

**Dell Storage Center Management Pack  
Version 4.0.1 for Microsoft System Center  
2012 Operations Manager  
Administrator'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.

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# Preface

This document describes how to install the Dell management packs and use the functionality to monitor Storage Centers using the Microsoft System Center Operations Manager (SCOM) console.

 **NOTE:** For complete information about the Microsoft System Center Operations Manager (SCOM), see the Microsoft documentation on the [Microsoft System Center Operations Manager](#) website.

## Revision History

Document Number: 680-038-004

| Revision | Date          | Description                 |
|----------|---------------|-----------------------------|
| A        | December 2015 | Version 4.0 initial release |
| B        | July 2016     | Version 4.0.1 release       |

## Audience

The target audience for this guide is Microsoft System Center Operations Manager (SCOM) administrators who monitor Storage Centers from the Microsoft SCOM console. The intended reader has a working knowledge of Storage Center and Microsoft System Center Operations Manager functionality.

## Contacting Dell

Dell provides several online and telephone-based support and service options. Availability varies by country and product, and some services might not be available in your area.

To contact Dell for sales, technical support, or customer service issues, go to [www.dell.com/support](http://www.dell.com/support).

- For customized support, type your system service tag on the support page and click **Submit**.
- For general support, browse the product list on the support page and select your product.

## Related Publications

In addition to this guide, the following related publications are available from the Dell Knowledge Center:

- *Dell Storage Center Management Pack for Microsoft System Center Operations Manager Release Notes*  
Describes important release information, including known issues.
- *Dell Storage Center System Manager Administrator's Guide*  
Describes the Storage Center System Manager software that manages an individual Storage Center.
- *Dell Storage Manager Administrator's Guide*  
Contains in-depth feature configuration and usage information.

# Getting Started

The Dell Storage Center Management Pack 4.0.1 for Microsoft System Center 2012 Operations Manager allows monitoring of Storage Center devices from the Microsoft System Center Operations Manager (SCOM) console.

The SCOM console provides basic system monitoring; however, detailed monitoring of the Dell Storage Center requires additional management packs. The Dell Storage Management Pack 4.0.1 monitors, collects, and displays the following Storage Center storage area network (SAN) information:

- Active alerts
- Dashboards that provide Storage Center performance data, including controller, disk, enclosure, server, and volume status
- Storage types
- Replications
- Data Collector discovery and health status
- Windows Management Instrumentation (WMI) Provider discovery and health status

## New in This Release

The Dell Storage Center Management Pack has added the following new functionality.

Version 4.0.1 adds support for Dell Storage Manager 2016 R1.

Version 4.0 added the following new features:

- **Alert Correlation** — Provides a mechanism in the SCOM console that lets SCOM administrators acknowledge Storage Manager alerts generated by one or more supported Storage Centers. Alert correlation provides SCOM administrators with a method for resolving and synchronizing all Storage Center alerts.
- **Virtualization Discovery** — Provides a method used to discover Windows Hyper-V hosts and virtual machines (VMs) managed by the System Center Virtual Machine Manager (SCVMM). This management pack depends on the Microsoft SCVMM Management Pack.
- **Storage Center Diagram View** — Provides a topology view of a selected Storage Center and its associated components.

## SCOM Components

The Storage Center Management Pack 4.0.1 for Microsoft System Center 2012 Operations Manager consists of the components listed in the following table.

**Table 1. SCOM Components**

| Component         | Description                                                                              |
|-------------------|------------------------------------------------------------------------------------------|
| Management Packs: | Defines the various components that make up a management pack. When a management pack is |

| Component                                                                                                                                            | Description                                                                                                                                                                                                                                                        |
|------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>Dell Storage Management Pack for SCOM 2012</li> <li>Dell VMM Storage Management Pack for SCOM 2012</li> </ul> | installed, instances of the classes defined by the management pack are automatically discovered and monitored. For more information, see <a href="#">Management Pack Classes</a> and <a href="#">Virtual Machine Discovery Management Pack Classes</a> .           |
| Windows Management Instrumentation (WMI) Provider                                                                                                    | A dynamic link library (DLL) that implements the WMI classes that provide the data discovered and monitored by the management pack. The provider is configured to connect to one or more Dell API endpoints using the Dell Storage WMI Provider Configurator tool. |

## Installation Requirements

The following table provides the installation requirements for the Storage Center Management Pack Version 4.0.1 for Microsoft System Center 2012 Operations Manager (SCOM).

**Table 2. Installation Requirements**

| Requirement                                             | Description                                                                                                                                                                                                                                   |
|---------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Microsoft SCOM                                          | The server must meet all SCOM requirements and must be one of the following supported versions: <ul style="list-style-type: none"> <li>SCOM 2012 R2</li> <li>SCOM 2012 SP1</li> </ul>                                                         |
| Microsoft System Center Virtual Machine Manager (SCVMM) | The following versions of SCVMM are supported: <ul style="list-style-type: none"> <li>SCVMM 2012 R2</li> <li>SCVMM 2012 SP1</li> </ul>                                                                                                        |
| Storage Manager                                         | <ul style="list-style-type: none"> <li>Enterprise Manager 2015 R2</li> <li>Enterprise Manager 2015 R3</li> <li>Dell Storage Manager 2016 R1 or later</li> </ul>                                                                               |
| Storage Center Operating System                         | The Storage Center Operating System version depends on the version supported by Storage Manager.                                                                                                                                              |
| Dell Storage Systems                                    | The following storage systems are supported: <ul style="list-style-type: none"> <li>SCv2020</li> <li>SC4020</li> <li>SC8000</li> <li>SC9000</li> </ul>                                                                                        |
| Operating System                                        | The following Windows Server operating system versions are supported: <ul style="list-style-type: none"> <li>Microsoft Windows Server 2008 R2 SP1</li> <li>Microsoft Windows Server 2012</li> <li>Microsoft Windows Server 2012 R2</li> </ul> |
| Microsoft .NET Framework                                | Microsoft .NET Framework 4.0 or later                                                                                                                                                                                                         |
| Processor                                               | x64                                                                                                                                                                                                                                           |

| Requirement        | Description                                                                                                                                                                      |
|--------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Memory             | See the <a href="#">Microsoft System Center Technical Documentation Library</a> website for the latest memory requirements.                                                      |
| Network Connection | <ul style="list-style-type: none"> <li>Gigabit Ethernet is highly recommended by Dell</li> <li>Visibility to each monitored Storage Center</li> </ul>                            |
| TCP Port           | By default, port 3033 is used for communication between the Windows Management Instrumentation (WMI) Provider and the Storage Manager Data Collector.                            |
| Server             | Must be monitored by SCOM and have a monitoring agent installed. For more information, see the <a href="#">Microsoft Operations Manager Agent Installation Methods</a> web page. |

## Updating the Management Pack

The System Center Operations Manager (SCOM) Management Pack Upgrade wizard can be used to update the software from version 3.x or 4.0 to version 4.0.1.

If you are updating the Windows Management Instrumentation (WMI) Configurator, the list of Data Collectors and their credentials are retained.

 **NOTE:** The SCOM version and the operating system must be the same versions as the versions used before the update. If a previous version of the SCOM Management Pack is installed, the Installation wizard issues a warning that the update is going to be installed. An option to cancel the update is provided.

## Connecting Virtual Machine Manager with Operations Manager

Connecting the Virtual Machine Manager (VMM) with Operations Manager integrates them so that they work together. Before the Dell VMM Storage Management Pack for SCOM 2012 is installed, connect the VMM with Operations Manager and choose and configure a version of Operations Manager that is compatible with the version of VMM that you are using.

 **NOTE:** The version of the Operations Manager operations console that is installed on the VMM management server must match the version of Operations Manager with which you intend to integrate. For instructions, see the [Microsoft System Center](#) website.

## Installing the Management Pack

The Storage Center Management Pack 4.0.1 provides a standard installer that is used to install both the Dell Storage Management Pack for SCOM 2012 and the Dell VMM Storage Management Pack for SCOM 2012.

To install the Storage Center Management Pack 4.0.1 for Microsoft SCOM:

1. Download the Storage Center Management Pack for Microsoft SCOM software.
  - a. Go to the Dell Storage Customer Portal.
  - b. Log in to the customer or partner portal.
  - c. Click **Knowledge Center**, then download the Storage Center Management Pack for Microsoft SCOM Setup file.
2. Unpack the Storage Center Management Pack for Microsoft SCOM Setup compressed (.zip) file and specify a directory to extract its contents.

 **NOTE:** The Dell Storage Management Pack.msi file is used to install both the management packs and the Windows Management Instrumentation (WMI) provider.

3. Navigate to the directory where you extracted the contents of the setup file and double-click the Dell Storage Management Pack.msi file to start the installation wizard.

The Dell Storage Management Pack installation wizard starts and the **Welcome** page opens.

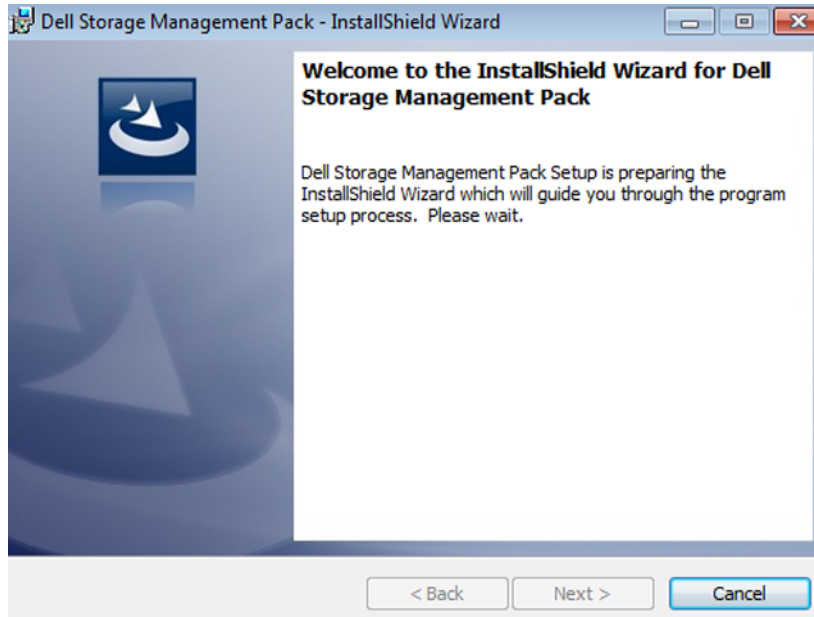


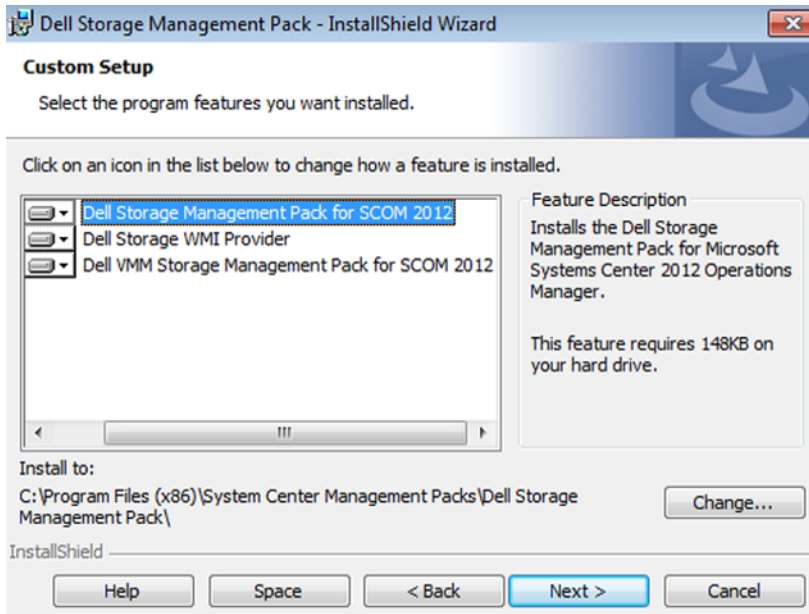
Figure 1. Dell Storage Management Pack Installation Wizard

4. Click **Next**. The **License Agreement** page opens.



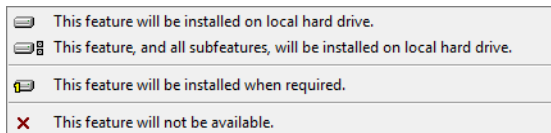
Figure 2. Dell End User License Agreement

5. To continue the installation, read the agreement, select the **I accept the terms in the license agreement** checkbox, and then click **Next**. The **Custom Setup** page opens.



**Figure 3. Custom Setup**

6. Use the drop-down menus for each management pack to select from the following options:



7. Verify that the **Dell Storage Management Pack for SCOM 2012** and the **Dell VMM Storage Management Pack for SCOM 2012** options are selected for installation.



**NOTE:** The Dell Storage Management Pack for SCOM 2012 is required for using the Dell VMM Storage Management Pack for SCOM 2012.

8. (Optional) To change the default installation location, click **Change** and then type the path.
9. Clear the **Dell Storage WMI Provider** option.

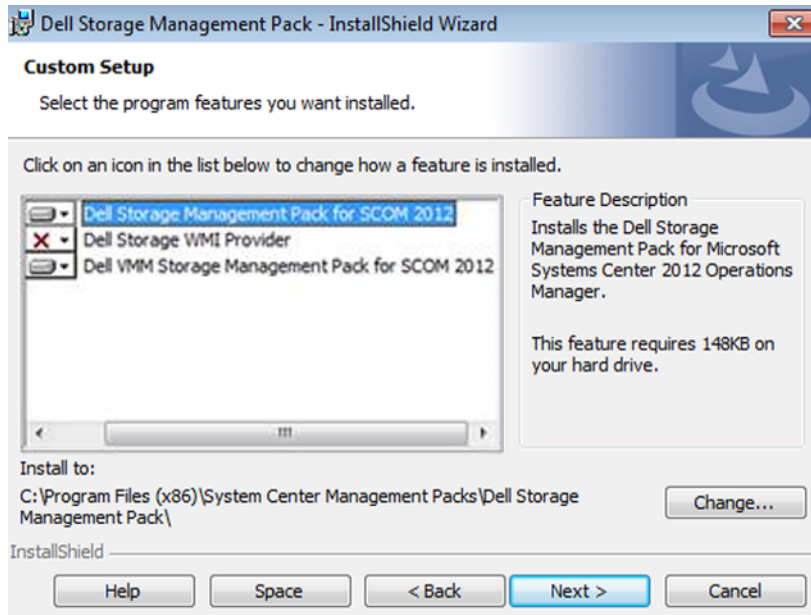


Figure 4. Custom Setup, continued

10. Click **Next**. The **Ready to Install the Program** page opens.

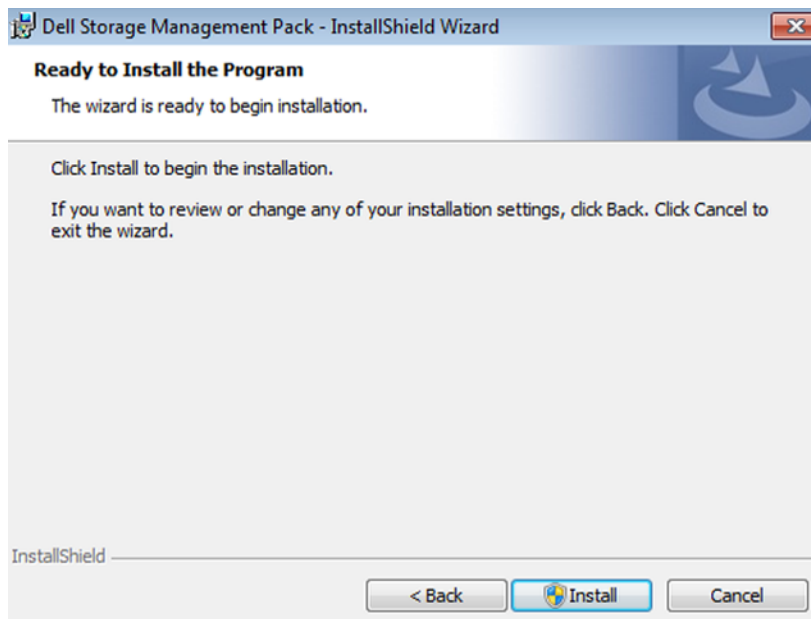
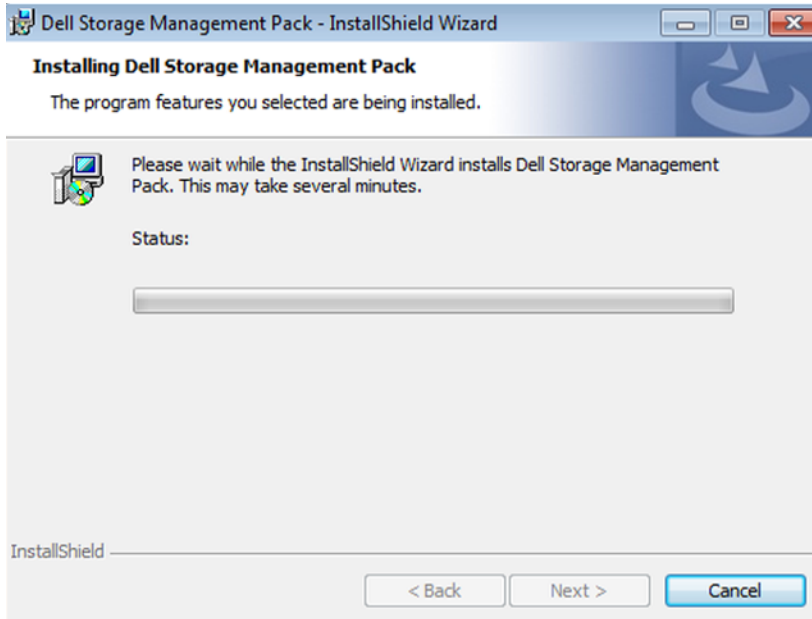


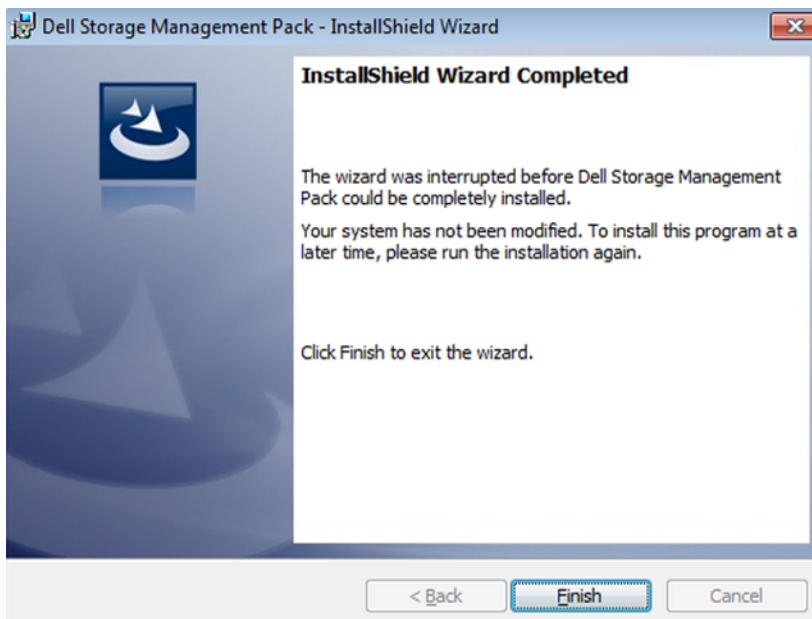
Figure 5. Ready to Install the Program

11. Click **Install**. A progress page opens.



**Figure 6. Installation Progress**

12. When the installation is complete, the following page opens.



**Figure 7. Installation Completed**

13. Click **Finish**.
14. Import Management Pack 4.0.1 using the SCOM console.  
For more information, see the [How to Import an Operations Manager Management Pack](#) web page.

## Importing Management Pack Bundle Files

After installing the management packs, the following management pack bundle (.mpb) files are available in the C:\Program Files (x86)\System Center Mangement Packs\Dell Storage Management Pack directory.

- Dell.Storage.Library.mpb
- Dell.Storage.VMMDiscovery.mpb

To import the .mpb files:

1. Select **Administration** → **Management Packs** → **Import Management Packs**.
2. After successfully importing the Dell.Storage.Library.mpb and the Dell.Storage.VMMDiscovery.mpb files, select **Administration** → **Run as Configuration** → **Profiles**.
3. Select **Dell.Storage.VMMDiscovery.RunAsProfile**.
4. Click **Properties**.
5. Select **Run As Accounts**.
6. Click **Add**.
7. From the **Run As Account** drop-down menu, select **Virtual Machine Manager Connection Account** and then click **OK**.
8. Click **Save**.

When the wizard is finished, close the window.

## Removing a Management Pack

The Dell Storage VMM Discovery management pack depends on the Dell Storage management pack. The VMM Discovery management pack must be removed before the Dell Storage management pack is removed.

 **NOTE:** The VMM Discovery management pack is referenced by the Secure Reference Override management pack; therefore, follow the steps in the following procedure before removing the VMM Discovery management pack from the System Center Operations Manager (SCOM).

To remove the management pack .mpb files:

1. Select **Administration** → **Run as Configuration** → **Profiles**.
  - a. Select **Dell.Storage.VMMDiscover.RunAsProfile**.
  - b. Click **Properties**.
  - c. Select **Run as Accounts** and **Virtual Machine Manager Connection** and then click **Remove**.
  - d. Click **Save**.

When the wizard is finished, close the window.
2. Open Windows PowerShell and run the following script. The script removes any references in the Microsoft Secure Reference Override management pack.

```
> $MP = Get-SCOMManagementPack -Name \
Microsoft.SystemCenter.SecureReferenceOverride
> $MP.References.Remove("Storage")
> $MP.Verify()
> $MP.AcceptChanges()
```
3. Select **Administration** → **Management Packs**.
4. Select the management pack that you want to delete.

5. Click **Delete**.

## Using the Windows Management Instrumentation Provider

During discovery, the Storage Center Management Pack looks for target hosts in the SCOM Management Group that have the Windows Management Instrumentation (WMI) Provider installed.

 **NOTE:** The Storage Center Management Pack discoveries run every 4 hours by default. Initial discoveries of instances of the management pack classes might take up to 4 hours.

Install the WMI Provider on the same server as the Storage Manager Data Collector. Installing the WMI Provider on a standalone computer is recommended only if one of the following conditions applies:

- The WMI Provider will be connected to multiple Data Collectors.
- Installing the WMI Provider on the same computer as the Data Collector will cause a performance impact. A performance impact could be caused by computing resource issues (CPU and memory) or a large number of discovered components.

### WMI Provider Requirements

Before SCOM can monitor Storage Centers, the Windows Management Instrumentation (WMI) Provider must be configured using a Storage Manager administrator-level user account. To allow SCOM to monitor a Storage Center, the following requirements for the Storage Manager user and environment apply:

- The WMI Provider must be installed on a host with the ability to communicate with the Storage Manager Data Collector.
- The WMI Provider must be configured with a Dell Storage Manager user with administrator-level user privileges.
- Storage Centers must be added to the Storage Manager Client using a Storage Center user with administrator-level user privileges.

For more information about using Storage Manager, see the *Dell Storage Manager Administrator's Guide*.

### Install the WMI Provider

Use the following procedure to install the Windows Management Instrumentation (WMI) Provider.

 **NOTE:** Storage Manager administrator-level user privileges are required to install the WMI Provider.

1. Launch the `Dell Storage Management Pack.msi` file from the extracted location. The **Welcome** page opens.

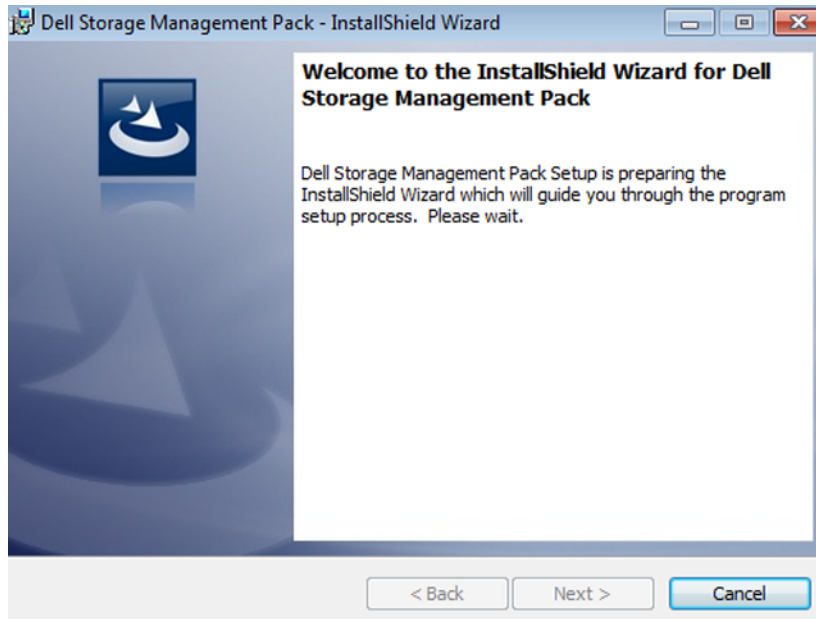


Figure 8. Dell Storage Management Pack Installation Wizard

2. Click **Next**. The **License Agreement** page opens.



Figure 9. Dell End User License Agreement

3. To continue the installation, read the license terms, select the **I accept the terms in the license agreement** checkbox, and then click **Next**. The **Custom Setup** page opens.

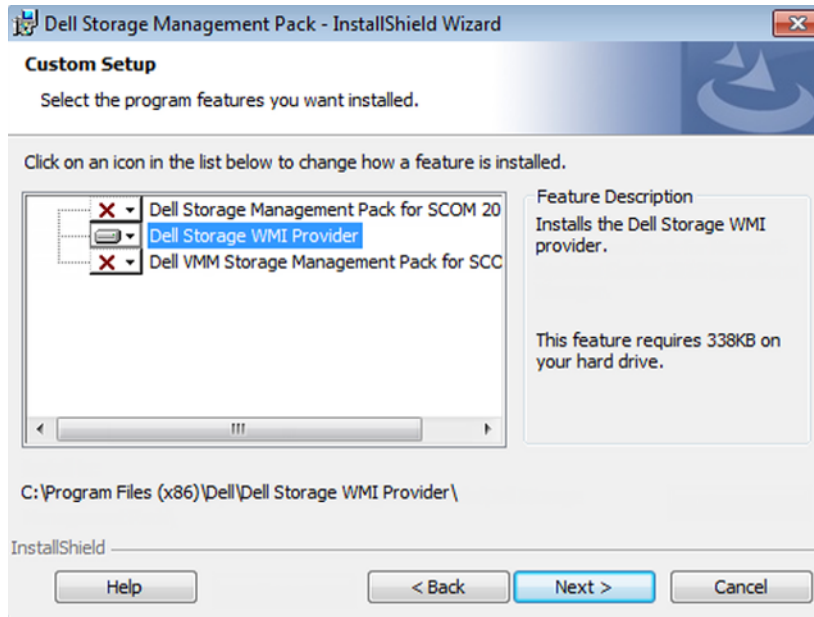


Figure 10. Custom Setup for WMI Provider

4. Clear the **Dell Storage Management Pack for SCOM 2012** and **Dell VMM Storage Management Pack for SCOM 2012** options.
5. Select **Dell Storage WMI Provider** for installation and then click **Next**.
6. (Optional) Click **Change** to change the default installation folder and then click **Next**. The **Ready to Install the Program** page opens.

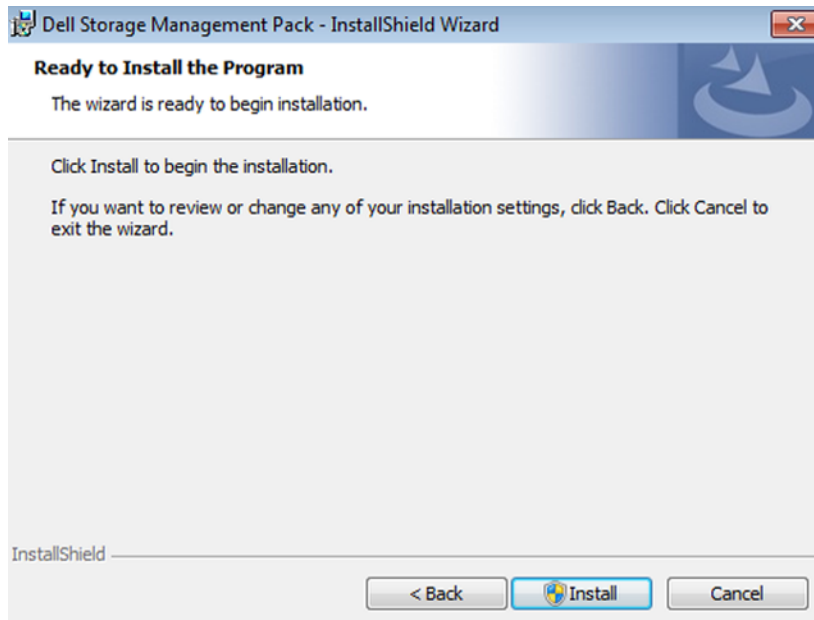


Figure 11. Ready to Install the Program

7. Click **Install**. The installation wizard displays a progress page and then the **Completed** page.
8. When the installation is complete, click **Finish**.

## Configure the WMI Provider

After installing the WMI Provider, configure the provider to connect to the Storage Manager Data Collector.

 **NOTE:** To allow monitoring, a SCOM monitoring agent must be installed on the same server as the WMI Provider. For more information, see the [Microsoft System Center Operations Manager](http://www.microsoft.com/technet/systemcenter/opsmanager/) website.

1. Open Windows Explorer and navigate to C:\Program Files (x86)\Dell\Dell Storage WMI Provider.
2. Double-click the Dell.Storage.Configurator.exe file to run the WMI Provider Configurator. The **Dell Storage WMI Provider Configurator** dialog box opens.

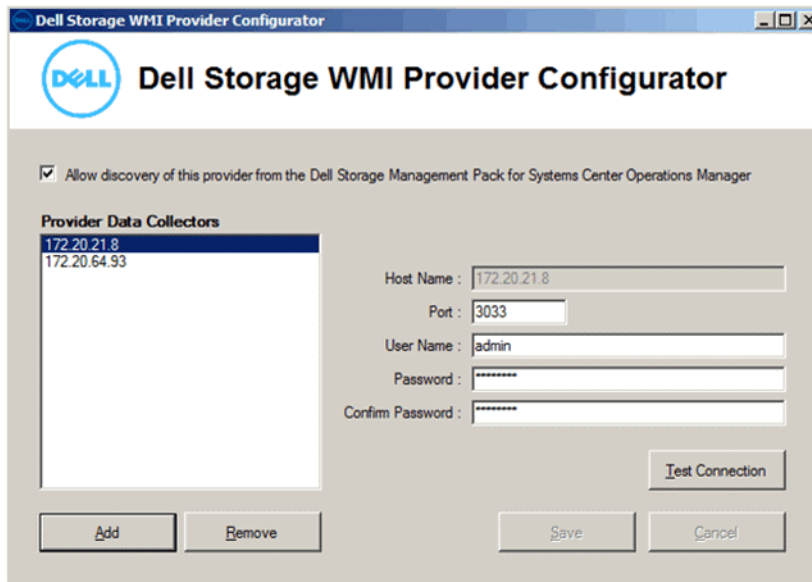


Figure 12. Dell Storage WMI Provider Configurator

 **NOTE:** On rare occasions, a load failure might occur if the WMI Provider is installed, uninstalled, and reinstalled continuously over a short period. If the Dell Storage WMI Provider Configurator returns a load failure, run C:\Windows\Microsoft.NET\Framework64\v4.0.30319\installutil.exe on the C:\Windows\Microsoft.NET\assembly\GAC\_64\Dell.Storage.Instrumentation\v4.0\_4.0.0.2\_07519b417fc2eafb\Dell.Storage.Instrumentation.dll file.

3. Select the **Allow discovery of this provider from the Dell Storage Management Pack for System Center Operations Manager** checkbox.
4. Click **Add** to add a new host.
5. Type the **Host Name** or IP address of the Storage Manager Data Collector. The default number for the **Port** (3033) is input automatically.
6. Type the required information in the **User Name** and **Password** fields, and confirm the password for the Storage Manager Data Collector. The user must have administrator-level user privileges.
7. Click **Test Connection** to verify that the information provided for the Data Collector is correct. If the connection is not successful, verify the host name and login credentials and then click **Test Connection** again.
8. After the connection is successful, click **Save** to save the entry.

9. Add the computer where the WMI Provider is installed to the SCOM Management Group. The WMI Provider will not be discovered by the Dell Storage Management Pack unless the computer is added to this group. For more information, see the [Microsoft System Center Operations Manager](#) website.

## Repairing an Installation

The Dell Storage Management Pack installation wizard provides an option for repairing an installation. To repair the installation:

1. Run the Dell Storage Management Pack.msi file. The **Welcome** page opens.

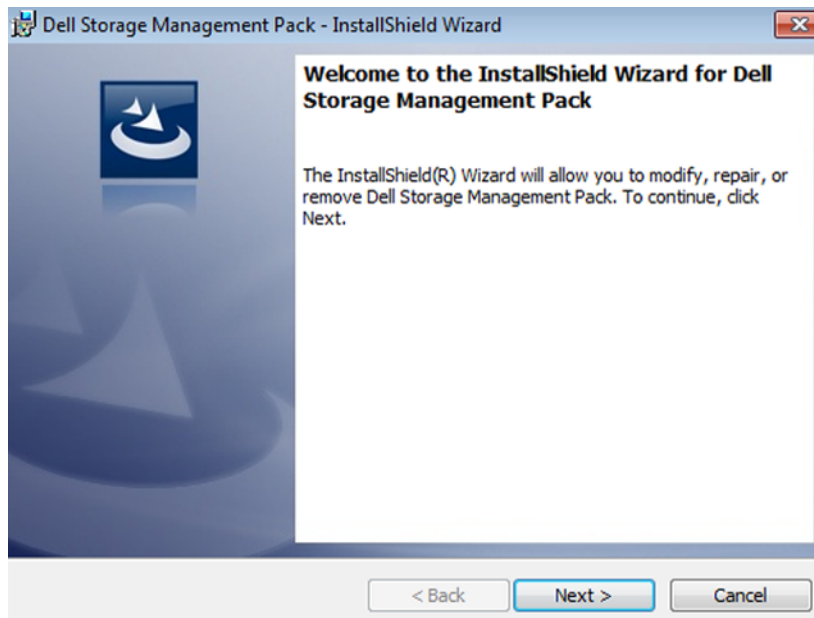
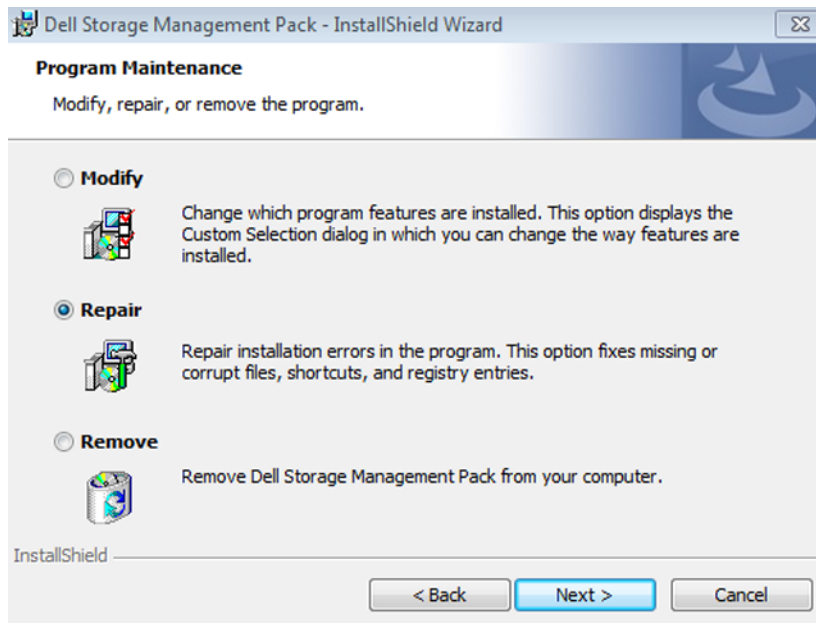


Figure 13. Installation Welcome

2. Click **Next**. The **Program Maintenance** page opens.



**Figure 14. Program Maintenance**

3. Select **Repair** and then click **Next**. The **Ready to Repair the Program** page opens.
4. Click **Install**. A progress screen displays the progress of the installation.
5. After the process is complete, click **Finish**.

## Viewing and Monitoring Storage Centers

The Storage Center Management Pack 4.0.1 for Microsoft System Center 2012 Operations Manager allows IT departments to monitor Storage Center devices from the Microsoft SCOM console. Using the management pack, users can view Storage Center alerts, monitor the health of Storage Center components, and view performance data.

### Using the Monitoring Navigation Tree

All discovered objects and their associated dashboards can be found in the **Dell Storage Center Monitoring** folder in the **Monitoring** navigation tree.

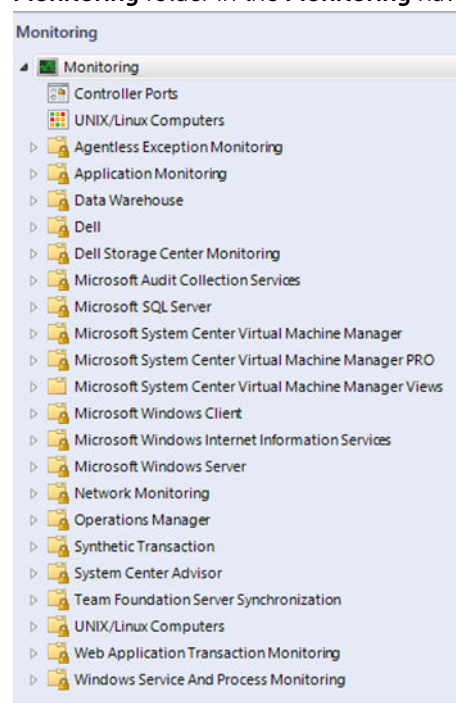


Figure 15. Monitoring Navigation Tree

1. Open System Center Operations Manager (**Start** → **All Programs** → **System Center 2012 R2 Operations Manager** → **Operations Console**).
2. Click the **Monitoring**  button.
3. In the navigation tree, expand the **Dell Storage Center Monitoring** folder.

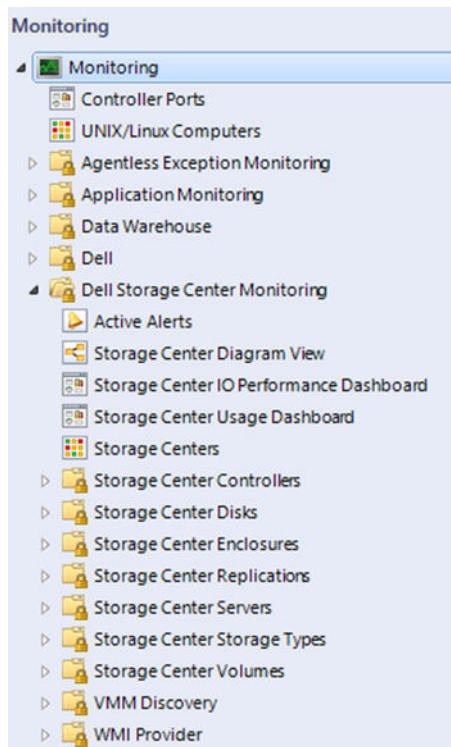


Figure 16. Dell Storage Center Monitoring Menu

## Viewing and Acknowledging Alerts

The management pack polls the Storage Manager Data Collector for Storage Center alerts and displays them in the **Active Alerts** pane. SCOM administrators can then acknowledge the alerts using the SCOM console and synchronize any actions taken through the console with the Storage Manager Data Collector.

After an alert is acknowledged, SCOM runs the alert rule once every 150 seconds. The alert must remain in the acknowledged state in the SCOM console for the required time period before being closed. If the alert is closed before the alert rule finishes running, the alert will not be acknowledged in Storage Manager.

**NOTE:** If the SCOM console is used as the primary console for monitoring Storage Center alerts, use the SCOM console **Acknowledge** feature to acknowledge them. Acknowledging alerts using the Storage Manager client or the Windows PowerShell Storage Manager API will not acknowledge the alert in the SCOM console.

To view and acknowledge SCOM active alerts:

1. In the **Dell Storage Center Monitoring** folder, click **Active Alerts**. The active alerts for the Storage Center appear in the **Active Alerts** pane.



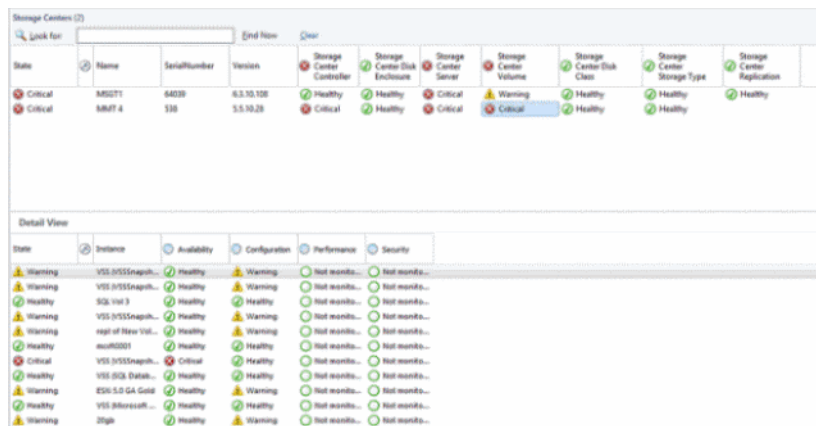


Figure 18. Health Indicator View

## Viewing Dashboards

The dashboards included with the management pack display performance metrics and usage data for the monitored Storage Centers.

**NOTE:** The Storage Center Management Pack 4.0.1 for Microsoft System Center 2012 Operations Manager is sealed and therefore the dashboards contained within the management pack cannot be edited. However, SCOM can be used to create unique dashboards outside of the management pack.

The following figure provides an example of the Storage Center IO Performance Dashboard.

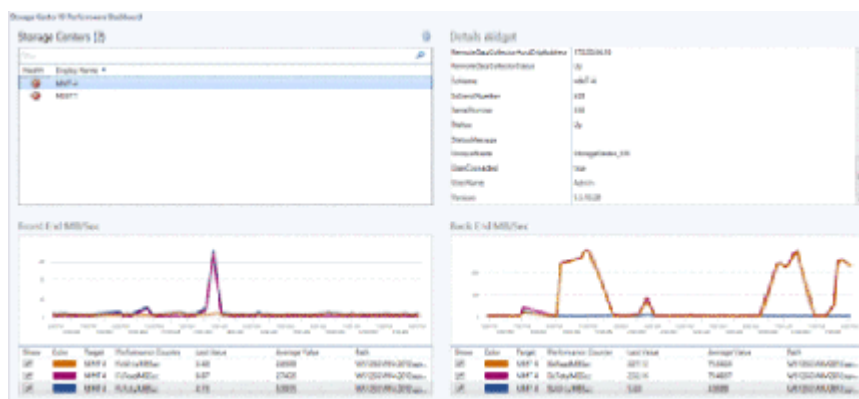


Figure 19. Storage Center IO Performance Dashboard

## Select a Dashboard to View

Select a dashboard in the navigation tree to view its associated metrics. Each dashboard displays the selected components for the Storage Centers being monitored. Select one or more components on a dashboard to view the values specific to the component.

The following table describes the dashboards included with the management pack.

**Table 4. Management Pack Dashboards**

| Dashboard                     | Displays                                                                   |
|-------------------------------|----------------------------------------------------------------------------|
| Storage Center IO Performance | Front- and back-end IO and MB per second for the monitored Storage Centers |
| Storage Center Usage          | Historical usage for the monitored Storage Centers                         |
| Controller IO Performance     | Controller IO performance metrics                                          |
| Disk Class IO Performance     | Disk class IO performance metrics                                          |
| Server IO Performance         | Server IO performance metrics                                              |
| Server Usage                  | Historical usage for the monitored Storage Center servers                  |
| Volume IO Performance         | Volume IO performance metrics                                              |
| Volume Usage                  | Historical usage for the monitored Storage Center volumes                  |

## Personalize a Dashboard View

Although changes cannot be saved to a management pack dashboard, the display options can be saved as a personalized view outside of the management pack. Making a personalized view creates a copy of the dashboard and allows the display options to be modified.

1. In the **Monitoring** tree, click **Settings**  → **Personalize**. The **Personalize view** dialog box opens and shows the default settings of the dashboard.
2. In **Columns to display**, select any properties that you want to be displayed in your personalized view.
3. In the **Sort columns by** drop-down box, click the arrow to choose a property for sorting the monitored objects.
4. Click **OK** to save the personalized view.

## Specifying Override Parameters

Customize the Storage Center Management Pack 4.0.1 for Microsoft System Center 2012 Operations Manager by using overrides.

1. From the SCOM console, click **Authoring**.
2. Expand **Authoring** and select **Management Pack Objects**.
3. Select the management page object that you want to override.
4. Right-click on any of the components of a management pack object and from the pop-up menu select **Overrides** → **Override the object\_name**. The **Override Properties** dialog box opens.
5. Select the object to override and modify the override values.
6. Click **Apply**.

## Management Pack Classes

The following table describes the classes discovered by the management pack.

**Table 5. Management Pack Classes**

| Class Name                                           | Description                                                                                                   |
|------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|
| Dell.Storage.StorageCenterWMIProvider                | Represents the WMI Provider.                                                                                  |
| Dell.Storage.StorageCenterComponent                  | Represents a Storage Center component.                                                                        |
| Dell.Storage.DataCollector                           | Represents a Storage Manager Data Collector. The Data Collector credentials are provided to the WMI Provider. |
| Dell.Storage.StorageCenter                           | Represents a Storage Center.                                                                                  |
| Dell.Storage.StorageCenterVolume                     | Represents a volume on the Storage Center.                                                                    |
| Dell.StorageCenterReplication                        | Represents a Storage Center replication.                                                                      |
| Dell.Storage.StorageCenterType                       | Represents the Storage Center storage type.                                                                   |
| Dell.Storage.StorageCenterController                 | Represents a Storage Center controller.                                                                       |
| Dell.Storage.StorageCenterControllerPort             | Represents a port on the Storage Center controller.                                                           |
| Dell.Storage.StorageCenterControllerPowerSupply      | Represents a power supply on the Storage Center controller.                                                   |
| Dell.Storage.CenterControllerTemperatureSensor       | Represents a temperature sensor on the Storage Center controller.                                             |
| Dell.Storage.StorageCenterControllerFanSensor        | Represents a fan sensor on the Storage Center controller.                                                     |
| Dell.Storage.StorageCenterControllerVoltageSensor    | Represents a voltage sensor on the Storage Center controller.                                                 |
| Dell.Storage.StorageCenterControllerCacheCard        | Represents a cache card on the Storage Center controller.                                                     |
| Dell.Storage.StorageCenterEnclosure                  | Represents a Storage Center enclosure.                                                                        |
| Dell.Storage.StorageCenterEnclosureIOModule          | Represents an IO module on a Storage Center enclosure.                                                        |
| Dell.Storage.StorageCenterPowerSupply                | Represents a power supply on a Storage Center enclosure.                                                      |
| Dell.Storage.StorageCenterEnclosureTemperatureSensor | Represents a temperature sensor on a Storage Center enclosure.                                                |
| Dell.Storage.StorageCenterEnclosureFanSensor         | Represents a fan sensor on a Storage Center enclosure.                                                        |

| Class Name                              | Description                                                               |
|-----------------------------------------|---------------------------------------------------------------------------|
| Dell.Storage.StorageCenterEnclosureDisk | Represents a disk on a Storage Center enclosure.                          |
| Dell.StorageCenterServer                | Represents a Storage Center server.                                       |
| Dell.StorageCenterDiskClass             | Represents the Storage Center disk class.                                 |
| Dell.Storage.StorageCenterDisk          | Represents a Storage Center disk.                                         |
| Dell.Storage.StorageCenterAlert         | Represents a Storage Center alert. Alerts are displayed in Active Alerts. |

## Virtual Machine Discovery Management Pack Classes

The following table describes the virtual machine (VM) discovery classes for the management pack.

**Table 6. Management Pack VM Discovery Classes**

| Class Name                                     | Description                                  |
|------------------------------------------------|----------------------------------------------|
| Dell.Storage.VMMDiscovery.VirtualMachine       | Represents the VM.                           |
| Dell.Storage.VMMDiscovery.VirtualMachineVolume | Represents the volume mapped to the VM.      |
| Dell.Storage.VMMDiscovery.VMHost               | Represents the VM host.                      |
| Dell.Storage.VMMDiscovery.VMHostVolume         | Represents the volume mapped to the VM host. |

## Health Monitors

The following table describes the health monitors for the management pack.

**Table 7. Management Pack Health Monitors**

| Monitor Name                     | Type       | Description                                         |
|----------------------------------|------------|-----------------------------------------------------|
| ControllerCacheCardMonitor       | Dependency | Rolls up the cache card health to the controller.   |
| ControllerCacheCardStatusMonitor | Unit       | Monitors the status of the cache card.              |
| ControllerFanSensorMonitor       | Dependency | Rolls up the fan sensor health to the controller.   |
| ControllerFanSensorRpmMonitor    | Unit       | Monitors the RPM of the fan sensor.                 |
| ControllerPortMonitor            | Dependency | Rolls up the port health to the controller.         |
| ControllerPortStatusMonitor      | Unit       | Monitors the status of the controller port.         |
| ControllerPowerSupplyMonitor     | Dependency | Rolls up the power supply health to the controller. |

| Monitor Name                             | Type       | Description                                                    |
|------------------------------------------|------------|----------------------------------------------------------------|
| ControllerPowerSupplyStatusMonitor       | Unit       | Monitors the status of the controller's power supply.          |
| ControllerStatusMonitor                  | Unit       | Monitors the status of the controller.                         |
| ControllerTemperatureSensorMonitor       | Dependency | Rolls up the temperature sensor health to the controller.      |
| ControllerTemperatureSensorStatusMonitor | Unit       | Monitors the status of the temperature sensor.                 |
| ControllerVoltageSensorMonitor           | Dependency | Rolls up the health of the voltage sensor to the controller.   |
| ControllerVoltageSensorStatusMonitor     | Unit       | Monitors the status of the voltage sensor.                     |
| DataCollectorStatusMonitor               | Unit       | Monitors the status of a Data Collector.                       |
| DataCollectorStorageCenterMonitor        | Dependency | Rolls up the health of a Storage Center to the Data Collector. |
| DiskClassDiskMonitor                     | Dependency | Rolls up the health of a disk to the disk class.               |
| DiskStatusMonitor                        | Unit       | Monitors the status of the disk.                               |
| EnclosureDiskMonitor                     | Dependency | Rolls up the health of an enclosure disk to the enclosure.     |
| EnclosureDiskStatusMonitor               | Unit       | Monitors the status of an enclosure disk.                      |
| EnclosureFanSensorMonitor                | Dependency | Rolls up the health of the fan sensor to the enclosure.        |
| EnclosureFanSensorStatusMonitor          | Unit       | Monitors the status of an enclosure fan sensor.                |
| EnclosureIoModuleMonitor                 | Dependency | Rolls up the health of an IO module to the enclosure.          |
| EnclosureIoModuleStatusMonitor           | Unit       | Monitors the status of an enclosure IO module.                 |
| EnclosurePowerSupplyMonitor              | Dependency | Rolls up the health of a power supply to the enclosure.        |
| EnclosurePowerSupplyStatusMonitor        | Unit       | Monitors the status of an enclosure power supply.              |
| EnclosureStatusMonitor                   | Unit       | Monitors the status of an enclosure.                           |
| EnclosureTemperatureSensorMonitor        | Dependency | Rolls up the health of an enclosure temperature sensor.        |
| EnclosureTemperatureSensorStatusMonitor  | Unit       | Monitors the status of an enclosure temperature sensor.        |

| Monitor Name                    | Type       | Description                                                  |
|---------------------------------|------------|--------------------------------------------------------------|
| ReplicationStatusMonitor        | Unit       | Monitors the status of a replication.                        |
| ServerStatusMonitor             | Unit       | Monitors the status of a server.                             |
| ServerVolumesMappedMonitor      | Unit       | Monitors whether a server has any volumes mapped to it.      |
| StorageCenterControllerMonitor  | Dependency | Rolls up the health of a controller to the Storage Center.   |
| StorageCenterDiskClassMonitor   | Dependency | Rolls up the health of the disk class to the Storage Center. |
| StorageCenterEnclosureMonitor   | Dependency | Rolls up the health of the enclosure to the Storage Center.  |
| StorageCenterReplicationMonitor | Dependency | Rolls up the health of a replication to the Storage Center.  |
| StorageCenterServerMonitor      | Dependency | Rolls up the health of a server to the Storage Center.       |
| StorageCenterStatusMonitor      | Unit       | Monitors the status of a Storage Center.                     |
| StorageCenterStorageTypeMonitor | Dependency | Rolls up the health of a storage type to the Storage Center. |
| StorageCenterVolumeMonitor      | Dependency | Rolls up the health of a volume to the Storage Center.       |
| StorageTypeStatusMonitor        | Unit       | Monitors the status of a storage type.                       |
| VolumeMappedMonitor             | Unit       | Monitors whether a volume has been mapped to a server.       |
| VolumeStatusMonitor             | Unit       | Monitors the status of a volume.                             |
| WMIProviderDataCollectorMonitor | Dependency | Rolls up the health of a Data Collector to the WMI Provider. |

## Performance Counter Rules

The following table lists the performance counters included with the management pack.

**Table 8. Management Pack Performance Counters**

| Performance Counter Rule       | Description                          |
|--------------------------------|--------------------------------------|
| ControllerAverageIoSizeCounter | Controller average IO count          |
| ControllerReadIoSecCounter     | Controller read IO count per second  |
| ControllerReadKBSecCounter     | Controller read IO per second in KB  |
| ControllerReadLatencyCounter   | Controller IO read latency           |
| ControllerReadMBSecCounter     | Controller read IO per second in MB  |
| ControllerTotalIoSecCounter    | Controller total IO per second count |

| Performance Counter Rule      | Description                               |
|-------------------------------|-------------------------------------------|
| ControllerTotalKBSecCounter   | Controller total IO per second in KB      |
| ControllerTotalMBSecCounter   | Controller total IO per second in MB      |
| ControllerWritelosSecCounter  | Controller write IO count per second      |
| ControllerWriteKBSecCounter   | Controller write IO per second in KB      |
| ControllerWriteLatencyCounter | Controller IO write latency               |
| ControllerWriteMBSecCounter   | Controller write IO per second in MB      |
| DiskClassAverageloSizeCounter | Disk class average IO count               |
| DiskClassloPendingCounter     | Disk class pending IO count               |
| DiskClassReadloSecCounter     | Disk class read IO count per second       |
| DiskClassReadKBSecCounter     | Disk class read IO per second in KB       |
| DiskClassReadLatencyCounter   | Disk class read latency                   |
| DiskClassReadMBSecCounter     | Disk class read IO count per second in MB |
| DiskClassTotalloSecCounter    | Disk class total IO count per second      |
| DiskClassTotalKBSecCounter    | Disk class total IO per second in KB      |
| DiskClassTotalMBSecCounter    | Disk class total IO per second in MB      |
| DiskClassWritelosSecCounter   | Disk class write IO count per second      |
| DiskClassWriteKBSecCounter    | Disk class write IO per second in KB      |
| DiskClassWriteLatencyCounter  | Disk class write latency                  |
| DiskClassWriteMBSecCounter    | Disk class write IO per second in MB      |
| ServerActiveSpaceCounter      | Active space count on the server          |
| ServerActualSpaceCounter      | Actual space count on the server          |
| ServerAverageloSizeCounter    | Average IO count on server                |
| ServerConfiguredSpaceCounter  | Configured space count on the server      |
| ServerRaidOverheadCounter     | Overhead count on the server RAID         |
| ServerReadloSecCounter        | Server read IO count per second           |
| ServerReadKBSecCounter        | Server read IO per second in KB           |
| ServerReadLatencyCounter      | Server read latency                       |
| ServerReadMBSecCounter        | Server read IO per second in MB           |
| ServerReplaySpaceCounter      | Replay space count on the server          |
| ServerTotalDiskSpaceCounter   | Total disk space count on the server      |
| ServerTotalloSecCounter       | Server total IO per second count          |
| ServerTotalKBSecCounter       | Server total IO per second in KB          |
| ServerTotalMBSecCounter       | Server total IO per second in MB          |

| Performance Counter Rule                   | Description                                              |
|--------------------------------------------|----------------------------------------------------------|
| ServerWriteloSecCounter                    | Server write IO count per second                         |
| ServerWriteKBSecCounter                    | Server write IO per second in KB                         |
| ServerWriteLatencyCounter                  | Server write latency                                     |
| ServerWriteMBSecCounter                    | Server write IO per second in MB                         |
| ServerXferLatencyCounter                   | Server transfer latency                                  |
| StorageCenterAlertThresholdSpaceCounter    | Storage Center alert threshold space count               |
| StorageCenterAllDiskAverageloSizeCounter   | Average IO size of all disks on the Storage Center count |
| StorageCenterAllDiskIoPendingCounter       | Pending IO count of all disks on the Storage Center      |
| StorageCenterAllDiskReadIoSecCounter       | Storage Center all disk read IO per second count         |
| StorageCenterAllDiskReadKBSecCounter       | Storage Center all disk read IO per second count in KB   |
| StorageCenterAllDiskReadLatencyCounter     | Storage Center all disk read latency                     |
| StorageCenterAllDiskTotalIoSecCounter      | Storage Center all disk total IO per second count        |
| StorageCenterAllDiskTotalKBSecCounter      | Storage Center all disk total IO per second in KB        |
| StorageCenterAllDiskWriteloSecCounter      | Storage Center all disk write IO per second count        |
| StorageCenterAllDiskWriteKBSecCounter      | Storage Center all disk write IO per second in KB        |
| StorageCenterAllDiskWriteLatencyCounter    | Storage Center all disk write latency                    |
| StorageCenterAllServerXferLatencyCounter   | Storage Center all server transfer latency               |
| StorageCenterAllocatedSpaceCounter         | Count of allocated space on the Storage Center           |
| StorageCenterAllServerAverageloSizeCounter | Average IO size of all servers on Storage Center count   |
| StorageCenterAllServerReadIoSecCounter     | Storage Center all server read IO per second count       |
| StorageCenterAllServerReadKBSecCounter     | Storage Center all server read IO per second in KB       |
| StorageCenterAllServerReadLatencyCounter   | Storage Center all server read latency                   |
| StorageCenterAllServerTotalIoSecCounter    | Storage Center all server total IO per second count      |
| StorageCenterAllServerTotalKBSecCounter    | Storage Center all server total IO per second in KB      |
| StorageCenterAllServerWriteloSecCounter    | Storage Center all server write IO per second count      |
| StorageCenterAllServerWriteKBSecCounter    | Storage Center all server write IO per second in KB      |
| StorageCenterAllServerWriteLatencyCounter  | Storage Center all server write latency                  |
| StorageCenterAllVolumeAverageloSizeCounter | Storage Center all volume average IO size count          |
| StorageCenterAllVolumeloPendingCounter     | Storage Center all volume IO pending count               |

| Performance Counter Rule                  | Description                                          |
|-------------------------------------------|------------------------------------------------------|
| StorageCenterAllVolumeReadIoSecCounter    | Storage Center all volume read IO per second count   |
| StorageCenterAllVolumeReadKBSecCounter    | Storage Center all volume read IO per second in KB   |
| StorageCenterAllVolumeReadLatencyCounter  | Storage Center all volume read latency               |
| StorageCenterAllVolumeTotalIoSecCounter   | Storage Center all volume total IO per second count  |
| StorageCenterAllVolumeTotalKBSecCounter   | Storage Center all volume total IO per second in KB  |
| StorageCenterAllVolumeWriteIoSecCounter   | Storage Center all volume write IO per second count  |
| StorageCenterAllVolumeWriteKBSecCounter   | Storage Center all volume write IO per second in KB  |
| StorageCenterAllVolumeWriteLatencyCounter | Storage Center all volume write latency              |
| StorageCenterAvailableSpaceCounter        | Count of available space on the Storage Center       |
| StorageCenterBeReadIoSecCounter           | Storage Center back-end read IO per second counter   |
| StorageCenterBeReadKBSecCounter           | Storage Center back-end read IO per second in KB     |
| StorageCenterBeReadMBSecCounter           | Storage Center back-end read IO per second in MB     |
| StorageCenterBeTotalIoSecCounter          | Storage Center back-end total IO per second counter  |
| StorageCenterBeTotalKBSecCounter          | Storage Center back-end total IO per second in KB    |
| StorageCenterBeTotalMBSecCounter          | Storage Center back-end total IO per second in MB    |
| StorageCenterBeWriteIoSecCounter          | Storage Center back-end write IO per second counter  |
| StorageCenterBeWriteKBSecCounter          | Storage Center back-end write IO per second in KB    |
| StorageCenterBeWriteMBSecCounter          | Storage Center back-end write IO per second in MB    |
| StorageCenterFeReadIoSecCounter           | Storage Center front-end read IO per second counter  |
| StorageCenterFeReadKBSecCounter           | Storage Center front-end read IO per second in KB    |
| StorageCenterFeReadMBSecCounter           | Storage Center front-end read IO per second in MB    |
| StorageCenterFeTotalIoSecCounter          | Storage Center front-end total IO per second counter |
| StorageCenterFeTotalKBSecCounter          | Storage Center front-end total IO per second in KB   |

| Performance Counter Rule         | Description                                          |
|----------------------------------|------------------------------------------------------|
| StorageCenterFeTotalMBSecCounter | Storage Center front-end total IO per second in MB   |
| StorageCenterFeWriteloSecCounter | Storage Center front-end write IO per second counter |
| StorageCenterFeWriteKBSecCounter | Storage Center front-end write IO per second in KB   |
| StorageCenterFeWriteMBSecCounter | Storage Center front-end write IO per second in MB   |
| StorageCenterIoPendingCounter    | Storage Center IO pending counter                    |
| StorageCenterUsedSpaceCounter    | Storage Center used space counter                    |
| VolumeActiveSpaceCounter         | Volume active space counter                          |
| VolumeActualSpaceCounter         | Volume actual space counter                          |
| VolumeAverageloSizeCounter       | Volume average IO size counter                       |
| VolumeFreeSpaceCounter           | Volume free space counter                            |
| VolumeIoPendingCounter           | Volume IO pending counter                            |
| VolumeRaidOverheadCounter        | Volume RAID overhead counter                         |
| VolumeReadIoSecCounter           | Volume read IO per second counter                    |
| VolumeReadKBSecCounter           | Volume read IO per second in KB                      |
| VolumeReadLatencyCounter         | Volume read latency counter                          |
| VolumeReadMBSecCounter           | Volume read IO per second in MB                      |
| VolumeReplaySpaceCounter         | Volume replay space counter                          |
| VolumeTotalDiskSpaceCounter      | Volume total disk space counter                      |
| VolumeTotalIoSecCounter          | Volume total IO per second counter                   |
| VolumeTotalKBSecCounter          | Volume total IO per second in KB                     |
| VolumeTotalMBSecCounter          | Volume total IO per second in MB                     |
| VolumeWriteloSecCounter          | Volume write IO per second counter                   |
| VolumeWriteKBSecCounter          | Volume write IO per second in KB                     |
| VolumeWriteLatencyCounter        | Volume write latency                                 |
| VolumeWriteMBSecCounter          | Volume write IO per second in MB                     |

## Viewing Storage Centers

The SCOM Management Pack 4.0.1 provides a graphical topology (diagram) view that lets SCOM administrators view Storage Center components and their mappings and associations to other Storage Center components on the same storage area network (SAN).

To open a Storage Center diagram view:

1. In the **Dell Storage Center Monitoring** folder, click **Storage Center Diagram View**. The **Storage Center Diagram View** pane opens.



**Figure 20. Storage Center Diagram View**

2. Click the plus (+) or minus (-) sign on a Storage Center node to expand or collapse its associated components.
3. (Optional) Right-click the Storage Center node for a menu of applicable commands. For example, you can open the **Object Properties** dialog box and change the diagram view layout.

## Viewing Virtual Machines

The Dell VMM Storage Management Pack for SCOM 2012 discovers Storage Center virtual machines (VMs) managed by the System Center Virtual Machine Manager (SCVMM). This management pack lets SCOM administrators view and monitor Storage Center VMs, including Windows Hyper-V hosts (Windows Server versions 2012 and 2012 R2).

**NOTE:** The Dell VMM Storage Management Pack for SCOM 2012 is a separate management pack and depends on the Microsoft SCVMM management packs provided by Microsoft. After installing the management pack, the Virtual Machine Manager (VMM) must be connected and configured to work with SCOM. For more information, see [How to Connect VMM with Operations Manager](#).

Volumes can be mapped to a Hyper-V or VM in various ways. The following table provides a summary of connectivity supported as part of the VM discovery. For more information, see the *Dell Storage Center Management Pack 4.0.1 for Microsoft System Center 2012 Operations Manager Release Notes*.

**Table 9. Mapping Volumes**

| System/Connectivity | Fibre Channel | iSCSI         | Pass-Through   |
|---------------------|---------------|---------------|----------------|
| Hyper-V host        | Supported     | Supported     | Not applicable |
| Virtual machine     | Supported     | Not supported | Not supported  |

**NOTE:** The **Virtual Machine Volumes** state and the **Virtual Machine Volume Diagram View** do not display iSCSI volumes mapped to Hyper-V hosts. For more information about Hyper-V hosts, see the [Microsoft Hyper-V](#) web page.

In addition to discovering VMs and providing a standard list view, SCOM provides two types of diagram views:

- Virtual Machine Volume Diagram View

- VM Host Volume Diagram View

To open a VMM Discovery diagram view:

1. In the **Dell Storage Center Monitoring** folder, expand the **VMM Discovery** folder.
2. To view VM volumes, select **Virtual Machine Volume Diagram View**. The **Virtual Machine Volume Diagram View** pane opens.

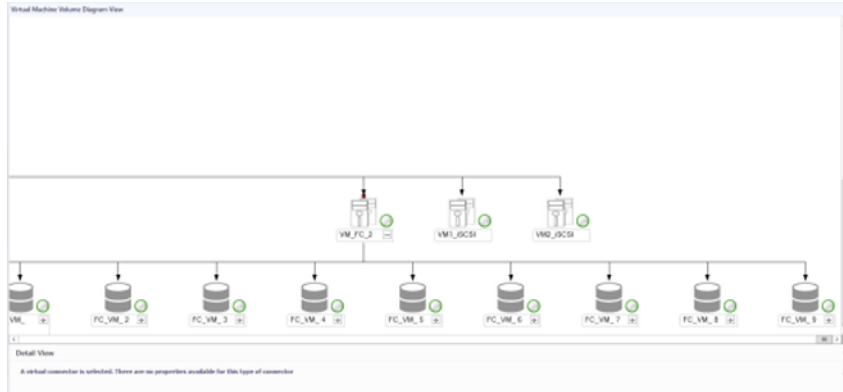


Figure 21. Virtual Machine Volume Diagram View

3. To view VM host volumes, select **VM Host Volume Diagram View**. The **VM Host Volume Diagram View** pane opens.

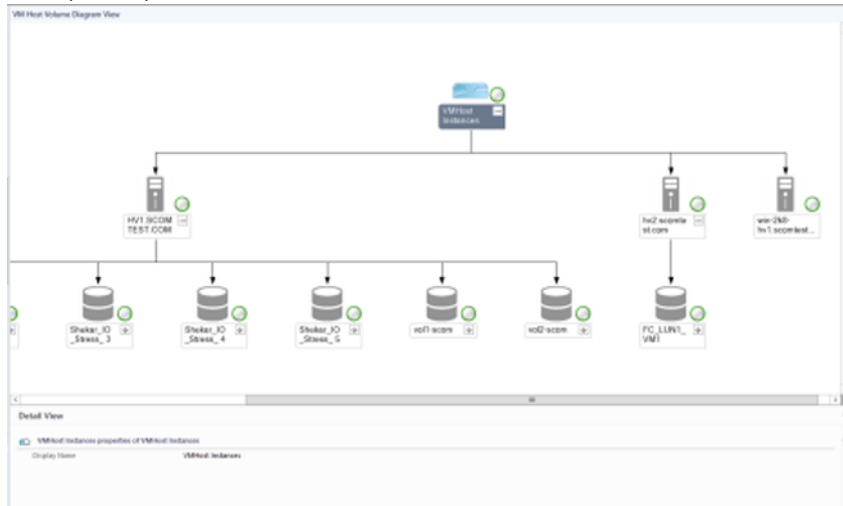


Figure 22. VM Host Volume Diagram View

4. Click the plus (+) or minus (-) sign on a VM node to expand or collapse its associated components.
5. (Optional) Right-click the VM node for a menu of applicable commands. For example, you can open the **Object Properties** dialog box, change the diagram view layout, and so on.