Storage Center Management Pack Version 4.1
for Microsoft System Center Operations Manager
Administrator's Guide

DELLEMC

Notes, Cautions, and Warnings

(i) **NOTE: A NOTE indicates important information that helps you make better use of your product.**

△ **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

About this Guide

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. 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: 680-038-005

Revision	Date	Description
A	August 2019	Initial 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 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 support site:

- *Dell Storage Center Management Pack for Microsoft System Center Operations Manager Release Notes*

  Describes important release information, including known issues.
- *Storage Manager Administrator's Guide*

  Provides instructions for using the Storage Manager software.

Getting Started

Introduction to Storage CenterManagement Pack

The SCOM console provides basic system monitoring; however, detailed monitoring of the Storage Center requires additional management packs. The Dell Storage Management Pack 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

Storage Center Management Pack Components

The Storage Center Management Pack 4.1 for Microsoft System Center Operations Manager consists of the components listed in the following table.

Table 1. Storage Center Management Pack Components

Component	Description
Management Packs: - Dell Storage Management Pack for SCOM - Dell VMM Storage Management Pack for SCOM - Microsoft System Center Virtual Machine Manager (SCVMM)	Defines the various components that make up a management pack. When a management pack is installed, instances of the classes defined by the management pack are automatically discovered and monitored. For more information, see Management Pack Classes and Virtual Machine Discovery Management Pack Classes.
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 4.1.

ⓘ **NOTE: The Management pack upgrade from 4.0.1 to 4.1 is not required for SCOM 2012 R2 as there are no new features added in SCOM 4.1 release.**

Table 2. Installation Requirements

Requirement	Description
Microsoft System Center operations Manager	The server must meet all SCOM requirements and must be one of the following supported versions: - SCOM 2012 R2 - SCOM 2016 - SCOM 2019
Add requirement for TLS 1.2 setupTLS 1.2 Protocol	To use Storage Manager 2018 and later, follow the prerequisites described in the article TLS 1.2 Protocol Support Deployment Guide for System Center 2012 R2.

Requirement	Description
Microsoft System Center Virtual Machine Manager (SCVMM)	The following versions of SCVMM are supported: • SCVMM 2012 R2 • SCVMM 2016 • SCVMM 2019
Storage Manager	• Dell Storage Manager 2016 R1 • Dell Storage Manager 2018 R1 • Dell Storage Manager 2019 R1
Storage Center Operating System	The Storage Center Operating System version depends on the version supported by Storage Manager.
Dell EMC Storage Systems	The following storage systems are supported: • SCv2000 series • SCv3000 series • SC4020 • SC5020/SC5020F • SC7020/SC7020F • SC8000 • SC9000
Operating System	The following Windows Server operating system versions are supported: • Microsoft Windows Server 2012 R2 • Microsoft Windows Server 2016 • Microsoft Windows Server 2019
Microsoft .NET Framework	Microsoft .NET Framework 4.0 or later
Processor	x64
Memory	See the Microsoft System Center Technical Documentation Library website for the latest memory requirements.
Network Connection	• Gigabit Ethernet is highly recommended by Dell EMC • Visibility to each monitored Storage Center
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 Microsoft Operations Manager Agent Installation Methods web page.

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 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

Storage Center Management Pack 4.1 provides a standard installer that is used to install both the Dell Storage Management Pack for SCOM and the Dell VMM Storage Management Pack for SCOM.

To install the Storage Center Management Pack 4.1 for Microsoft SCOM:

1. Download the Storage Center Management Pack for Microsoft SCOM software from Dell Digital Locker.
2. Unpack the `Storage Center Management Pack for Microsoft SCOM Setup` compressed (`.zip`) file and specify a directory to extract its contents.

   (i) **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.

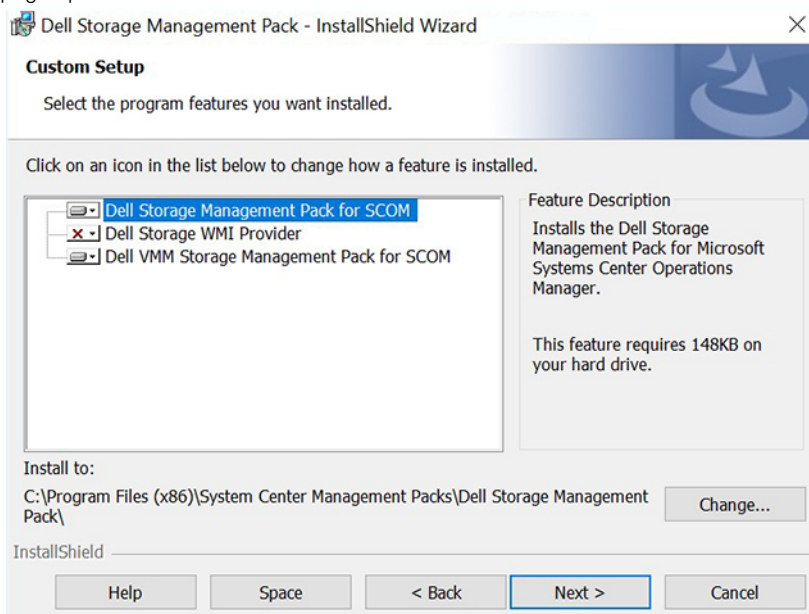   The Dell Storage Management Pack installation wizard starts and the **Welcome** page opens.
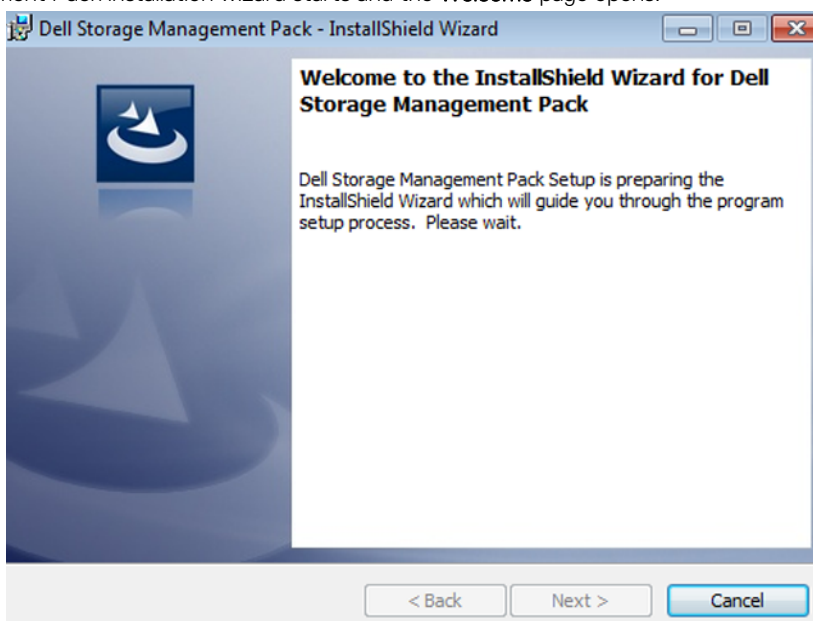
Figure 1. DellStorage Management Pack Installation Wizard

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** check box, 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:
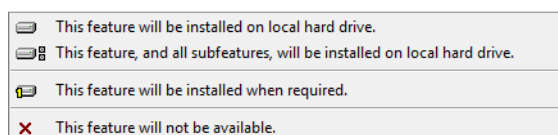
7. Verify that the **Dell Storage Management Pack for SCOM** and the **Dell VMM Storage Management Pack for SCOM** options are selected for installation.

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

8. Clear the **Dell Storage WMI Provider** option.
9. (Optional) To change the default installation location, click **Change** and then type the path.
10. Click **Next**. The Ready to Install the Program page opens.
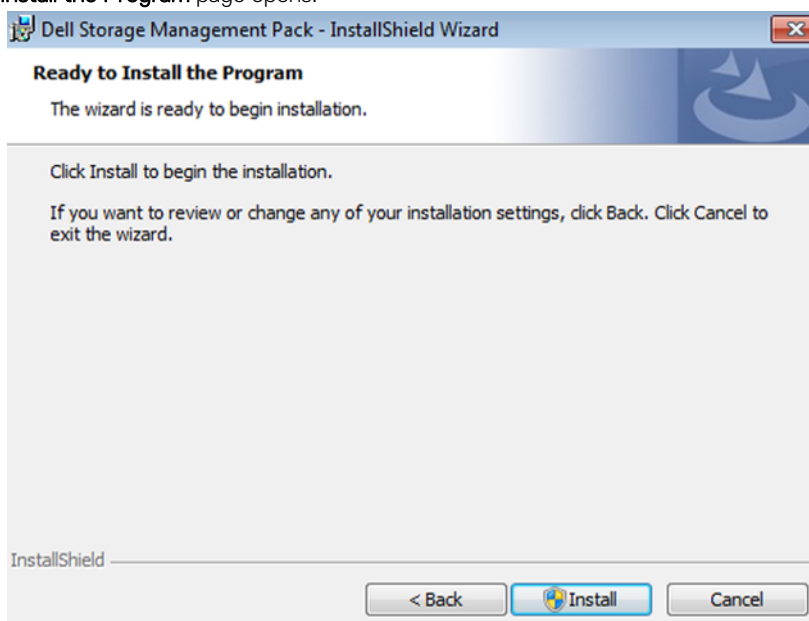
Figure 4. Ready to Install the Program

11. Click **Install**. A progress page opens.
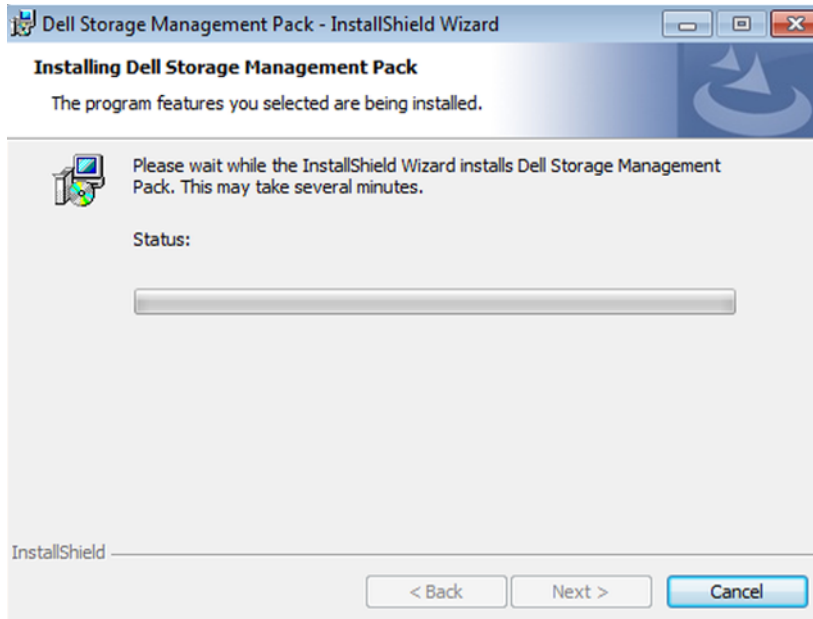
Figure 5. Installation Progress

12. When the installation is complete, the following page opens.
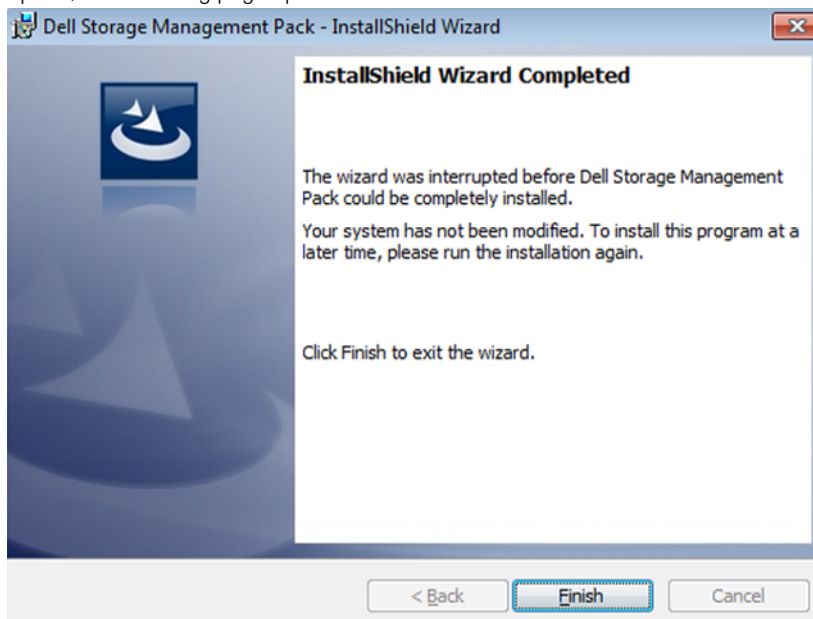
Figure 6. Installation Completed

13. Click **Finish**.
14. Import Management Pack 4.1 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.

(i) 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.

(i) 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.

(i) **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.
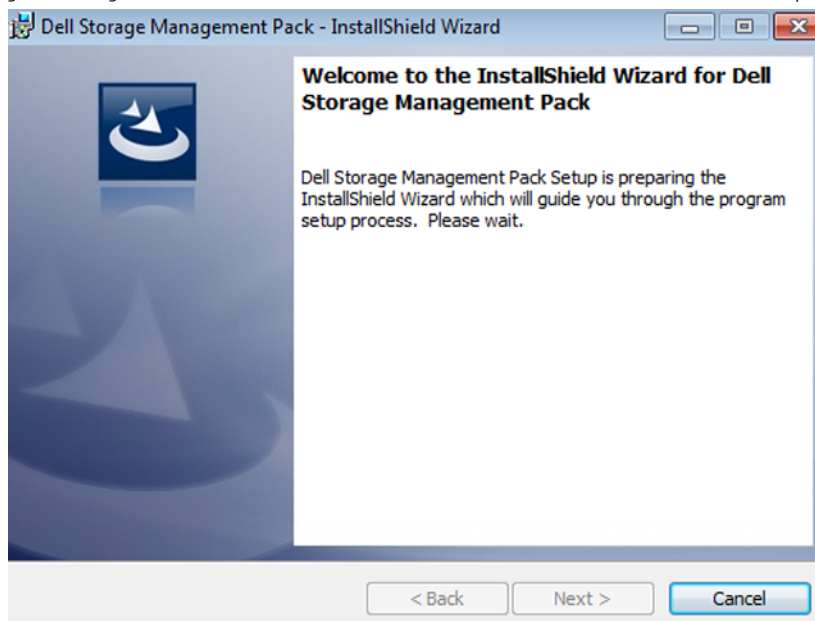
Figure 7. Dell Storage Management Pack Installation Wizard

2. Click **Next**. The **License Agreement** page opens.
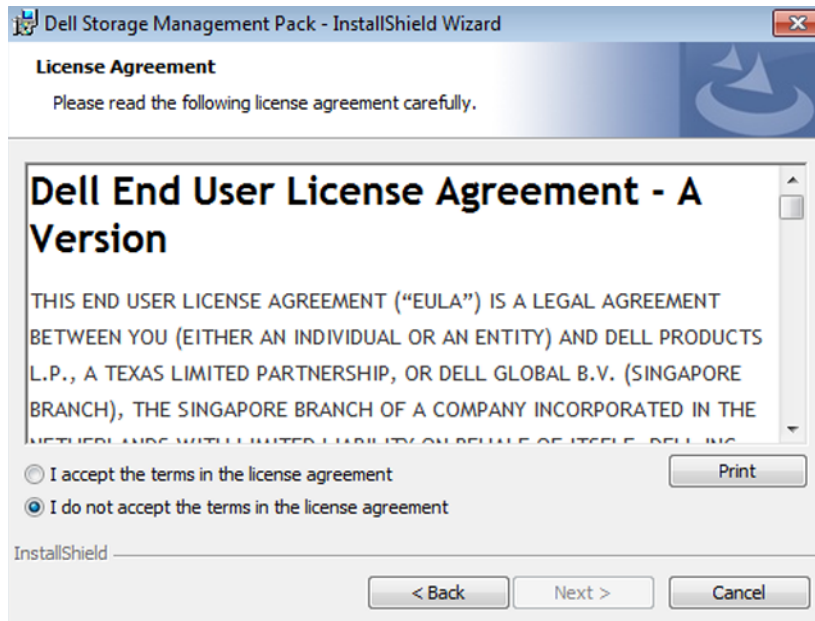
Figure 8. Dell End User License Agreement

3. To continue the installation, read the license terms, select the **I accept the terms in the license agreement** check box, and then click **Next**. The Custom Setup page opens.
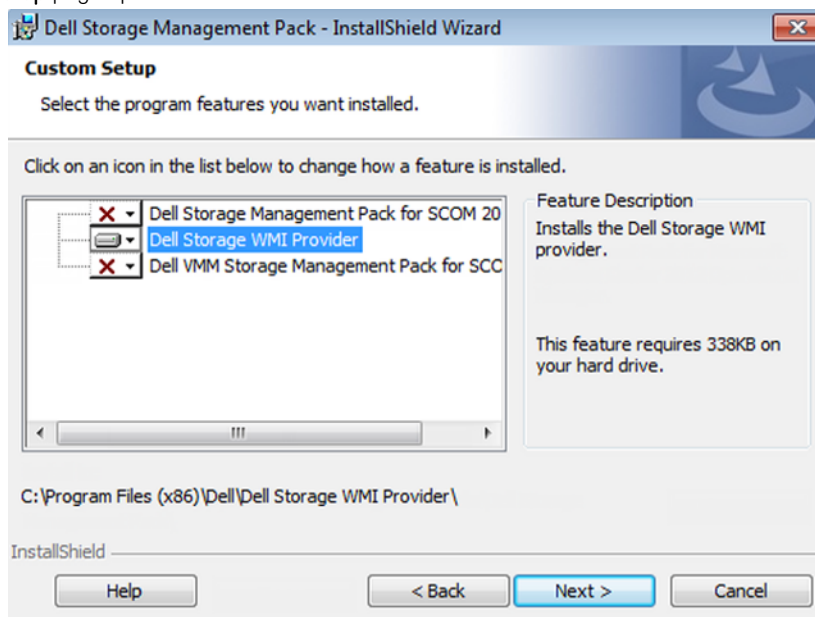
Figure 9. Custom Setup for WMI Provider

4. Clear the **Dell Storage Management Pack for SCOM** and **Dell VMM Storage Management Pack for SCOM** 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.
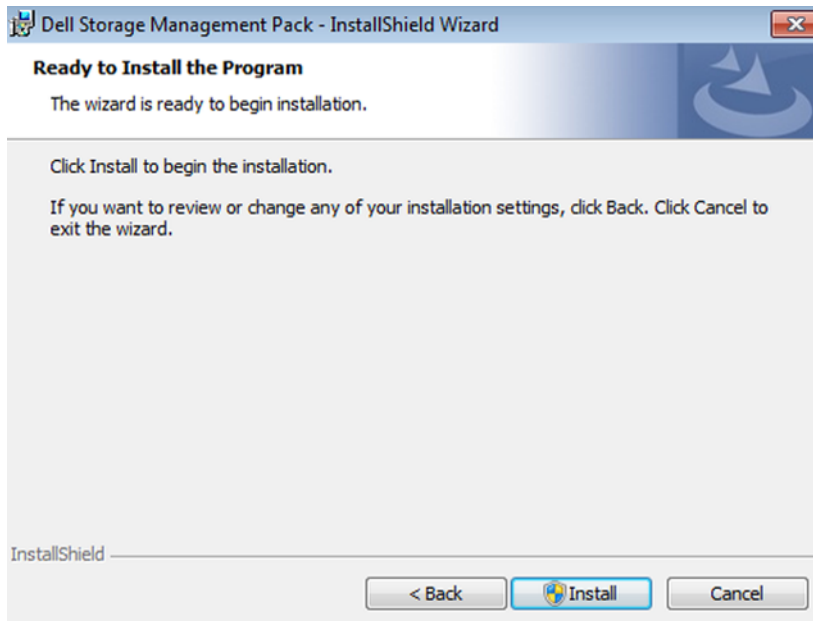
Figure 10. Ready to Install the Program

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 monitor for target hosts, 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 website.**

1. Open Windows Explorer and go 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.
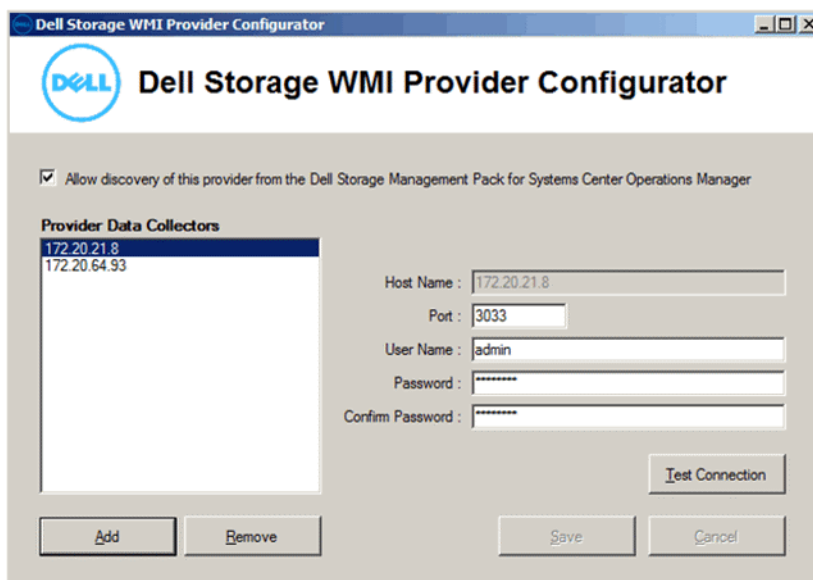
Figure 11. Dell Storage WMI Provider Configurator

ⓘ **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 the following command: `C:\Windows\Microsoft.NET\Framework64\v4.0.30319\InstallUtil.exe C:\Windows`**

```
\Microsoft.NET\assembly\GAC_64\Dell.Storage.Instrumentation\v4.0_4.1.0.2__07519b417fc2eafb
\Dell.Storage.Instrumentation.dll.
```

3. Select the **Allow discovery of this provider from the Dell Storage Management Pack for System Center Operations Manager** check box.

4. Click **Add**.

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 hostname 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. Dell Storage Management Pack will not discover the WMI Provider 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.
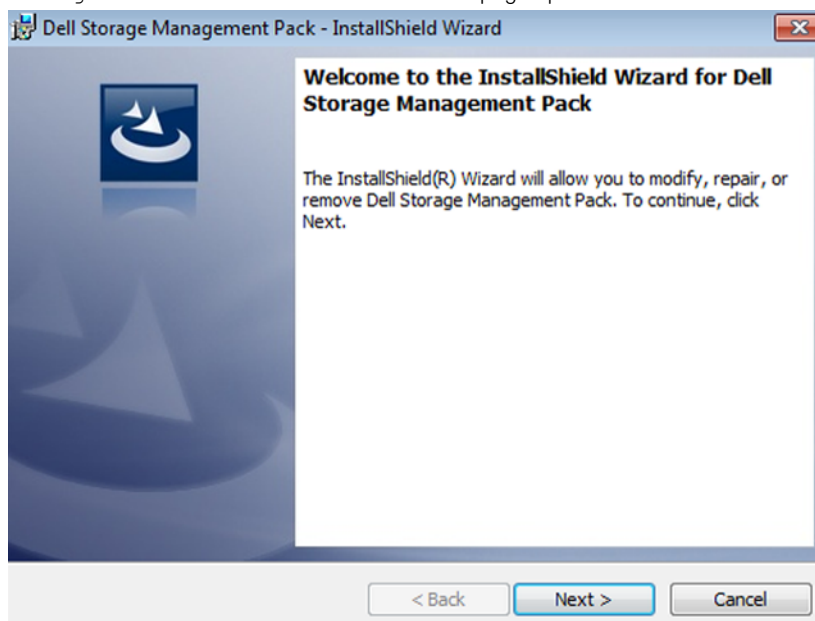
Figure 12. Installation Welcome

2. Click **Next**. The **Program Maintenance** page opens.
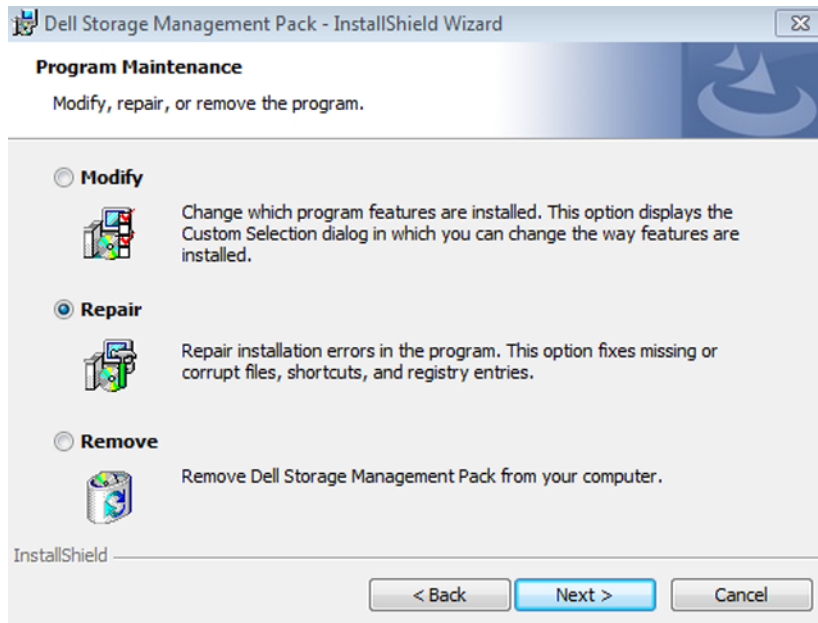
Figure 13. Program Maintenance

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

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.

1. Open System Center Operations Manager (**Start** > **All Programs** > **System Center** *[version]* **Operations Manager** > **Operations Console**).

2. Click the **Monitoring** [Monitoring] button.

3. In the navigation tree, expand the **Dell Storage Center Monitoring** folder.
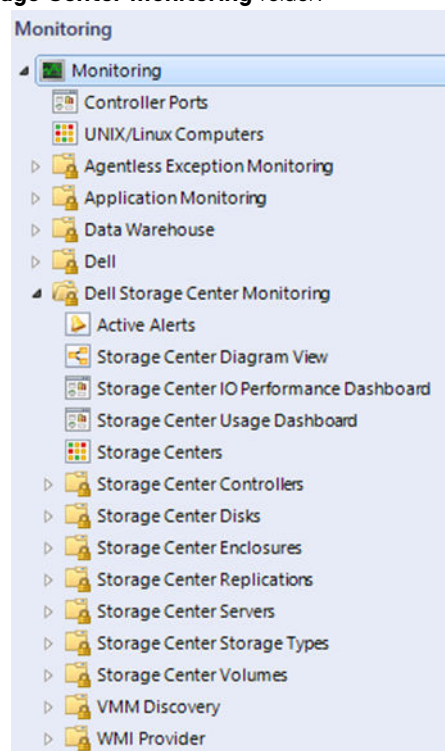
Figure 14. Storage Center Monitoring Menu

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 15. SCOM Active Alerts Pane

2. Click an alert to display more information about the alert in the **Alert Details** pane.

3. For more detailed information, double-click the alert to open the **Alert Properties** pane.

4. To acknowledge an alert, right-click the alert and select the **Acknowledge** resolution state to resolve the alert and synchronize the resolution with the Storage Manager Data Collector.

5. (Optional) To configure notifications for alerts, click **Administration** and configure notifications (**Administration** > **Notifications** > **Subscriptions**).

   For more information, see the Microsoft System Center Operations Manager website.

Viewing Health Indicators

Click **Storage Centers** to view the health information for all monitored Storage Centers. Type the name of a specific Storage Center in the **Look for** field to filter the list.

The following table describes the Health Indicator alerts.

Table 3. Health Indicator Alert Types

Alert Type	Description
Critical	A component has failed or failure is imminent.
Warning	A monitored component is above or below an acceptable threshold.
Healthy	The component is working as expected.
Maintenance Mode	The component is being repaired or replaced.
Unknown Status	The component is not currently being monitored.

A health state is assigned to the Storage Center and also to its components (Controller, Enclosure, Server, Volume, Center Disk Class, Storage Type, and Replication).
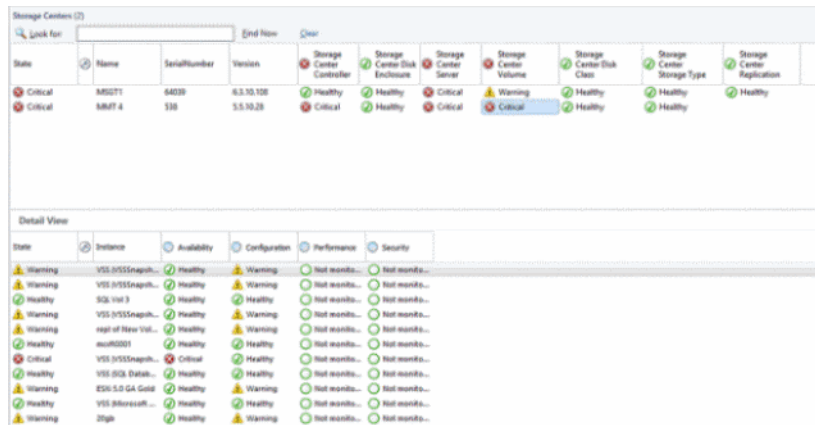
Figure 16. Health Indicator View

Viewing Dashboards

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

(i) **NOTE: The Storage Center Management Pack 4.1 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.
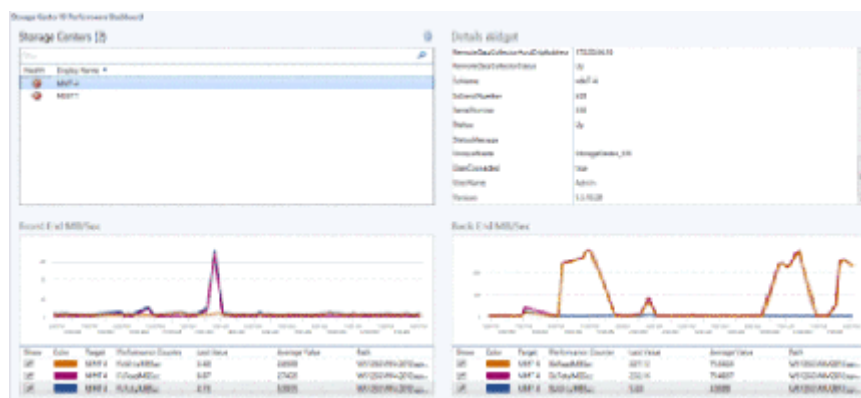
Figure 17. Storage Center IO Performance Dashboard

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

Dashboard	Displays
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 for Microsoft System Center 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.

Class Name	Description
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.
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.
ControllerPowerSupplyStatusMonitor	Unit	Monitors the status of the controller's power supply.

Monitor Name	Type	Description
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.
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
ControllerTotalKBSecCounter	Controller total IO per second in KB
ControllerTotalMBSecCounter	Controller total IO per second in MB
ControllerWriteIoSecCounter	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
DiskClassAverageIoSizeCounter	Disk class average IO count
DiskClassIoPendingCounter	Disk class pending IO count
DiskClassReadIoSecCounter	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
DiskClassTotalIoSecCounter	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
DiskClassWriteIoSecCounter	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
ServerAverageIoSizeCounter	Average IO count on server
ServerConfiguredSpaceCounter	Configured space count on the server
ServerRaidOverheadCounter	Overhead count on the server RAID
ServerReadIoSecCounter	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

Performance Counter Rule	Description
ServerTotalDiskSpaceCounter	Total disk space count on the server
ServerTotalIoSecCounter	Server total IO per second count
ServerTotalKBSecCounter	Server total IO per second in KB
ServerTotalMBSecCounter	Server total IO per second in MB
ServerWriteIoSecCounter	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
StorageCenterAllDiskAverageIoSizeCounter	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
StorageCenterAllDiskWriteIoSecCounter	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
StorageCenterAllServerAverageIoSizeCounter	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
StorageCenterAllServerWriteIoSecCounter	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
StorageCenterAllVolumeAverageIoSizeCounter	Storage Center all volume average IO size count
StorageCenterAllVolumeIoPendingCounter	Storage Center all volume IO pending count
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

Performance Counter Rule	Description
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
StorageCenterFeTotalMBSecCounter	Storage Center front-end total IO per second in MB
StorageCenterFeWriteIoSecCounter	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
VolumeAverageIoSizeCounter	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

Performance Counter Rule	Description
VolumeTotalMBSecCounter	Volume total IO per second in MB
VolumeWriteIoSecCounter	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 4.1 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 18. 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 discovers Storage Center virtual machines (VMs) managed by the System Center Virtual Machine Manager (SCVMM). This management pack allows SCOM administrators to view and monitor Storage Center VMs, including Windows Hyper-V hosts.

ⓘ **NOTE: The Dell VMM Storage Management Pack for SCOM 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 for Microsoft System Center 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

(i) **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.
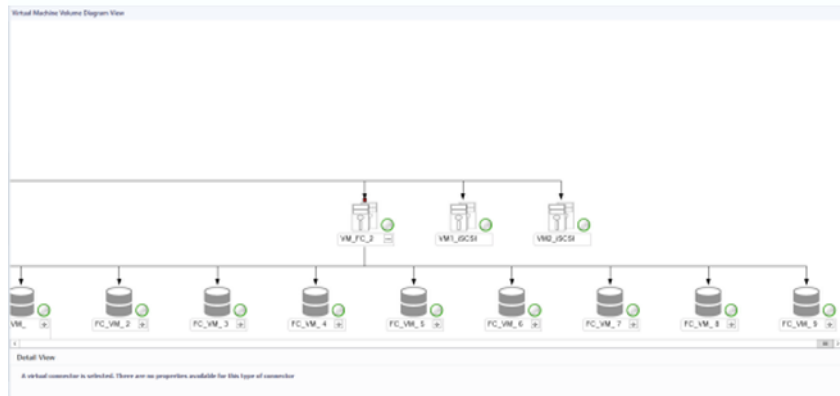
Figure 19. Virtual Machine Volume Diagram View

3. To view VM host volumes, select **VM Host Volume Diagram View**. The VM Host Volume Diagram View pane opens.
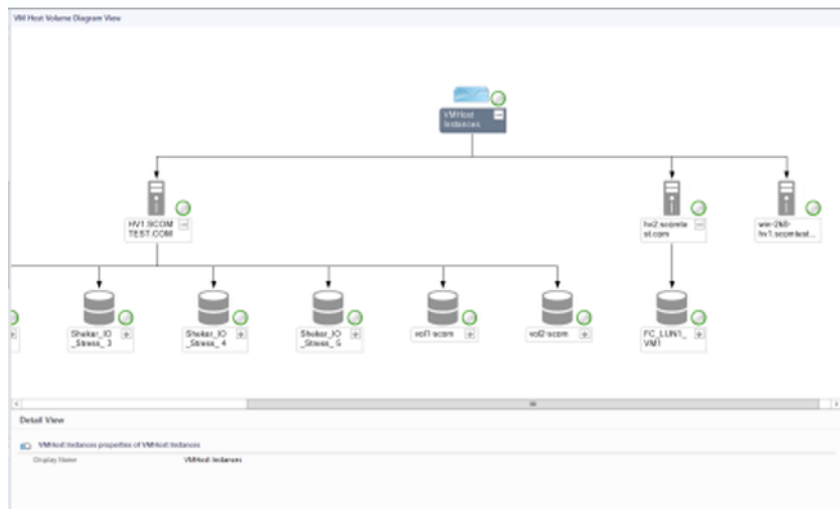
Figure 20. VM Host Volume Diagram View

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.