Dell MD Storage Array VMware vStorage APIs For Storage Awareness (VASA) Provider (Client)
User's Guide

Notes, cautions, and warnings

NOTE: A NOTE indicates important information that helps you make better use of your computer.

CAUTION: A CAUTION indicates either potential damage to hardware or loss of data and tells you how to avoid the problem.

WARNING: A WARNING indicates a potential for property damage, personal injury, or death.

Contents

Overview

VMware vStorage APIs for Storage Awareness (VASA) is a set of application program interfaces (APIs) that support Dell PowerVault MD Series iSCSI and Fibre Channel storage arrays. VASA enables vSphere vCenter to recognize MD storage array features and corresponding datastores, which allows storage administrators to easily set virtualization and maintenance policies.

Using the VASA provider on an MD storage array enables a vCenter-based storage administrator to:

- Review information about MD-attached expansion storage
- Discover and characterize an attached datastore's static capabilities, which helps in selecting the appropriate storage disk for virtual machine (VM) placement
- Receive alert and event notifications from the MD storage arrays

The following figure shows the high-level VASA provider architecture and how it integrates with the vCenter management environment.
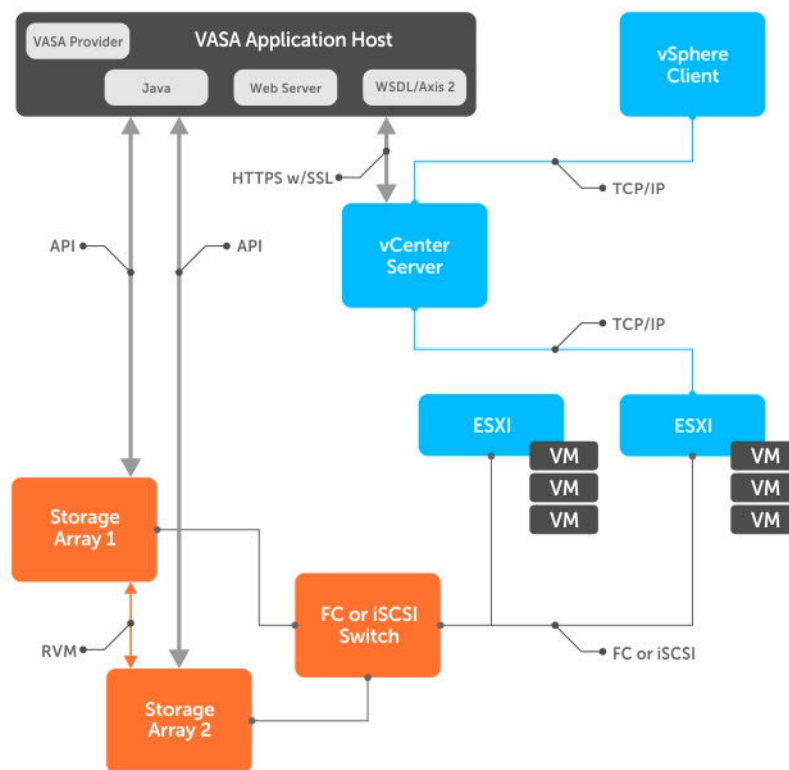

Figure 1. VASA Provider in a vCenter Storage Management Architecture

VASA storage capabilities

Storage provisioning operations in vSphere enable VASA to monitor whether a storage array's physical components meet VM requirements according to defined capabilities. Available capabilities and their common performance ranges are listed in the Table 1.

Table 1. Available VASA storage capabilities

Storage capabilities	Common use/Performance range	
SSDs	Storage Type	Virtual disks containing solid-state drives (SSDs) or hard drives
	Performance Level	Highest available
SSDs-Thin	Storage Type	Thin-provisioned virtual disks containing solid-state physical disks
	Performance Level	Highest available
10K/15K Drives	Storage Type	Virtual disks containing high-performance physical disks
	Performance Level	High (used in most standard environments)
10K/15K Drives-Thin	Storage Type	Thin-provisioned virtual disks containing high-performance physical disks
	Performance Level	High (used in most standard environments)
NLSAS Drives	Storage Type	Virtual disks containing Near-Line SAS (NL-SAS) physical disks 10K RPM or less
	Performance Level	Intermediate performance, good for bulk storage requirements
NLSAS Drives-Thin	Storage Type	Thin-provisioned virtual disks containing Near-Line SAS (NL-SAS) physical disks 10 K RPM or less
	Performance Level	Intermediate performance, good for bulk storage requirements
Replicated SSDs	Storage Type	Virtual disks containing SSDs.
	Performance Level	Highest available for replicated virtual disks

Storage capabilities	Common use/Performance range	
Replicated 10K/15K Drives	Storage Type	Virtual disks containing high-performance physical disks
	Performance Level	High (used in most standard replicated environments)
Replicated NLSAS Drives	Storage Type	Replicated virtual disks containing Near-Line SAS (NL-SAS) physical disks 10K RPM or less
	Performance Level	Intermediate performance, good for bulk storage requirements

For assigning these capabilities in vSphere, see [Using the VASA provider](#).

Profile-driven and policy-based storage

The VASA provider supports profile-driven storage management by categorizing virtual disks based on performance and reporting its performance capability to vCenter. You can use this information to establish profiles based on specific application performance requirements. Benefits of this approach are:

- Rapid and intelligent provisioning of applications
- Application service levels that match available storage
- Information on the available storage pool

vSphere policy-based storage management enables you to further provision VMs by automating datastore placement decisions.

Storage service-level agreements

The VASA provider replaces the requirement to maintain storage capability spreadsheets for each LUN. Instead, you can deliver the best-matched resources to any service-level agreement (SLA) required by the VM.

The VASA provider enables you to discover and monitor storage array SLA properties based on availability, security, and performance. You can then use VASA to enforce storage VM SLAs and create end-to-end storage SLA guarantees for each VM.

Storage distributed resource scheduler

The VASA provider extends VMware's Distributed Resource Scheduler (DRS) functionality to data storage by enabling a Storage Distributed Resource Scheduler (SDRS) to operate on a group of datastores with similar capabilities. With the VASA provider, SDRS can determine whether a storage array can support SDRS migration, and whether migration is recommended.

VASA session communications

All communications between the vCenter Server and the VASA provider is through Secure Sockets Layer (SSL) certificates. The VASA provider can use a self-signed certificate or a certificate issued by a certificate authority (CA).

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Installing the VASA provider

This section describes prerequisites and installation steps for the VASA provider.

Before you install

Before installing the VASA provider, read through the information in this section.

Supported operating systems and platforms

The VASA provider depends on specific operating system (OS) and application platform requirements. Before installing and configuring VASA, ensure that your environment meets the requirements described in this section.

> **NOTE:**
> - Install VASA provider on a separate Windows host server than the vCenter Server platform.
> - For more information about supported OSs, see *MD Storage Array support matrix*.

Required VMware application platforms

Install and configure the following VMware application platforms before installing the VASA provider:

- VMware vSphere Client
- VMware vCenter Server (installed separately from the VASA provider)

> **NOTE:** For information about supported VMware platforms, see the Support Matrix available at **www.dell.com/support/home**.

For information about installing and configuring VMware platforms, see **https://www.vmware.com/support/pubs/**. For information about configuring your VMware environment, see the *VMware Fibre Channel SAN Configuration Guide* available at **https://www.vmware.com/support/pubs/**.

Supported MD series storage arrays

For information about supported MD storage arrays and controller firmware versions, see the Support Matrix available at **www.dell.com/support/home**.

Required RAID controller module firmware

For information about controller firmware versions, see the Support Matrix available at **www.dell.com/support/home**.

Downloading the VASA provider

The VASA provider is a self-extracting, self-installing file available on the **Drivers and Download** page at **www.dell.com/support/home**.

To download the VASA provider:

1. Go to **Dell.com/support/home**, and then click the **Drivers and Download** link.
2. Select your MD Series storage array model, and then click **Select Model → Servers, Storage, Networking → PowerVault Storage.**
3. Select your model, and then click **Confirm** to view available downloads.
4. Select the **VASA provider download** link, and then download the executable to your host server.

Installing the VASA provider

1. Open the **VASA installation** wizard.
2. Accept the license agreement and follow the installation prompts.
   The default installation path on a 32-bit Windows OS is: **C:\Program Files\Dell\Modular Disk Storage VASA Provider**.

   The default installation path on a 64-bit Windows OS is: **C:\Program Files (x86)\Dell\Modular Disk Storage VASA Provider**.
3. After the installation is complete, ensure that the VASA provider is displayed in your programs list.

Uninstalling the VASA provider

You can uninstall the VASA provider by one of the following two methods:

- By using the Windows **Add and Remove Programs** option
- By using the VASA provider uninstaller at **C:\Program Files (x86)\Dell\Modular Disk Storage VASA Provider\Uninstall_ Modular Disk Storage VASA Provider**
  After uninstalling the VASA provider, ensure that all application files and folders are deleted.

Using the VASA provider

After installing the VASA provider, configure VASA provider for use in your environment:

1. From the installation directory, double-click the **VASAPConfigUI.exe** file.
   The application server starts and the **Configuration Manager** page is displayed.

Figure 2. VASA Provider Configuration Manager Window

2. On the **Configuration Manager** page, type data such as user IDs, passwords, and then select port settings for the host server.

   📝 **NOTE:** The default admin user password is *password*. Type SSL settings, including key store/trust store file names, and passwords. Passwords are verified dynamically and displayed in a red colored text field background, if they do not match existing values.

3. To configure security between VASA and vSphere using a self-signed certificate, click **Generate Self Signed Certificate**.

   📝 **NOTE:** Using this option requires a thorough understanding of the security requirements in place at your site. Consult your local IT administrator before using this option.

4. Click **Start Service** to start the VASA provider.

> **NOTE:** Any time you change passwords, stop, and then restart the VASA service before the password change takes effect. Use the **Stop Service** and **Start Service** options in the **Configuration Manager** window.

5. When you register the VASA provider with the vSphere Client in the next section, you will need the URL of the server containing VASA. To copy the server URL to your clipboard and paste it into a text file, click **Copy Provider URL to Clipboard**.

Bringing storage arrays under VASA management

Before you can use the capabilities of the VASA provider to manage your MD storage arrays, do the following:

1. Add your storage arrays to VASA control (by using VASA's Array Manager).
2. Register the VASA provider with your vSphere Client.

Adding your storage arrays to VASA control

1. On **VASA's Configuration Manager**, click **Launch Array Manager**. Alternately, you can start the array manager by using URL: **http://<host_address>:8080/arraytree**.

   > **NOTE:** If you are using static IP address, substitute a standard IP address for *<host_address>*. If you are using DHCP, substitute a DNS name for *<host_address>*.
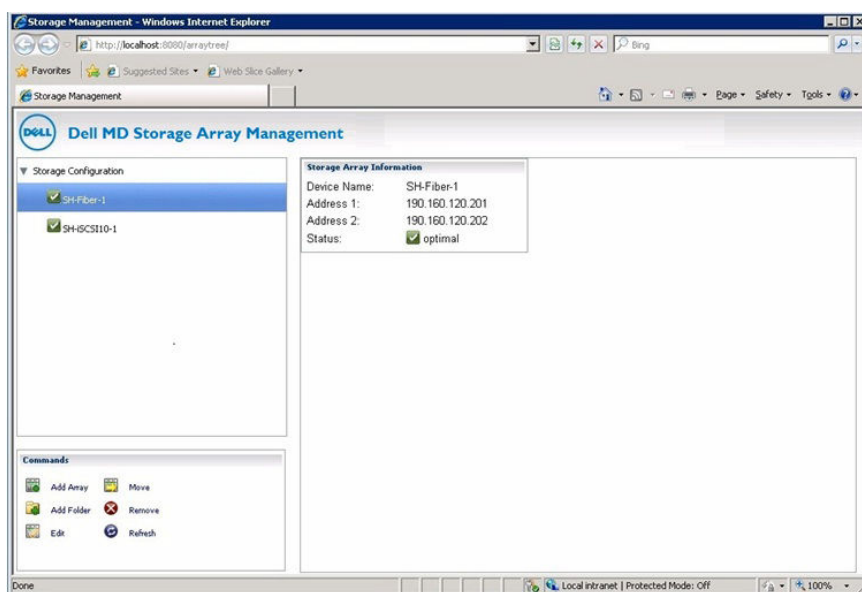

Figure 3. Array Manager Window

2. In the **Array Manager** window, click **Add Array** in the **Commands** section.

   > **NOTE:** vSphere supports a **Discover Arrays** option to perform automatic array discovery based on a range of RAID controller module IP addresses that you provide. You can use either method of specifying arrays—**Add Array** or **Discover Arrays** (if available).

3. Click **Add Folder** to create a separate folder to contain the storage arrays that you want to add.

4. In the **Add Storage Device** window, enter the IP addresses for the RAID controllers module in the storage arrays that you want to add to VASA.

5. Enter the RAID controller module password, if necessary.

6. Repeat step 2 through 5 to add more storage arrays.

7. Close the **Array Manager** window.

Registering the VASA provider in your vSphere Client

1. Start the vSphere Client and connect to your vCenter Server.

Figure 4. vSphere Client Login Screen

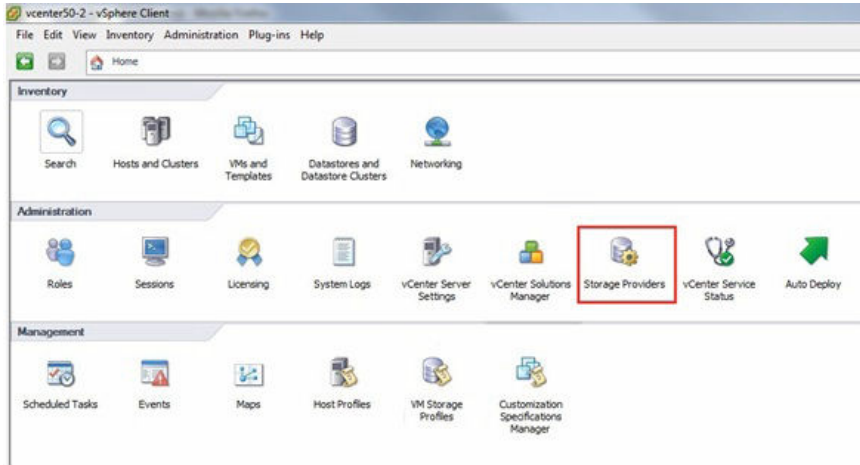2. In the **vSphere Client** window, click **Storage Providers**.

Figure 5. vSphere Client Home Screen

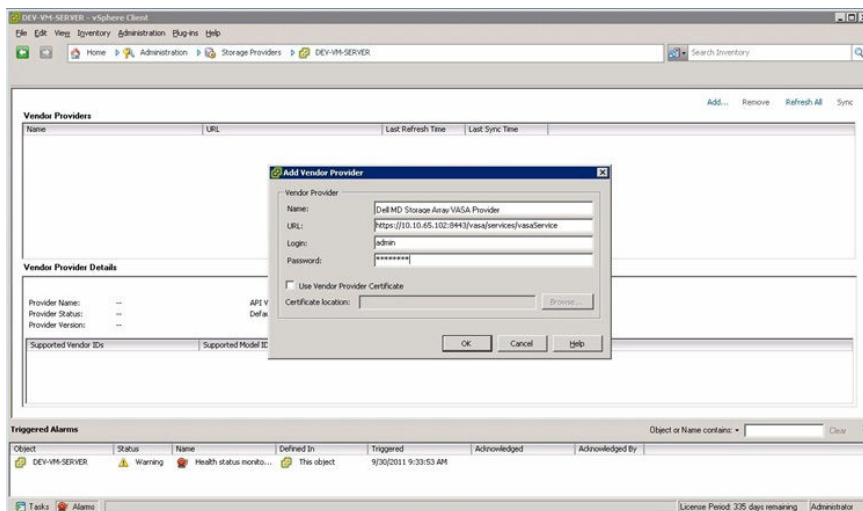3. In the **Vendor Providers** window, click **Add**.

Figure 6. vSphere Add Vendor Provider Menu

4. In the **Add Vendor Provider** window, type the name, URL, and login credentials to the server containing the VASA provider that you installed earlier.

   Before you begin:

   In the **URL** field, paste the URL you copied when you clicked **Copy Provider URL to Clipboard** in **VASA Configuration Manager**. Ensure that the URL in the **Add Vendor Provider** window matches the following requirements:

   - **/vasa/services/vasaService** must be appended following your port number (for example, if the location of your server containing the VASA provider is **https://kswa-vasa3-prov: 8443** the value in the URL field must be: **https://kswa-vasa3-prov:8443/vasa/ services/vasaService** where https specifies an SSL connection and 8443 is the default port number for the VASA provider.

   - If you specify a different port number in the **Configuration Manager** window other than the default, ensure to use a valid port number.

When entering a login ID and password, ensure that they match what you used in the **VASA Configuration Manager** window.

5. If you require a vendor-signed security certificate, select the **Use Vendor Provider Certificate** check box and type the location of the certificate. Else, do not select the check box.
6. When complete, click **OK** to register the VASA provider with your vCenter Server.

Verifying VASA registration

After successfully registering the VASA provider, your managed storage arrays are displayed in the **Vendor Provider Details** window.
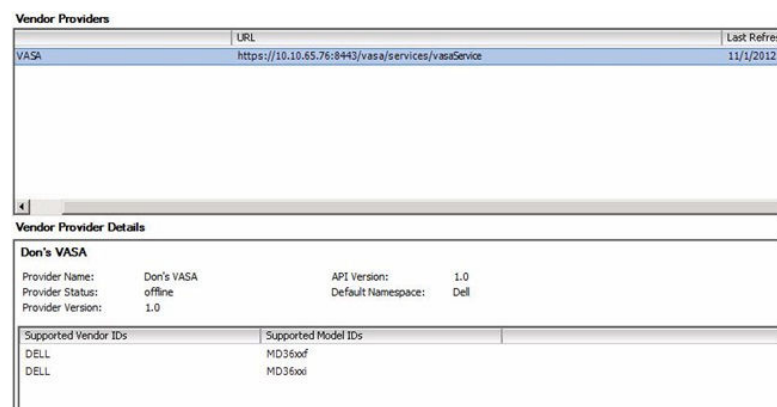

Figure 7. vSphere Client VASA Provider Window

Working with storage profiles

To recognize and report the storage capabilities, create a profile, and assign the capability to said profile by using the check box provided with the corresponding system-defined capability. This change enables the System Defined capabilities to be associated with the datastore and then displayed properly.

Using the VASA provider, you can create storage profiles that use datastores based on user-selected criteria. To enable **VM Storage Profiles**:

1. In the **vSphere Client Home** window, click **VM Storage Profiles**.
2. Click **Enable VM Storage Profiles**.
3. On the **Summary** tab, under **Commands**, click **Create VM Storage Profile**.
4. In the **Create New VM Storage Profile Properties** window, type the properties for the new profile, and then click **Next**.
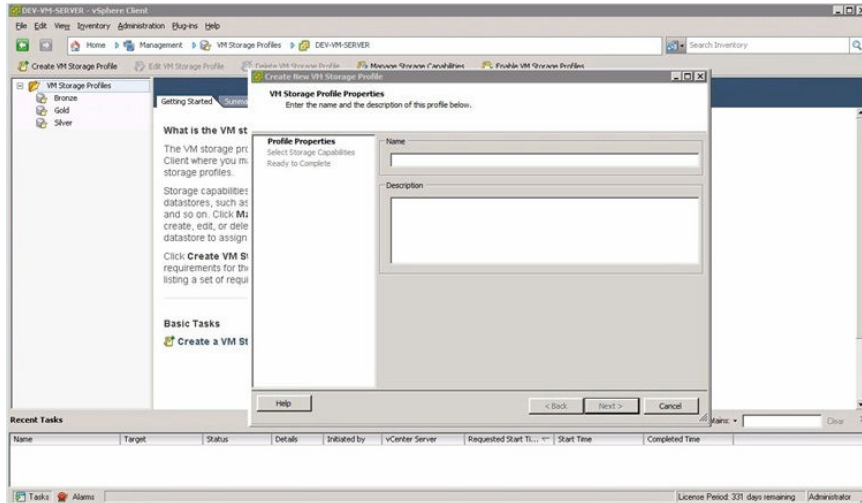
Figure 8. Create VM Storage Profile

5. In the **Select Storage Capabilities** window, select the storage capability that you want to associate with the profile, and then click **Next**.
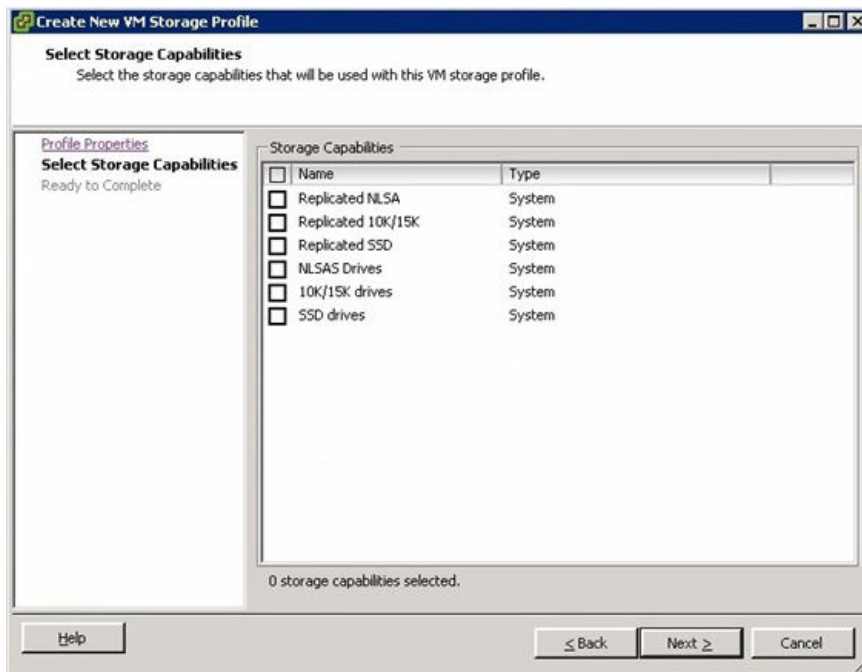

Figure 9. Select Storage Capabilities

6. Review the summary information, and then click **Finish**.

Assigning VM storage profiles to existing VMs

After creating the storage profile, assign the profile to an existing VM:

1. From the **vSphere Hosts and Clusters** view, select the virtual machine.
2. Right-click the VM and click **VM Storage Profile → Manage Profiles.**
3. From the **Home VM Storage Profile** drop-down menu, select the VM storage profile that you want to use, and then click **Propagate to Disks**.
4. Click **OK** to apply changes.
5. On the **Summary** tab of the **VM Storage Profiles** window, click **Refresh**.

   The assigned profile is displayed, along with the status under **Compliance Status**.
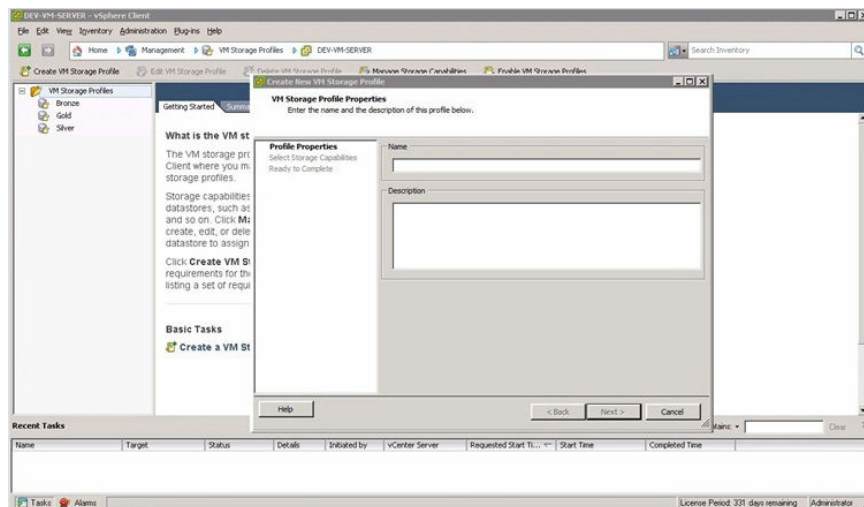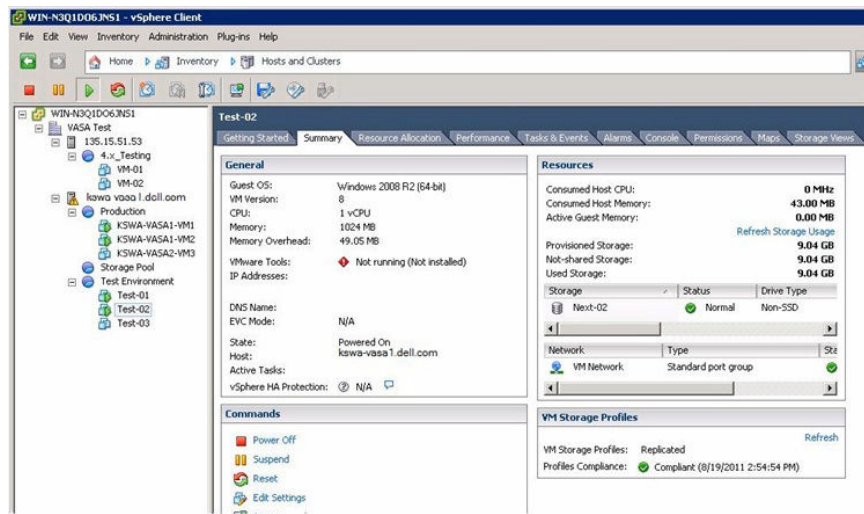

Figure 10. Create VM Storage Profile

Figure 11. vSphere Storage Profile Summary

Checking storage profile compliance

After assigning a storage profile to a VM, you can verify its compliance by selecting the VM from the **Host and Clusters** view and selecting the **Summary** tab. The **VM Storage Profiles** section displays compliance details.
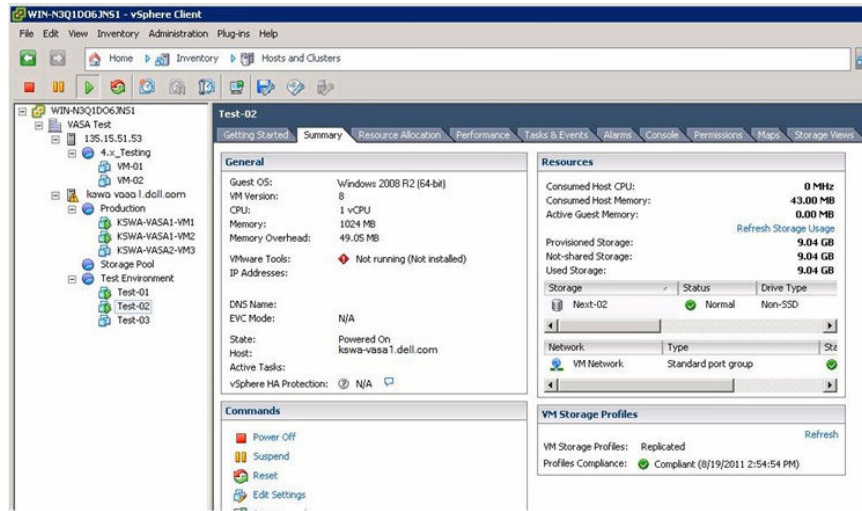

Figure 12. vSphere Storage Profile Summary

Storage array events and alerts

The VASA provider propagates storage array alerts to the vCenter Server Event Monitor. Alerts are displayed in two separate views:

- Alert tab in the Tasks view
- Alarms view at the bottom of the vSphere Client

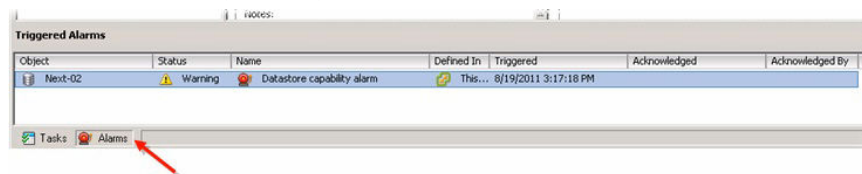Events are viewed by clicking the **Events** icon on the **vSphere Client Home** view.

Figure 13. Triggered Alarms View

Troubleshooting tips

The Table 2 lists some common issues and possible steps for resolution.

Table 2. Issues and corrective steps

Issue	Possible Resolution
Unable to connect to the provider host	• Ensure that the URL used for storage provider is registered. • Ensure that firewall settings allow for configured ports (default values: 8080 and 8443). • Ensure that the VASA provider service is started on provider host.
No datastore capabilities being displayed	• Ensure that a valid vendor ID and model ID are listed for the registered storage provider in vCenter Server. • Ensure that monitored storage arrays have been added to the array manager. • Ensure that the VASA provider service is running on the provider host.
Unable to access the Array Manager	• Ensure that the URL for the Storage Array Manager is correct. (The default provider host URL is **http://localhost:8080/ arraytree/**) • Ensure that firewall settings allow configured ports. • Ensure that the VASA provider service is running on the provider host.
Event messages do not display description information	This is a known issue with the VASA APIs and will be resolved in a future release.

Troubleshooting logs

If further troubleshooting is required, Dell technical support may require that you send a copy of the working log directory for analysis. The log directory is located on the VASA provider host at **C:\Program Files (x86)\ Dell\Modular Disk Storage VASA Provider\working\logs** (64-bit) and **C:\Program Files\ Dell \Modular Disk Storage VASA Provider\working\logs** (32-bit).

Configuration reset

If you want to reset the VASA provider configuration to a clean configuration, perform the following steps:

1. Stop the Dell VASA provider application server service on provider host.
2. Delete the **/db** directory in the **C:\Program Files (x86)\ Dell\Modular Disk Storage VASA Provider \working** directory.
3. Delete the **/tmp** directory in the **C:\Program Files (x86)\ Dell\Modular Disk Storage VASA Provider \working** directory.
4. Start the Dell VASA Provider application server service on the provider host.

This procedure removes the alert information and cached data from the Dell VASA provider application server. However, monitored storage array information is retained.

4

Getting help

Documentation matrix

The documentation matrix provides information about documents that you can refer to for setting up and managing your system.

Dell documentation

- For all PowerEdge and PowerVault documentation, go to **Dell.com/support** and enter the system Service Tag to get your system documentation.
- For all Virtualization documents, go to **Dell.com/virtualizationsolutions**.
- For all operating system documents, go to **Dell.com/operatingsystemmanuals**.
- For all storage controllers and PCIe SSD documents, go to **Dell.com/storagecontrollermanuals**.
- For Dell Support Forums, go to **en.community.dell.com/support-forums/default.aspx**.
- For Dell Advanced Search, go to **search.dell.com/index.aspx**.

VMware documentation

- For vCenter SRM 6.0 documentation, go to

  https://www.vmware.com/support/pubs/srm_pubs.html
- For vSphere 6.0 Documentation (ESXi, ESX, and vCenter Server), go to

  https://www.vmware.com/support/pubs/vsphere-esxi-vcenter-server-6-pubs.html
- For information about VMware Knowledge Base (Searchable Support Issues), go to

  http://kb.vmware.com/selfservice/microsites/microsite.do
- For information about VMware Communities (Help Forums), go to

  https://communities.vmware.com/welcome
- For VMware Compatibility Guide, go to

  http://www.vmware.com/resources/compatibility/search.php?deviceCategory=io

Contacting Dell

✎ **NOTE:** If you do not have an active Internet connection, you can find contact information on your purchase invoice, packing slip, bill, or Dell product catalog.

Dell provides several online and telephone-based support and service options. Availability varies by country and product, and some services may not be available in your area. To contact Dell for sales, technical support, or customer service issues:

1. Go to **dell.com/support.**
2. Select your support category.
3. Verify your country or region in the **Choose a Country/Region** drop-down list at the bottom of the page.
4. Select the appropriate service or support link based on your need.

Locating your System Service tag

Your system is identified by a unique Express Service Code and Service Tag number. The Express Service Code and Service Tag are found on the front of the system by pulling out the information tag. This information is used by Dell to route support calls to the appropriate personnel.