurred between the storage system and the storage management software. Refresh the storage systems in the management software.
- Accessing a storage system while it is busy may prevent the task from completing.
- Verify if the VASA Provider, storage system, or storage management software has stopped or if any other problems have occurred.
- Verify that all related host groups are configured as follows: Host Mode: 21h (VMware); Host Mode Option: 63h.
- Verify the storage container pool's remaining free capacity. If the pool is full, free sufficient space by expanding the pool's capacity.
- Verify that the storage container pool is not blocked. If the pool is blocked, remove the blockage.
- Verify that ample unused LDEV IDs are registered in the storage container resource group.
- If you cannot create snapshots or clones, verify that a Hitachi Thin Image pool is registered for the storage container.
- If you cannot delete a VM or disk, use the storage management software to determine whether any SLUs have been paired.
- If there are no problems with the hardware or software, check the VASA Provider log for possible errors. If an error has occurred, follow the recommended action for that error ID.
- A conflict may have occurred with a maintenance operation from the storage management software. Contact the storage administrator and verify if any storage maintenance operations have been running. Retry the failed operation after the maintenance is completed.

VM does not start/stop

Check the following:

- An inconsistency may have occurred between the storage system and the storage management software. Refresh the storage systems in the management software.
- Accessing a storage system while it is busy may prevent processing from completing properly.
- Verify if the VASA Provider, storage system, or storage management software has stopped or if any other problems have occurred.
- Verify the storage container pool's remaining free capacity. If the pool is full, free sufficient space by expanding the pool's capacity.

- Verify that the storage container pool is not blocked. If the pool is blocked, remove the blockage.
- Verify that ample unused LDEV IDs are registered in the storage container resource group.
- If there are no problems with the hardware or software, check the VASA Provider log for possible errors. If an error has occurred, follow the recommended action for that error ID.
- A conflict may have occurred with a maintenance operation from the storage management software. Contact the storage administrator and verify if any storage maintenance operations have been running. Retry the failed operation after the maintenance is completed.

Protocol Endpoint is not recognized by ESXi

Check the following:

- Restart the ESXi host, then re-verify the recognition status.
- Verify that you have the required hardware drivers and that the versions are supported in your environment.
- Verify that there are no problems with the storage system settings for the connection to the ESXi host.
- An inconsistency may have occurred between the storage system and the management software. Refresh the storage systems in the management software.
- Verify that a VVol datastore has been mounted on the ESXi host. After mounting it, verify that it is recognized as a Protocol Endpoint.

Storage container is not shown when creating a datastore

- Refresh the Storage Provider, then try to create the datastore again.

Displayed VM name is corrupt

The displayed name for a VM may become corrupt due to interrupted communication between vCenter and the storage system. The VM name may appear similar to the following example.

```
/vmfs/volumes/vvol: 1a9f5bf045564e66-98d68378b6f26999/naa.60060E8130274C3
```

This might occur when a vCenter internal process is running. Wait for the process to complete, then refresh the vSphere Web Client screen to see if the VM name displays properly. If it does not, re-register the affected VM in the inventory, then verify if the VM name displays properly.

VM reconfiguration fails

- Verify that the VM is in compliance with the VM storage policy. If it is non-compliant, modify the VM's storage policy settings.

Cannot modify VM storage policy

Procedure

1. Relocate the virtual machine to a different datastore.
2. Assign it a new storage policy.
3. Relocate it back the current datastore.
4. Verify that the storage systems and the storage management software for the Storage Provider are not suspended and that an error has not occurred.

Chapter 8: Messages

The message type indicates the operation corresponding to the message. The message types are as follows:

Type	Description
E	Error message indicating that processing cannot continue due to an error or an incorrectly specified option.
W	Warning message indicating that an error occurred or that an option was incorrectly specified, but that processing will continue.
I	Message providing additional information about processing. Messages that are neither error messages nor warning messages.

List of messages

Message ID	Message text	Recommended actions
EB301001	Failed to retrieve storage system [{X}] information.	Verify that storage systems are available. If the problem persists, download the log files and submit them to Support. Verify that the registered storage systems are running without problems.
EB301003	The argument of entityType value is not supported. entityType=[{X}].	Download the log files, then contact Support.
EB301004	Failed to register Class with the Dependency Injection Container=[{X}].	Download the log files, then contact Support.
EB301005	The Vasa To VP Map failed to initialize.	Download the log files, then contact Support.
EB301006	Failed to initialize Data Manager=[{X}].	Download the log files, then contact Support.
EB301007	Failed to convert World Wide Names=[{X}].	Download the log files, then contact Support.
EB301008	Cannot find the catalog file with the specified catalog type=[{X}].	Download the log files, then contact Support.
EB301009	Failed to update StorageContainer association=[{X}].	Download the log files, then contact Support. Verify that the storage systems are available.
EB30100B	The caRootCert list is not specified.	Download the log files, then contact Support.
EB30100D	Failed to create a certificate.	Restart the VASA Provider. If this problem persists, download the log files, then contact Support.
EB30100E	Invalid certificate: does not meet x509Cert Requirements.	Restart the VASA Provider. If this problem persists, download the log files, then contact Support.
EB30100F	Failed to add certificate.	Restart the VASA Provider. If this problem persists, download the log files, then contact Support.
EB301010	Failed to read SSL certificate.	Restart the VASA Provider. If this problem persists, download the log files, then contact Support.

Message ID	Message text	Recommended actions
EB301011	Failed to read SSL certificate.	Restart the VASA Provider. If this problem persists, download the log files, then contact Support.
EB301012	An error occurred while checking the caRoot certificate expiration date.	Restart the VASA Provider. If this problem persists, download the log files, then contact Support.
EB301013	Failed to replace the SSL certificate.	Restart the VASA Provider. If this problem persists, download the log files, then contact Support.
EB301014	Could not remove the certificate that might be in the CRL.	Restart the VASA Provider. If this problem persists, download the log files, then contact Support.
EB301015	Failed to create a CRL:CRL=[{X}].	Restart the VASA Provider. If this problem persists, download the log files, then contact Support.
EB301016	Could not resolve the missing registration.	Restart the VASA Provider. If this problem persists, download the log files, then contact Support.
EB301017	Context Index is out of range. The index exceeds topContextIndex.	Download the log files, then contact Support.
EB301018	Contract class is already implemented: Contract class=[{X}].	Download the log files, then contact Support.
EB301019	Contract class is not an interface: Contract class=[{X}].	Download the log files, then contact Support.
EB30101A	Contract class must be implemented: Class=[{X}].	Download the log files, then contact Support.
EB30101B	No inheritance relation between implementation class and contract class:implementation=[{X}], contract=[{X}].	Download the log files, then contact Support.
EB30101C	An implementation class does not have a public constructor.	Download the log files, then contact Support.

Message ID	Message text	Recommended actions
EB30101D	Contract class is not registered: Construct class=[{X}].	Download the log files, then contact Support.
EB30101E	getAlarm failed=[{X}].	Restart the VASA Provider. If this problem persists, download the log files, then contact Support.
EB30101F	getEvent failed=[{X}].	Restart the VASA Provider. If this problem persists, download the log files, then contact Support.
EB301020	Invalid Login: Unrecognized User or Password.	Verify the VASA Provider credentials.
EB301022	Not supported Catalog Type=[{X}].	Download the log files, then contact Support.
EB301023	Exception during WebUIServiceImpl:init()=[{X}].	Verify that the SSL certificate exists and was created correctly. If the SSL certificate is present and correct, restart the VASA Provider. If the problem occurs frequently, download the log files, then contact support.
EB301024	Invalid VASA session for the current transaction. Re-establish the VASA session.	If the problem occurs frequently, download the log files then contact support.
EB301025	Exception during VasaServiceImpl:init()=[{X}].	Verify that the SSL certificate exists and was created correctly. If the SSL certificate is present and correct, restart the VASA Provider. If the problem occurs frequently, download the log files, then contact support.
EB301026	There is no client host for the current transaction. Re-establish the VASA session.	Restart the VASA Provider. If this problem persists, download the log files, then contact Support.
EB301027	Invalid client host for current transaction. Re-establish the VASA session.	Restart the VASA Provider. If this problem persists, download the log files, then contact Support.
EB301028	Logging threw an exception -- [{X}].	Download the log files, then contact Support.

Message ID	Message text	Recommended actions
EB301029	Unhandled exception at the root of a scheduled task	Download the log files, then contact Support.
EB30102A	Failed to initialize the VASA Provider.	Verify that the SSL certificate exists and was created correctly. If the SSL certificate is present and correct, restart the VASA Provider. If the problem occurs frequently, download the log files then contact support.
EB30102B	EXIT: NullPointerException	Download the log files, then contact Support.
EB30102C	unbindAllVirtualVolumesFromHost : host ID could not be obtained from the session.	If the problem occurs frequently, download the log files, and then contact customer support.
EB30102D	The VASA Provider is in maintenance mode.	Wait until the VASA Provider has returned from maintenance mode to normal.
EB30102E	An error occurred while mapping DeviceHandler object to DataManager object=[{X}].	Download the log files, then contact Support.
EB30102F	VVolMetaData is not valid.	Download the log files, then contact Support.
EB301030	StorageFault: "[{X}]" is not mapped in the VASA Provider.	Download the log files, then contact Support.
EB301031	The specified alarm ID is out of range.	If this problem occurs frequently, download the log files, then contact Support.
EB301032	The specified eventID is out of range.	If this problem occurs frequently, download the log files, then contact Support.
EB301033	File Loader Failure: File Too Large [{X}].	Restart the VASA Provider. If this problem persists, download the log files, then contact Support.
EB301034	File Loader Failure: File Not Found [{X}].	Run a repair installation. If this problem persists, download the log files, then contact Support.

Message ID	Message text	Recommended actions
EB301035	File Loader Failure: File Not Readable [{X}].	Restart the VASA Provider. If this problem persists, download the log files, then contact Support.
EB301036	File Loader Failure: File Read Failure [{X}].	Verify that the SSL certificate exists and was created correctly. If the SSL certificate is present and correct, restart the VASA Provider. If this problem occurs frequently, download the log files then contact support.
EB301037	Failed to remove the storage system [{X}].	Download the log files, then contact Support.
EB301038	Failed to initialize DBMS Driver [{X}].	Download the log files, then contact Support.
EB301039	Failed to connect to DBMS [{X}].	Download the log files, then contact Support.
EB30103A	An error occurred while executing a retrieval query [{X}].	Download the log files, then contact Support.
EB30103B	An error occurred while executing an update query [{X}].	Download the log files, then contact Support.
EB30103C	An error occurred while committing a transaction in DBMS [{X}].	Download the log files, then contact Support.
EB30103D	An error occurred while rolling back a transaction in DBMS [{X}].	Download the log files, then contact Support.
EB30103E	Web UI session does not exist.	Log in again.
EB30103F	Failed to retrieve the VASA Provider information.	Restart the VASA Provider. If this problem persists, download the log files, then contact Support.
EB301040	Failed to discover the storage system.	Verify that the storage system is available. If this problem persists, download the log files, then contact Support.

Message ID	Message text	Recommended actions
EB301041	Failed to add the storage system.	Verify that the storage systems is available. If this problem persists, download the log files, then contact Support.
EB301042	Failed to remove the storage system.	Restart the VASA Provider. If this problem persists, download the log files, then contact Support.
EB301043	Failed to list the storage systems.	Verify that the storage systems are available. Download the log files, then contact Support.
EB301044	Failed to log in.	Close the browser and log in again. If this problem persists, download the log files, then contact Support.
EB301045	Failed to log out.	Close the browser and log in again. If this problem persists, download the log files, then contact Support.
EB301046	Failed to change user credentials.	Restart the VASA Provider. If this problem persists, download the log files, then contact Support.
EB301047	Failed to authenticate.	Restart the VASA Provider. If this problem persists, download the log files, then contact Support.
EB301048	Failed to add the storage system. serial number={X}	Verify that the storage systems are available. If this problem persists, download the log files, then contact Support.
EB301049	Failed to remove the storage system. serial number={X}	Restart the VASA Provider. If this problem persists, download the log files, then contact Support.
EB30104A	An unexpected error occurred during a process with the Setup Web UI. {X}	Restart the VASA Provider. If this problem persists, download the log files, then contact Support.
EB30104B	The Setup Web UI cannot communicate with the VASA Provider because the VASA Provider failed to initialize.	Restart the VASA Provider. If this problem persists, download the log files, then contact Support.
EB30104C	The Setup Web UI API {X} is not supported.	Download the log files, then contact Support.

Message ID	Message text	Recommended actions
EB30104D	The session timed out. Last access time={X}	Log in again.
EB30104E	The session [{X}] timed out.	Log in again.
EB30104F	Failed to retrieve the CA root certificates.	Download the log files, then contact Support.
EB301050	Did not find the storage model. [{X}]	Verify that the storage system is available. If this problem persists, download the log files, then contact Support.
EB301052	The shell script for restarting the VASA Provider service cannot be found.	If your OS is Debian, re-deploy the VM from the OVF. If your OS is Redhat, perform a repair installation.
EB301053	The storage system does not support VVOL. [{X}]	Download the log files, then contact Support.
EB301054	Storage information was not created. {X} [{X}] does not exist in {X}.	Download the log files, then contact Support.
EB301055	Storage information was not created. Target array ID [{X}] does not match array ID {X} in mapping table {X}.	Download the log files, then contact Support.
EB301056	An unexpected error occurred while loading the application monitoring files. {X}	Download the log files, then contact Support.
EB301057	An unexpected error occurred while calling the vSphere HA application monitoring API. Method name : {X}, Exception : {X}.	Download the log files, then contact Support.
EB301058	Failed to sign a request for the vCenter Single Sign On server. {X}	Download the log files, then contact Support.
EB301059	Could not append the node {X} to SOAP Header. {X}	Download the log files, then contact Support.

Message ID	Message text	Recommended actions
EB30105A	Failed to extract the SAML token from the SOAP Message. {X}	Download the log files, then contact Support.
EB30105B	An unexpected error occurred while loading the certificate. {X}	Download the log files, then contact Support.
EB30105C	Failed to initialize storage module information. {X}:exception	Download the log files, then contact Support.
EB30105D	Failed to start storage module.	Download the log files, then contact Support.
EB30105E	An unexpected error occurred in the storage module. The storage module will be stopped. {X}	Download the log files, then contact Support.
EB30105F	Failed to add or update the storage system. Requested value = [{X}]	Download the log files, then contact Support.
EB301060	The storage module cannot be started in its current state. [{X}]	Download the log files, then contact Support.
EB301061	An unexpected error occurred while updating status of the storage task. {X}	Download the log files, then contact Support.
EB301062	An unexpected error occurred while updating storage data. {X}	Download the log files, then contact Support.
EB301063	Failed to connect to VimService. {X}	Download the log files, then contact Support.
EB301064	Failed to send request to VimService. {X}	Download the log files, then contact Support.
EB301065	Connection to Lookup Service failed. {X}	Download the log files, then contact Support.
EB301066	Failed to send request to Lookup Service. {X}	Download the log files, then contact Support.
EB301067	Failed to send request to Automation Service. {X}	Download the log files, then contact Support.

Message ID	Message text	Recommended actions
EB301069	User is not authorized to use the Tagging service.	Try to log in with an account authorized to use the Tagging service.
EB30106A	An unexpected error occurred while updating tag and category. {X}	Download the log files, then contact Support.
EB301900	The argument value is NULL [{X}].	Download the log files, then contact Support.
EB301901	The argument value is not valid [{X}].	Download the log files, then contact Support.
EB301902	One of the arguments is used twice.	Download the log files, then contact Support.
EB301903	[{X}] is NULL.	Download the log files, then contact Support.
EB301904	[{X}] is invalid.	Download the log files, then contact Support.
EB301905	StorageFault Caught [{X}].	Verify that the storage systems are available. If this problem persists, download the log files, then contact Support.
EB301906	An error occurred while retrieving data from the storage module =[{X}].	Verify that the storage systems are available. If this problem persists, download the log files, then contact Support.
EB301907	An error occurred while setting data to the storage module={X}].	Download the log files, then contact Support.
EB301908	An error occurred while updating information={X}].	Download the log files, then contact Support.
EB301909	Not Found: Specified ID does not exist ID={X}].	Restart the VASA Provider. If this problem persists, download the log files, then contact Support.
EB30190A	Failed to lock the object. {X}	Download the log files, then contact Support.
EB30190B	An error occurred in the DBHandler processing.{X}	Download the log files, then contact Support.
EB30190C	An error occurred in the DeviceHandler processing.{X}	Download the log files, then contact Support.

Message ID	Message text	Recommended actions
EB30190D	[[X]] is not valid. {X}={X}	Download the log files, then contact Support.
EB301911	A timeout error occurred while removing the storage system.	Try again in few minutes.
EB301912	Storage array data already exists. Array ID : [[X]].	Download the log files, then contact Support.
EB301913	Storage array data cannot be found. Array ID : [[X]].	Download the log files, then contact Support.
EB301914	Target array ID [[X]] does not match array ID {X} in {X}.	Download the log files, then contact Support.
EB301915	VASA Provider database processing timed out.	Download the log files, then contact Support.
EB301916	VASA Provider storage information items are still being processed. Remaining storage information items: {X}	Download the log files, then contact Support.
EB301917	Storage module error = {X}, Description = {X}.	Download the log files, then contact Support.
EB301918	LUN information was not retrieved. Array ID : [[X]]	Download the log files, then contact Support.
EB30191A	Failed to create {X}. {X}	Download the log files, then contact Support.
EB30191B	Failed to log out. [[X]]	Download the log files, then contact Support.
EB303005	Storage systems were not selected.	Select one or more storage systems.
EB303006	Failed to discover the storage system.	Verify that the VASA Provider supports the registered storage system. Verify that network access between the storage systems and the VASA Provider is normal. Verify that the storage systems are available.

Message ID	Message text	Recommended actions
		If this problem persists, restart the VASA Provider, and download the log files, then contact Support.
EB30300A	Failed to download log files.	Restart the VASA Provider. If this problem persists, download the log files, then contact Support.
EB30300B	Failed to restart the VASA Provider service.	Download the log files, then contact Support.
EB30300C	Failed to log in.	Verify the account name and password.
EB30300D	Failed to log out.	Download the log files, then contact Support.
EB30300E	Failed to change user credentials.	Restart the VASA Provider. If this problem persists, download the log files, then contact Support.
EB30300F	Failed to retrieve the VASA Provider information.	Restart the VASA Provider. If this problem persists, download the log files, then contact Support.
EB303010	The current user's username is not specified.	Enter the current user's account name.
EB303011	The current user's password was not specified.	Enter the current user's password.
EB303012	The new username was not specified.	Enter the current user's new account name.
EB303013	A new password was not specified.	Enter the new password.
EB303014	The new confirmation password was not specified.	Enter the new password again, for confirmation.
EB303015	The current username is not valid.	Use up to 255 of the following characters. [A-Z a-z 0-9 ! # \$ % & ' { } * + - . = @ ^ ~ / ? `]
EB303016	The current password is not valid.	Use up to 255 of the following characters: [A-Z a-z 0-9 ! # \$ % & ' { } * + - . = @ ^ ~ / ? `]

Message ID	Message text	Recommended actions
EB303017	The new username is not valid.	Use up to 255 of the following characters: [A-Z a-z 0-9 ! # \$ % & ' { } * + - . = @ ^ ~ / ? `]
EB303018	The new password is not valid.	Use up to 255 of the following characters: [A-Z a-z 0-9 ! # \$ % & ' { } * + - . = @ ^ ~ / ? `]
EB303019	The new confirmation password is invalid.	Use up to 255 of the following characters: [A-Z a-z 0-9 ! # \$ % & ' { } * + - . = @ ^ ~ / ? `]
EB30301A	The confirmation password and new password are not the same.	Enter the same characters for the confirmation password and new password.
EB30301B	Failed to authenticate. User credentials were not changed.	Restart the VASA Provider. If this problem persists, download the log files, then contact Support.
EB30301D	A username was not specified.	Enter your account name.
EB30301E	A password was not specified.	Enter your password.
EB30301F	The entered username is not valid.	Use up to 255 of the following characters: [A-Z a-z 0-9 ! # \$ % & ' { } * + - . = @ ^ ~ / ? `]
EB303020	The password is not valid.	Use up to 255 of the following characters: [A-Z a-z 0-9 ! # \$ % & ' { } * + - . = @ ^ ~ / ? `]
EB303021	The session does not exist. Login again.	Restart the VASA Provider. If this problem persists, download the log files, then contact Support.
EB303022	Array ID [{X}] is not valid.	Restart the VASA Provider. If this problem persists, download the log files, then contact Support.

Message ID	Message text	Recommended actions
EB303025	The input IP address is not valid. Verify the input item value.	Enter a valid IP address.
EB303028	A timeout error occurred while removing the storage system.	Try again later.
EB303029	{X} is not specified.	Enter {X}
EB30302A	The port number is not valid. Verify the input item value.	Enter a port number between 0-65535.
EB30302B	The network IP address or FQDN is not valid. Verify the input item value.	For the FQDN, use up to 255 of the following characters: [A-Z a-z 0-9 - .]
EB30302C	The specified network IP address or the specified FQDN exceeded 255 characters.	For the FQDN, use up to 255 of the following characters: [A-Z a-z 0-9 - .]
EB30302D	Failed to configure the specified SSO information.	Restart the VASA Provider. If this problem persists, download the log files, then contact Support.
EB30302E	Failed to acquire information about the SSO configuration.	Restart the VASA Provider. If this problem persists, download the log files, then contact Support.
EB30302F	Select a network device.	Select a network device.
EB303030	Select an IP address.	Select an IP address.
EB303031	Failed to obtain information about the storage container.	Restart the VASA Provider. If this problem persists, download the log files, then contact Support.
EB303032	Failed to create a storage container.	Restart the VASA Provider. If this problem persists, download the log files, then contact Support.
EB303033	Failed to delete the storage container.	Restart the VASA Provider. If this problem persists, download the log files, then contact Support.
EB303034	Failed to obtain information about the capability schema.	Restart the VASA Provider. If this problem persists, download the log files, then contact Support.

Message ID	Message text	Recommended actions
EB303035	Failed to edit the storage container.	Restart the VASA Provider. If this problem persists, download the log files, then contact Support.
EB303036	Failed to obtain the list of storage systems. Restart the Storage Provider.	Restart the VASA Provider. If this problem persists, download the log files, then contact Support.
EB303037	Failed to obtain the list of storage systems. Update the storage system information.	Update the storage system. If this problem persists, download the log files, then contact Support.
EB303038	Processing to add, update, or edit a storage system failed. {X}	Restart the VASA Provider. If this problem persists, download the log files, then contact Support.
EB303039	Failed to obtain the list of storage systems.	Restart the VASA Provider. If this problem persists, download the log files, then contact Support.
EB30303A	The storage system search failed.	Restart the VASA Provider. If this problem persists, download the log files, then contact Support.
EB30303B	The storage system is already registered. {X}	Verify the input information.
EB30303C	The storage system is being added. {X}	Verify the input information.
EB30303D	Failed to add the storage system. {X}	Restart the VASA Provider. If this problem persists, download the log files, then contact Support.
EB30303E	The values entered in the form are incorrect. Check the values you entered.	Verify the input information.
EB303040	The storage system is being updated. {X}	Verify the input information.
EB303041	Failed to update the storage system. {X}	Restart the VASA Provider. If this problem persists, download the log files, then contact Support.
B303042	Failed to delete the storage system. {X}	Restart the VASA Provider. If this problem persists, download the log files, then contact Support.

Message ID	Message text	Recommended actions
EB303043	Failed to obtain the DP pool list.	Restart the VASA Provider. If this problem persists, download the log files, then contact Support.
EB303044	Failed to obtain the volume list.	Restart the VASA Provider. If this problem persists, download the log files, then contact Support.
EB303045	Failed to obtain tag definition information.	Restart the VASA Provider. If this problem persists, download the log files, then contact Support.
EB303046	Failed to obtain volume tag information.	Restart the VASA Provider. If this problem persists, download the log files, then contact Support.
EB303047	Failed to set volume tag information.	Restart the VASA Provider. If this problem persists, download the log files, then contact Support.
EB303048	Select a storage system to be edited.	Verify the input information.
EB303049	Failed to edit the storage system.	Restart the VASA Provider. If this problem persists, download the log files, then contact Support.
EB30304A	The storage system is being edited. {X}	Verify the input information.
EB30304B	The storage system is already deleted. {X}	Verify the input information.
EB30304C	The storage system is being deleted. {X}	Verify the input information.
EB303500	The IP address of the remote server is not configured in the properties file.	Download the log files, then contact Support.
EB303501	The port number of the remote server is not configured in the properties file.	Download the log files, then contact Support.
EB303502	The JSP file path for the Block WebUI Start page is not configured in the properties file.	Download the log files, then contact Support.

Message ID	Message text	Recommended actions
EB303503	The JSP file path for the File WebUI start page is not configured in the properties file.	Download the log files, then contact Support.
EB303504	An unexpected error occurred.	Download the log files, then contact Support.
EB303505	Failed to get the value from the properties file.	Download the log files, then contact Support.
EB303506	Failed to configure the values in the properties file.	Download the log files, then contact Support.
EB303507	Failed to get the path for the message properties file.	Download the log files, then contact Support.
EB303508	The WebUI start page does not exist on the local server.	Download the log files, then contact Support.
EB303509	The properties file does not exist.	Download the log files, then contact Support.
EB30350A	The IP address of the remote server is not specified.	Enter the IP address
EB30350B	The IP address of the remote server is not valid.	Verify the input information.
EB30350C	The port number of the remote server is not specified.	Enter the port number.
EB30350D	The port number of the remote server contains an invalid character.	Verify the input information.
EB303900	An unexpected error occurred. {X}	Download the log files, then contact Support.
EB303901	A GUI error occurred. {X}	Verify the previous error log for this error.
EB304001	The path to install the Storage Provider for VMware vCenter cannot be determined.	Please contact Support.
EB304002	Invalid parameter(s). Enter valid parameter(s).	Enter valid parameter(s).

Message ID	Message text	Recommended actions
EB304003	The current user is not the root user. Login as the root user.	Log in as root.
EB304004	The installer log file cannot be created. Allow write permission for the log file path directory that is displayed with [%s] and then try again.	Allow write permission to the directory, and then try again. If this problem persists, please contact Support.
EB304005	The current operating system is not supported. Operating system - [%s].	Install a supported OS version.
EB304006	The installation path cannot be found.	If StorageProvider-b_Installer.log exists, retrieve the log file, then contact Support.
EB304007	The installation version cannot be determined.	If StorageProvider-b_Installer.log exists, retrieve the log file, then contact Support.
EB304008	Installation was aborted.	If StorageProvider-b_Installer.log exists, retrieve the log file, then contact Support.
EB304009	The repair process was aborted.	If StorageProvider-b_Installer.log exists, retrieve the log file, then contact Support.
EB30400A	This file does not exist - [%s].	If StorageProvider-b_Installer.log exists, retrieve the log file, then contact Support.
EB30400B	Failed to run the command [%s].	Verify the software requirements. If this problem persists, download the log files, then contact Support.
EB30400C	The input parameter value is not valid - [%s]. Function name - [%s].	If StorageProvider-b_Installer.log exists, retrieve the log file, then contact Support.
EB30400D	The [%s] operating system is not supported by this installer.	Install a supported OS version.
EB30400E	The upgrade process was aborted.	If StorageProvider-b_Installer.log exists, retrieve the log file, then contact Support.

Message ID	Message text	Recommended actions
EB30400F	Installation cannot proceed as a later version %s of the Storage Provider for VMware vCenter is already installed on the system.	Use the correct installer.
EB304010	Log file path [%s] does not exist.	If StorageProvider-b_Installer.log exists, retrieve the log file, then contact Support.
EB304011	The specified port number [%s] is the reserved port number (50000 to 50006). Enter a different number.	Specify a different port number.
EB304012	The port numbers you entered are identical. Enter different numbers.	Enter a different port number.
EB304013	Uninstallation was aborted.	If StorageProvider-b_Installer.log exists, retrieve the log file, then contact Support.
EB304014	Failed to get the current port number for PostgreSQL.	Run a repair installation, then uninstall again.
EB304015	Failed to run the command [%s].	Verify that OpenJDK is installed. Verify that the OpenJDK version is correct. Verify that the OpenJDK environment variables are correct. If this problem persists, obtain the log files (StorageProvider-b_Installer.log), then contact Support. (For more information, see Software Requirements in the Deployment Guide.)
EB304016	Failed to run command [%s].	Verify that PostgreSQL is installed. Verify that the PostgreSQL version is correct. Verify that the parameters set during PostgreSQL's installation are correct. Verify that the PostgreSQL environment variables are correct. Verify that a PostgreSQL port number is available.

Message ID	Message text	Recommended actions
		If this problem persists, obtain the log files (StorageProvider-b_Installer.log), then contact support. (For more information, see Software Requirements in the Deployment Guide.)
EB304101	The data migration log file cannot be created. Allow write permission for the log file path directory displayed with [%s] and then try again.	The data migration log file cannot be created. Allow write permission for the directory and then try again.
EB304102	Data migration was aborted.	If StorageProvider-b_Installer.log exists, retrieve the log file, then contact Support.
EB304103	Restoration to the original state was aborted.	If StorageProvider-b_Installer.log exists, retrieve the log file, then contact Support.
EB304104	The [%s] operating system is not supported by this data migration script.	Install a supported operating system.
EB304105	The data migration process was aborted.	If StorageProvider-b_Installer.log exists, retrieve the log file, then contact Support.
EB304106	The HDvM version is not supported. HDvM version - [%s].	Install a supported HDvM version.
EB304202	The restoration script log file cannot be created. Allow write permission for the log file path directory displayed with [%s] and then try again.	Allow write permission for the directory, and then try again. If this problem persists, please contact Support.
EB304203	The database cluster path cannot be found.	If StorageProvider-b_Installer.log exists, retrieve the log file, then contact Support.
EB304204	Restoration was aborted.	If StorageProvider-b_Installer.log exists, retrieve the log file, then contact Support.
EB304205	The [%s] operating system is not supported by this restoration script.	Install a supported operating system.

Message ID	Message text	Recommended actions
EB304206	The backup process still exists.	Try again later.
EB304207	The backup file for the specified time does not exist. Enter a different time.	Specify a different time.
EB304208	The log file cannot be created. Give the write permissions of the log file path directory displayed with [%s] and then try again.	Allow write permission for the directory, and then try again. If this problem persists, please contact support.
EB304209	Deletion of the backup file was aborted.	The log file cannot be created. Verify that the directory is writable, and then try again.
EB304501	The openssl configuration file [%s] was not found.	Place the openssl.cnf file in the same directory as the createCertifications.sh file.
EB304502	The JAVA_HOME environment variable is not configured.	<p>Verify that OpenJDK is installed.</p> <p>Verify that the OpenJDK version is correct.</p> <p>Verify that the OpenJDK environment variables are correct.</p> <p>If this problem persists, obtain the log files (<code>StorageProvider-b_CreateCertification.log</code>), then contact support. For more information, see Software Requirements in the Deployment Guide.</p>
EB304503	The Java keytool [%s] does not exist.	<p>Verify that OpenJDK is installed.</p> <p>Verify that the OpenJDK version is correct.</p> <p>Verify that the OpenJDK environment variables are correct.</p> <p>If this problem persists, obtain the log files (<code>StorageProvider-b_CreateCertification.log</code>), then contact support. For more information, see Software Requirements in the Deployment Guide.</p>

Message ID	Message text	Recommended actions
EB304504	The Openssl command did not run [%s].	<p>Verify that OpenSSL is installed.</p> <p>Verify that the OpenSSL version is correct.</p> <p>If this problem persists, obtain the log files (StorageProvider-b_CreateCertification.log), then contact support. (For more information, see Software Requirements in the Deployment Guide.)</p>
EB304505	The Keytool command did not run [%s].	<p>Verify that OpenJDK is installed.</p> <p>Verify that the OpenJDK version is correct.</p> <p>Verify that the OpenJDK environment variables are correct.</p> <p>If this problem persists, obtain the log files (StorageProvider-b_CreateCertification.log), then contact support. For more information, see Software Requirements in the Deployment Guide.</p>
EB304506	The OS command did not run [%s].	<p>Run a repair installation of the VASA Provider. If the problem persists, verify the software requirements. If this problem persists, obtain the log files (StorageProvider-b_CreateCertification.log), then contact support.</p>
EB304507	The log file path [%s] was not found.	<p>Run a repair installation for the Storage Provider. If the problem persists, verify the software requirements. For more information, see the Deployment Guide.</p>
EB304508	The log file cannot be created. Enable write permission to the log file path directory indicated by [%s]. Try creating the log file again.	<p>Make the directory writable, and then try again. If this problem persists, please contact support.</p>
EB304509	The certificate file could not be created.	<p>If StorageProvider-b_CreateCertification.log exists, retrieve the log file, then, contact Support.</p>

Message ID	Message text	Recommended actions
EB30450A	The tomcat configuration path [%s] was not found.	Run a repair installation of the VASA Provider. If the problem persists, verify the software requirements. Obtain the log files (StorageProvider-b_CreateCertification.log), then contact Support.
EB30450B	The root user is not logged in. Log-off, then login as the root user.	Log in as root.
EB30450C	The [%s] operating system is not supported.	Install a supported operating system.
EB30450D	The interface configuration file does not exist - [%s].	If GetSystemSettings.log file exists, retrieve the log file, then contact Support.
EB30450E	Retrieving %s settings was aborted.	If the GetSystemSettings.log file exists, retrieve the log file, then contact Support.
EB30450F	Network device cannot be found.	Verify the network. If this does not resolve the issue, contact Support. If the GetSystemSettings.log file exists, retrieve the log file.
EB304510	The current operating system is not supported. Operating system - [%s].	Install a supported operating system.
EB304511	This file does not exist - [%s].	Verify that the network is working normally. If this does not resolve the issue, contact Support. If the GetSystemSettings.log file exists, retrieve the log file.
EB304512	Failed to run the command [%s].	Verify the network. If this does not resolve the issue, collect the log files(GetSystemSettings.sh), then contact Support.
EB304513	[%s] = null.	If the UpdateCertificate.log exists, retrieve the log file, then contact Support.
EB304514	Failed to recreate the certificate.	If the StorageProvider-b_CreateCertification.log file or the UpdateCertificate.log file exists, collect the log file, then contact Support.

Message ID	Message text	Recommended actions
EB304515	Failed to restart tomcat.	If the UpdateCertificate.log file exists, retrieve the log file, then contact Support.
EB304516	Updating the certificate was aborted.	If the UpdateCertificate.log file exists, retrieve the log file, then contact Support.
EB304517	Failed to run the shell script [%s].	If this problem persists, retrieve the log files (StorageProvider-b_CreateCertification.log, UpdateCertificate.log), then contact Support.
EB304518	A connectable device does not exist.	Verify the environment. If this problem persists, retrieve the log file (vpVmProps.log), then contact Support.
EB304519	Failed to add the network connection.	Verify the environment. If this problem persists, retrieve the log file (vpVmProps.log), then contact Support.
EB30451A	VMware Tools are not installed.	Contact support with log file (vpVmProps.log), if it is available.
EB30451B	Cannot get OVF parameters through VMware Tools.	Contact support with log file (vpVmProps.log), if it is available.
EB304601	Invalid parameter. Enter a valid parameter.	Enter a valid parameter.
EB304602	The directory was not found - [%s].	Verify that the directory exists in the specified path.

Chapter 9: Open source and third-party software licenses

This appendix includes copyrights and licenses for open source and third-party software used by the VASA Provider.

Software and license information

The VASA Provider contains software in the table below. Software used by the VASA Provider and corresponding licenses.

Software	License
Antlr (2.7.7)	ANTLR 4 License
Apache Tomcat (8.0.44)	Apache 2.0 license
Apache Axis2 (1.6.2)	
Apache Log4j (1.2.17)	
Apache Commons Collections (3.2.2)	
Apache Commons Lang (3.5)	
Jackson (2.9.7)	
Axiom API (1.2.13)	
Axiom DOM (1.2.13)	
Axiom IMPL (1.2.13)	
Apache Commons CLI (1.2)	
Apache Commons Codec (1.11)	
Apache Commons FileUpload (1.3.3)	
Apache Commons HttpClient (3.1)	
Apache Commons IO (1.4)	
Apache Commons Logging (1.1.1)	
Apache HttpCore (4.0)	

Software	License
Apache Log4j (1.2.15)	
Apache Neethi (3.0.2)	
Streaming API for XML (1.0.1)	
SNMP4J (1.11.5)	
WSDL4J (1.6.2)	
Woden API (1.0M9)	
Woden Commons (1.0M9)	
Woden DOM (1.0M9)	
Woodstox (3.2.9)	
XML Beans (2.3.0)	
XML Schema (1.4.7)	
XML Resolver (1.2)	
PostgreSQL JDBC driver (9.3-1101)	
com.springsource.javax.mail (1.4.0)	CDDL 1.0
JavaBeans Activation Framework (1.1)	COMMON DEVELOPMENT AND DISTRIBUTION LICENSE (CDDL) Version 1.0
WSDL4j (1.6.2)	Common Public License - v 1.0
c3p0 (0.9.1.2)	GNU Lesser General Public License Version 3
JDOM (1.0)	JDOM license
jQuery (3.3.1)	The MIT License
jQuery UI (1.12.1)	
Oracle Linux (7.4)	ORACLE LINUX LICENSE AGREEMENT
PostgreSQL (9.3)	PostgreSQL License
util.concurrent (1.3.1)	Public domain
VMware Guest SDK (9.10.0)	VMware vSphere Software Development Kit License
VMware vSphere Management SDK (6.0)	
VMware vSphere Automation SDK (6.5.0)	

ANTLR 4 License

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- javaee_5.xsd
- javaee_web_services_1_2.xsd
- javaee_web_services_client_1_2.xsd
- javaee_6.xsd
- javaee_web_services_1_3.xsd
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- jsp_2_2.xsd
- web-app_3_0.xsd
- web-common_3_0.xsd
- web-fragment_3_0.xsd
- javaee_7.xsd
- javaee_web_services_1_4.xsd
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For c3p0 0.9.1.2

Version 3, 29 June 2007

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JDOM

version 1.0

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VMware vSphere Automation SDK

vSphere Automation SDK for Java 6.5.0 GA

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src/test/org/apache/commons/codec/language/DoubleMetaphoneTest.java contains test data from <http://aspell.net/test/orig/batch0.tab>.

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Apache log4j

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>>> org.apache.httpcomponents:httppasynclient-4.1

Apache HttpAsyncClient

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>>> org.apache.httpcomponents:httpcore-nio-4.4.3

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