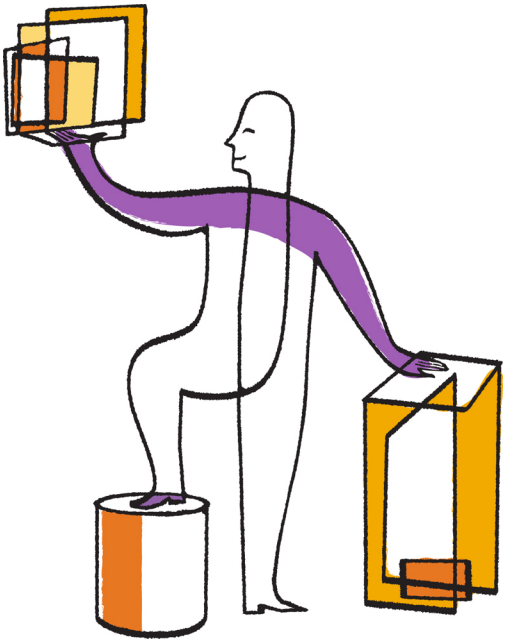
OnCommand® Plug-in 4.0 for Microsoft®

Installation and Administration Guide



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OnCommand Plug-in for Microsoft features

You can use OnCommand Plug-in for Microsoft to configure, monitor, and maintain your storage. The plug-in includes management packs for Microsoft System Center Operations Manager (SCOM) 2012, PowerShell cmdlets, and System Center Orchestrator integration packs (OIPs) that you can use to provision, clone, and recover Microsoft Hyper-V virtual machines.

The OnCommand Plug-in for Microsoft management packs for SCOM support both Data ONTAP for 7-Mode environments and clustered Data ONTAP, but the remaining plug-in components support only Data ONTAP for 7-Mode environments.

The plug-in consists of the following features:

System Center Operations Manager (SCOM) management packs	**Data ONTAP Storage Monitoring (7-Mode environments)**	This pack enables you to use your existing storage management tools to monitor and generate reports, through one interface, for all storage systems that are running Data ONTAP for 7-Mode environments. This pack is required for Data ONTAP for 7-Mode environments.
	Clustered Data ONTAP Storage Monitoring	This pack enables you to use your existing storage management tools to monitor and generate reports, through one interface, for all storage systems that are running clustered Data ONTAP. This pack is required for clustered Data ONTAP.
	Data ONTAP Hyper-V Storage Monitoring and Management (7-Mode environments)	This pack enables you to monitor and report on your virtualized environment for Data ONTAP. This pack is required if you are running a virtualized environment for Data ONTAP for 7-Mode environments.
	Clustered Data ONTAP Hyper-V Storage Monitoring and Management	This pack enables you to monitor and report on your virtualized environment for clustered Data ONTAP. This pack is required if you are running a virtualized environment for clustered Data ONTAP.
	SCOM Console	This pack enables you to access and perform tasks on a SCOM system remotely.

Cmdlets The Cmdlets are separate from the management packs and are not dependent on them to function correctly.

The OnCommand Web Service is installed with the cmdlets.

Cloning and Provisioning	The Cloning and Provisioning cmdlets enable you to clone storage, provision storage, and manage storage system credentials.
Disaster Recovery	The Disaster Recovery cmdlets enable you to replicate data across two sites, to provide a disaster recovery solution.

Storage System Credential Cmdlets and Activities

The Storage System Credential Cmdlets and Activities add storage systems to the storage systems database and add, retrieve, or remove user credentials to and from a database so that you can use other activities and cmdlets without entering credential information.

Orchestrator Integration Packs (OIPs)

The Orchestrator Integration Packs enable you create workflows to automate complex processes. There is an OIP for provisioning and cloning, one for disaster recovery, and another for commonly used data storage operations.

Cloning and Provisioning Integration Pack	The Cloning and Provisioning Integration Pack enables you to create workflows to provision storage, clone virtual machines, and manage storage system credentials.
Disaster Recovery Integration Pack	The Disaster Recovery Integration Pack enables you to create disaster recovery workflows that replicate data across two sites in both failover and failback scenarios.
Data ONTAP Toolkit Integration Pack	The Data ONTAP Toolkit Integration Pack enables you to invoke commands from System Center Orchestrator. You can also use the activities individually as an alternative to using the command-line interface and PowerShell scripting workflows.

OnCommand Plug-in VIM web service

The OnCommand Plug-in Web Service enables you to access the key features of storage discovery, storage provisioning, and cloning of virtual machines.

The OnCommand Plug-in Web Service is installed with the Orchestrator modules by default for all features except the `Debug-OCHost` cmdlet and the SCVMM add-ins. The web service is required for all features except for the `Debug-OCHost` cmdlet.

Documentation

This guide and the *OnCommand Plug-in for Microsoft Windows PowerShell Cmdlet and Orchestrator Activity Reference Guide* are available at `C:\Program Files\NetApp\OnCommand\MS_PLUGIN\` after the installation.

OnCommand Discovery Agent

The OnCommand Discovery Agent assists you with SCOM host discovery, provisioning, cloning, and disaster recovery cmdlet functionality. The agent enables the discovery of storage in environments in which LUNs are mapped using Fibre Channel.

Provisioning and cloning functionality requires the presence of the discovery agent for Hyper-V hosts with Fibre Channel initiators. For iSCSI initiators only, a discovery agent is not required.

SCVMM add-ins

The System Center Virtual Machine Manager (SCVMM) add-ins enable you to manage some controller activities from a GUI that you can open from the SCVMM toolbar. The following is a list of the names of the add-ins:

- The SCVMM clone a VM add-in
- The SCVMM clone a VM from a template add-in
- The SCVMM manage controllers add-in
- The SCVMM manage OCPM hosts add-in

Debug-OCHost cmdlet

The `Debug-OCHost` cmdlet enables you to debug configuration issues for plug-in features.

OnCommand Plug-in for Microsoft database

The controller credentials for all OnCommand Plug-in for Microsoft features except for SCOM are stored in the plug-in database.

OnCommand Plug-in for Microsoft installation

The information that you need to install the plug-in includes requirements and guidelines for installation, which you can perform either using a wizard or in silent mode. If you install in silent mode, you need information about the cmdlet and parameters that you can use.

Preparing to install SCOM and the plug-in

You must take certain actions prior to installation to ensure proper installation and setup of OnCommand Plug-in for Microsoft on System Center Operations Manager (SCOM).

Before you begin

All installation requirements must be fulfilled and proper functionality confirmed.

Steps

1. Choose whether you want to perform the installation with the wizard or silently.
2. Download and install the executable file for OnCommand Plug-in for Microsoft.
3. Add controllers and controller credentials.
4. Create overrides for the Data ONTAP discovery rule and the Data ONTAP virtualization discovery rule, but only for the management servers on which the plug-in is installed.
5. Save overrides to your own management pack rather than the default management pack, to avoid dependencies on the default management pack.
6. Run Data ONTAP discovery to discover any network devices that are already monitored in SCOM.

Related tasks

Installing OnCommand Plug-in for Microsoft on page 17
Installing OnCommand Plug-in for Microsoft using silent mode on page 19
Adding a storage system on page 28
Adding Data ONTAP storage controllers (7-Mode environments) on page 53
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Running PRO discovery on page 60

Running virtualization discovery on page 60
Running virtualization discovery on clustered Data ONTAP on page 34
Initiating storage discovery in SCOM on page 33

Related information

Microsoft TechNet web site

List of requirements for installing OnCommand Plug-in for Microsoft

Your environment must meet all hardware, software, Data ONTAP, and Microsoft licensing requirements before you can install and use OnCommand Plug-in for Microsoft, the various management packs, and the Orchestrator integration packs. The installer stops if the requirements for the minimum Windows operating system, any service pack level, .Net 4.0, or PowerShell 3.0 are not met.

The following topics contain more information about the installation requirements:

- *OnCommand Discovery Agent and reporting functionality requirements* on page 13
- *Data ONTAP versions supported by OnCommand Plug-in for Microsoft* on page 14
- *Hardware requirements for installation* on page 14
- *Software versions required for plug-in installation* on page 14
- *Required Microsoft licenses* on page 15
- *System Center Operations Manager requirements for installation* on page 15
- *Orchestrator integration pack installation requirements* on page 15
- *Requirements for SCVMM add-ins* on page 16
- *Cloning requirements for installation* on page 16
- *VIM web service requirements for OnCommand Plug-in for Microsoft installation* on page 17

OnCommand Discovery Agent and reporting functionality requirements

Before you can install OnCommand Discovery Agent, you must ensure that the Hyper-V server role is enabled and that Windows Server 2012 is installed. In addition, there are several System Center Operations Manager management packs that are required for OnCommand Discovery Agent and reporting functionality.

You should only install the OnCommand Discovery Agent if you want to discover FCP LUNs.

The following System Center Operations Manager (SCOM) management packs are required for OnCommand Discovery Agent and reporting functionality:

- Microsoft.SystemCenter.InstanceGroup.Library
- Microsoft.SystemCenter.NetworkDevice.Library
- Microsoft.Windows.Library

- System.Health.Library
- System.Library
- System.Performance.Library
- System.Snmp.Library
- Microsoft.SystemCenter.VirtualMachineManager.Pro.2008.Library
- Microsoft.SystemCenter.VirtualMachineManager.2008.Library

The following System Center Operations Manager management packs are required for reporting functionality:

- Microsoft.SystemCenter.DataWarehouse.Report.Library
- Microsoft ODR Report Library
- Microsoft.SystemCenter.DataWarehouse.ServiceLevel.Report.Library

Data ONTAP versions supported by OnCommand Plug-in for Microsoft

Before you can install the plug-in, you must have the correct version of Data ONTAP installed.

OnCommand Plug-in for Microsoft installation requires the following versions of Data ONTAP:

- Data ONTAP (7-Mode environments) 7.3.4 and later in the 7.3 release family
- Data ONTAP (7-Mode environments) 8.0.1, 8.0.2, 8.0.3, and 8.0.4 in the 8.0 release family
- Data ONTAP (7-Mode environments) 8.1.0, 8.1.1, and 8.1.2 in the 8.1 release family
- Clustered Data ONTAP 8.2

Hardware requirements for installation

Microsoft System Center Operations Manager (SCOM) 2012 SP1 and Microsoft System Center Virtual Machine Manager (SCVMM) 2012 SP1 determine your hardware installation requirements. For more information about the requirements to install these Microsoft products, see the Microsoft TechNet web site.

Related information

Microsoft TechNet web site

Software versions required for plug-in installation

To ensure that the plug-in has all of the functionality that you require to perform your monitoring and management tasks, you must have the appropriate versions of software installed.

The following versions of software are required for use with OnCommand Plug-in for Microsoft:

- Microsoft System Center Operations Manager (SCOM) 2012 SP1 for SCOM management packs
- Microsoft System Center Virtual Machine Manager (SCVMM) 2012 SP1 for cloning cmdlets
- Microsoft System Center Orchestrator 2012 SP1 for Orchestrator integration packs
- Microsoft .NET Framework 4.0 for all features

Required Microsoft licenses

Before you can install the plug-in on your storage system, you must have specific Microsoft licenses.

The following Microsoft licenses are required before you can install OnCommand Plug-in for Microsoft:

- SQL Server 2008 R2 SP1 and later
- System Center 2012 SP1 - Operations Manager
- System Center 2012 SP1 Virtual Machine Manager Enterprise or Data Center
- System Center 2012 SP1 - Orchestrator
- Windows PowerShell 3.0
- Windows Server 2012
- Windows 2008 R2 SP1

System Center Operations Manager requirements for installation

Before you install the plug-in on your system, your environment must meet some basic requirements for OnCommand Plug-in for Microsoft to function with System Center Operations Manager (SCOM).

You must ensure the following prior to installing the plug-in:

- The management packs must be installed on a SCOM management server to be automatically imported.
- To monitor your VHDs for alignment issues, you must have enabled PowerShell remoting on all Hyper-V hosts.
- You must have configured System Center Operations Manager 2012 SP1 for reporting so that the Reports management pack appears with the other management packs.

  To do this, you must correctly configure the SQL server data warehouse. For more information about configuring the SQL server data warehouse, see the Microsoft TechNet site.
- For multinode SCOM setup to function, you must have the plug-in installed on the SCOM server node before you install the plug-in on any other node.

Related information

Microsoft TechNet web site

Orchestrator integration pack installation requirements

Orchestrator integration packs (OIPs) enable you to perform provisioning, cloning, and disaster recovery activities with the plug-in. To install the OIPs during plug-in installation, you must meet some specific requirements.

The following requirements must be met before you can install OnCommand Plug-in for Microsoft:

- You must install System Center 2012 SP1 - Orchestrator and deploy the OIPs to the Orchestrator runbook server.
- You must install the plug-in VIM web service on a Windows Server 2012 host to enable the PowerShell toolkit, cloning, provisioning, and disaster recovery functionality.
- You must install .NET 4.0 on the runbook server host to use integration packs in the Orchestrator runbook server.
- You must manually upgrade all OIPs.

Requirements for adding SCVMM add-ins

Before you can install the System Center Virtual Machine Manager (SCVMM) add-ins, you must meet certain requirements.

SCVMM add-ins have the following requirements:

- For hosts that are managed in SCVMM, the OnCommand Plug-in for Microsoft System Center TCP/IP web service ports (default 808) must be open in the firewalls or the firewalls must be turned off.
- All cluster nodes with the OnCommand Plug-in for Microsoft System Center TCP/IP web service installed must be using the same port that you specified during installation (default 808).

The following software must be installed before you can use the SCVMM add-ins:

- SCVMM 2012 SP1 Virtual Machine Manager
- .NET 4.0 or later
- PowerShell 3.0 or later

Attention: If you have not installed Update Rollup 2 or later, then you must install the current Update Rollup for System Center 2012 Service Pack 1. You can use Windows Update to install the current Update Rollup. If you already installed Update Rollup 2 or later but did not uninstall Update Rollup 1, then you must uninstall all Update Rollups. You can then install the current Update Rollup using Windows Update.

Related information

Microsoft TechNet web site

Cloning requirements for installation

To use cloning to monitor your VHDs for alignment issues, you must have a FlexClone license for the storage system and you need to have a Hyper-V role enabled on the host where you running the clone cmdlets.

VIM web service requirements for OnCommand Plug-in for Microsoft installation

Before you can install the plug-in on your system, the system must meet some basic requirements for Virtual Infrastructure Management (VIM) web service.

You must ensure the following prior to installing the plug-in:

- The VIM web service login account must have administrative privileges on the local and remote hosts or clusters across the primary and secondary sites.
- You should use the preferred port number for all cmdlets, System Center Operations Manager, and Orchestrator functions.
  The preferred port number is the value retrieved from the configuration reader file and stored in memory during installation.
- You must have the SQL database installed on your system.

Installing OnCommand Plug-in for Microsoft

You can use the installation wizard to install OnCommand Plug-in for Microsoft, the management packs, the Orchestrator integration pack, the SCVMM add-ins, and the web service.

About this task

All features are installed by default, unless the host is not a System Center Operations Manager (SCOM) management server, in which case the management pack features are not installed.

During installation, the OCPM management packs for clustered Data ONTAP are automatically imported while the OCPM resource pool is initialized and management servers are discovered. You must not manually unimport and then reimport the management packs because the OCPM resource pool is not initialized correctly. You must reinstall the plug-in if you unimport the management packs.

You can install the plug-in on any node in your environment and it will function as if it is installed on the SCOM server node.

Steps

1. From the NetApp Support Site, download the OnCommand Plug-in for Microsoft executable file to a directory on your hard drive.
2. Double-click the installer icon, and click **Run** to start the installation wizard.
3. Follow the instructions in the installation wizard to install the software.
4. In the **Feature Selection** dialog box, select the program features that you want to install.
5. Optional: If you want to view the **Custom Setup Tips** dialog box that explains the icons and their meanings, click **Help**.

6. Optional: If you want to change the location to which the files are installed, click **Change** and type in the new path.
7. Optional: If you want to view the disk space usage, click **Disk Space**.
8. After you have specified the features that you want to install, click **Next**.

   The Web Service Credentials dialog box opens.
9. Type your web service credentials and click **Next**.
10. In the **Configure OCPM Database** dialog box, type the required information.

    You must type the instance in the Database server field in the following format:

    <server_name>\<instance>

    If you do not include the instance, the default instance is used.
11. In the **Ready to Install** dialog box, click **Install** to begin the installation or click **Back** if you want to make any changes to the settings.

    If the installer finds that required software is missing, a dialog box opens with information on where you can view the list of requirements and from which you can specify the installation of the missing software; the dialog box also includes a **Back** button that you can use to change your specifications, if necessary.

    After all the files are installed on a storage system running clustered Data ONTAP, a dialog box shows the remote systems from which you can select one or more remote systems on which you want to install the plug-in.

    If you install System Center Operations Manager (SCOM) on a storage system running clustered Data ONTAP and import the management pack on one of three remote management servers, the SCOM Console is visible on all three systems. However, you cannot access any of the functionality in the SCOM Console because the plug-in is not installed on the other two systems.
12. Click **Finish** to complete the installation.

    When the installation of the plug-in is complete on a storage system running clustered Data ONTAP, the installer checks for remote SCOM management servers that were in the same management group to install the plug-in. You can select all SCOM management servers for a remote installation.

Related tasks

Upgrading OnCommand Plug-in for Microsoft on page 23

Centralized controller credential authentication and management

When you install the plug-in on new hosts except for the System Center Operations Manager (SCOM) management packs, you simply point to the SQL Server instance on which the

OnCommand Plug-in for Microsoft database is located to obtain your controller credential authentication. After you create the database, you can manage your stored controller credentials in several ways.

The OnCommand Plug-in for Microsoft database provides a centralized location from which you can authenticate controller credentials. You configure the OnCommand Plug-in for Microsoft database during your first installation of the plug-in.

You can use the OnCommand Plug-in for Microsoft database to manage controller credentials used by System Center Orchestrator Integration Packs, System Center Virtual Machine Manager Add-ins, and PowerShell cmdlets.

During your initial installation of the plug-in, in the **Configure OCPM Database** screen, you specify the SQL Server instance on which you want the OnCommand Plug-in for Microsoft database to reside: for example, **`ServerName\InstanceName`**. If you are using a default instance, you need only specify the server name.

After you create the OnCommand Plug-in for Microsoft database, you specify the SQL Server instance on which the OnCommand Plug-in for Microsoft database resides to centrally manage your controller credentials using that database during all subsequent installations on different hosts.

After you create the OnCommand Plug-in for Microsoft database, you can manage your stored controller credentials in a few ways:

- Use the SCVMM **Manage Controllers** add-ins to add, modify, or remove controller credentials.
- Use the PowerShell cmdlets `Add-OCStorageSystem`, `Remove-OCStorageSystem`, and `Get-OCStorageSystem`.
- Use the System Center Orchestrator activities **Add Controller Credentials**, **List Controller Credentials**, and **Remove Controller Credentials**.

Installing OnCommand Plug-in for Microsoft using silent mode

You can install OnCommand Plug-in for Microsoft using silent mode instead of following the pages of the installation wizard. When you use silent mode, you can use a command line that lets you automatically install all of the software features at once.

About this task

During silent installation, no interface, progress bars, or error messages are displayed. Any error messages are written to a log file that is located in the `Temp` folder if you do not provide a custom log file path in the silent install command line. A new log file is written whenever there is any software that you need to install before you can install the plug-in.

Steps

1. From the NetApp Support Site, download the OnCommand Plug-in for Microsoft executable file to a directory on your hard drive.
2. From the command line, switch to the directory to which you saved the executable file.
3. Run the executable:

```
OnCommand-PlugIn-Microsoft_4.0_x64_NetApp.exe /s /v"/qn
SILENT_MODE=1 /L*v <log_file_name> ADDLOCAL=<ALL|Feature Names>
SVCUSERNAME=<domain_user> SRV_PASSWORD=<passwd>
SRV_CONFIRMUSERPASSWORD=<passwd> DBCONNECTIONSTRING=
\"Server=<server_name>; Integrated security=SSPI; database=master;\""
```

   The installation begins and runs in the background.

Related tasks

Managing controller credentials on page 70

Related references

Plug-in feature names used with AddLocal parameter in silent installation cmdlets on page 21
Silent install and uninstall process parameters and variables on page 20

Silent install and uninstall process parameters and variables

When you want to run an install or uninstall process in the background, or *silently*, you construct a command to do so using a particular set of parameters and variables.

The plug-in passes the parameters to `setup.exe` in the following order:

```
OnCommand-PlugIn-Microsoft_4.0_x64_NetApp.exe /s /v"/qn SILENT_MODE=1 /L*v
<log_file_name> ADDLOCAL=<ALL|Feature Names> SVCUSERNAME=<domain_user>
SRV_PASSWORD=<passwd> SRV_CONFIRMUSERPASSWORD=<passwd> DBCONNECTIONSTRING=
\"Server=<server_name>; Integrated security=SSPI; database=master;\""
```

The following list includes those parameters and variables that you can use with the silent installation command:

/s Specifies silent mode

/v Passes the parameters to the installer

> **Note:** Do not leave a space between the “v” and the quotation mark.

/q Specifies silent installation, with which you can use the following options:

- **b** Creates a basic user interface
- **f** Displays a full user interface

n	Does not create a user interface
r	Displays a reduced user interface

/w (Optional) Waits until the installation is complete before exiting

If you are using the `/w` parameter in a batch file, you should precede the entire `setup.exe` command line with **`start /WAIT`**:

```
start /WAIT OnCommand-PlugIn-Microsoft_4.0_x64_NetApp.exe /
w ...
```

ADDLOCAL= In a custom installation, indicates the features that you want to install

If there is no `AddLocal` parameter in the command, all features are installed by default.

Selecting features for custom installation

If you do not want to use the default OnCommand Plug-in for Microsoft installation that includes all plug-in features, you must select the names of the features that you want to install and use the `AddLocal` parameter to construct a command that silently runs a custom installation.

If you install a parent feature, such as Management Packs, then all of its child features are also installed. If you install a child feature, such as Hyper-V Storage Monitoring and Management, its parent feature, Management Packs, is also installed, along with any required sibling features, such as Storage Monitoring.

The following example illustrates a custom installation that contains only cmdlets and documentation:

```
OnCommand-PlugIn-Microsoft_4.0_x64_NetApp.exe /s /v"/qn
SILENT_MODE=1 /L*v <log_file_name> ADDLOCAL=<Cmdlets, Doc>
SVCUSERNAME=<domain_user> SRV_PASSWORD=<passwd>
SRV_CONFIRMUSERPASSWORD=<passwd> DBCONNECTIONSTRING=
\"Server=<server_name>; Integrated security=SSPI; database=master;\""
```

Plug-in feature names used with AddLocal parameter in silent installation cmdlets

There are specific feature names that you must use with the `AddLocal` parameter to install the various plug-in components.

The following are the feature names for the `AddLocal` parameter:

Management pack	**Feature**	**Subfeature**	**AddLocal parameter**
System Center Operations Manager (SCOM) Management Packs			ManagementPacks
	Storage Monitoring		StorageMonitoring
		Reporting	Reporting
	Hyper-V Storage Monitoring and Management		HVStorageMonitoring
		Reporting	HVStorageReporting
	Clustered Data ONTAP Management Pack		ClusteredDataONTAPManagementPack
		Reporting	ClusterReporting
		Clustered Data ONTAP Virtualization Management Pack	ClusteredDataONTAPVirtualization
	SCOM Console		SCOMConsole
Cmdlets			Cmdlets
	Cloning and Provisioning Cannot be installed individually		CmdletsCP
	Disaster Recovery Cannot be installed individually		CmdletsDR
Orchestrator Integration Pack			Opalis
	Cloning and Provisioning Integration Pack		OpalisCP

Management pack	Feature	Subfeature	AddLocal parameter
	Disaster Recovery Integration Pack		OpalisDR
	Data ONTAP Toolkit Integration Pack		OpalisDataOntap
	OnCommand Plug-in VIM Web Service		OCWebServices
Documentation			Doc
OnCommand Discovery Agent			OCAgent
SCVMM Console Add-Ins			VMMAddins

Upgrading OnCommand Plug-in for Microsoft

If you have OnCommand Plug-in 3.2.1 or 3.2 for Microsoft installed, you can upgrade to plug-in version 4.0. However, if you want to use the plug-in to monitor storage systems running clustered Data ONTAP, you must install additional management packs that are not imported during the upgrade.

Before you begin

If you are upgrading from versions earlier than OnCommand Plug-in 3.2 for Microsoft, you must first uninstall the software, and then install the plug-in version 4.0.

Steps

1. From the NetApp Support Site, download the OnCommand Plug-in for Microsoft executable file to a directory on your hard drive.
2. Double-click the installer icon, and then click **Run** to start the installation wizard.
3. Follow the instructions in the installation wizard to install the software.
4. In the **Ready to Install** dialog box, click **Install** to begin the installation or click **Back** if you want to make any changes to the settings.
5. Click **Finish** to complete the first part of the upgrade, which does not include the clustered Data ONTAP management packs.

   You must rerun the installation wizard to install the management packs.
6. Double-click the installer icon, and then click **Run** to start the installation wizard.

After you start the installation wizard, you are prompted to modify, repair, or remove the program.

7. Click **Modify** to install the clustered Data ONTAP management packs.
8. Click the plus sign (+) to the left of SCOM Management packs to expand the list of available features.
9. Select the clustered Data ONTAP management pack if you only want to install this feature or click the plus sign (+) to the left of Clustered Data ONTAP management pack to select the clustered Data ONTAP Virtualization management pack and to install both management packs.
10. Click **Next**.
11. Click **Finish** to complete the upgrade, including the management packs.

Related tasks

Installing OnCommand Plug-in for Microsoft on page 17

Uninstalling OnCommand Plug-in for Microsoft

You can uninstall OnCommand Plug-in for Microsoft from the server using the uninstall wizard, or you can perform a silent uninstall. You can uninstall and reinstall if necessary to troubleshoot any issues with the software. The uninstall process uninstalls only the plug-in; it does not uninstall the management packs.

Uninstalling the plug-in by using the wizard

You can use the wizard to uninstall OnCommand Plug-in for Microsoft when you no longer need the plug-in or when you upgrade to a later version.

Steps

1. Open the Windows **Control Panel** on the appropriate management server.
2. From the **Control Panel**, double-click **Programs and Features**.
3. Select **OnCommand Plug-in for Microsoft**.
4. Click **Uninstall**.

Uninstalling the plug-in using silent mode

You can uninstall the OnCommand Plug-in for Microsoft software silently, without a wizard, when you no longer need the plug-in or when you upgrade to a later version.

About this task

During the silent uninstall process, no interface, progress bars, or error messages are displayed.

Step

1. From a command line prompt, run the following command:

   ```
   MsiExec.exe /x{3FEDDDE8-6819-4D79-8444-1AB602C51F0B} /L*v
   C:your_log_file.log /q
   ```

   ```
   msiexec.exe /x{3FEDDDE8-6819-4D79-8444-1AB602C51F0B}
   ```

   The uninstall process begins and runs in the background.

   Any errors that occur during the uninstall process are saved to the log file that was included in the command input. If a log file is not specified in the command, then the log file is saved to the Temp folder after the procedure finishes.

After you finish

You can view the log file to ensure the uninstallation is successful.

How the plug-in works with SCOM

System Center Operations Manager (SCOM) is a data center management system for operating systems and hypervisors. The plug-in provides an interface through SCOM that you can use to view state, health, and performance information about your monitored objects. The plug-in also generates alerts for particular availability, performance, configuration, or security situations that affect your storage system.

How the plug-in works with the management pack for clustered Data ONTAP

There are several tasks you can perform with the management pack for clustered Data ONTAP. These tasks include adding storage systems, discovering and configuring the storage systems, and defining the management pack rules.

Related tasks

Adding a storage system on page 28
Running discovery on clustered Data ONTAP on page 33
Running virtualization discovery on clustered Data ONTAP on page 34
Initiating storage discovery in SCOM on page 33
Overriding clustered Data ONTAP management pack rules on page 30

Management pack features for clustered Data ONTAP

When you install OnCommand Plug-in for Microsoft, the installation wizard installs the components that you select. Each management pack and its associated features are installed on the specified server.

You can install the following management packs, to use its associated features:

Management pack	Feature	Subfeature
System Center Operations Manager (SCOM) Management Packs	Storage Monitoring	Reporting
	Hyper-V storage Monitoring and Management	Reporting

Management pack	Feature	Subfeature
	Clustered Data ONTAP management pack	Clustered Data ONTAP Virtualization management pack Reporting

Monitoring your clustered Data ONTAP storage

The System Center Operations Manager (SCOM) monitors the health and performance data that it collects from the discovered storage systems running clustered Data ONTAP. SCOM generates events when the status is abnormal or when a predefined threshold has been reached. If configured to do so, SCOM sends a notification when an event triggers an alert.

Adding a storage system

Before you can monitor the performance and health of your clustered Data ONTAP storage, you must first add a storage system that must be discovered in System Center Operations Manager (SCOM).

About this task

When you add a storage system, the storage objects for the system are automatically discovered or you can initiate discovery by clicking **Discover** in the Manage Storage Systems dialog box.

Steps

1. Click **Monitoring**.
2. In the navigation pane, select **Clustered Data ONTAP > Management Servers**.
3. In the **Tasks** pane, click **Clustered Data ONTAP: Manage Storage System**.

   The Manage Storage Systems dialog box opens.
4. Click **Add**.

   The Add Storage System dialog box opens.
5. Type the name or IP address of the storage system, whether it is a cluster or a Storage Virtual Machine (SVM), and the user credentials of the system that you want to add.
6. Click **Add**.

Related tasks

Initiating storage discovery in SCOM on page 33

Modifying the user credentials for a storage system

You can modify the user credentials for a storage system at any time by updating the IP address, user name, and password.

About this task

You can modify the user credentials for multiple storage systems if you want the credentials to be the same for all systems. If a storage system has multiple management LIFs, you can select the LIF you want to change from the drop-down list.

Steps

1. Click **Monitoring**.
2. In the navigation pane, select **Clustered Data ONTAP > Management Servers**.
3. In the **Tasks** pane, click **Clustered Data ONTAP: Manage Storage System**.

   The Manage Storage Systems dialog box opens.
4. Select a storage system for which you want to modify the user credentials and click **Modify**.
5. To change the user credentials for the selected storage system, type the IP address, user name, or password for the system and click **Save**.

Removing a storage system

You can remove a storage system when you no longer need to monitor it. Once it has been added, you should keep your storage system in the database, but if you want to stop monitoring the storage system with OnCommand Plug-in for Microsoft, you can remove it.

Steps

1. Click **Monitoring**.
2. In the navigation pane, select **Clustered Data ONTAP > Management Servers**.
3. In the **Tasks** pane, click **Clustered Data ONTAP: Manage Storage System**.

   The Manage Storage Systems dialog box opens.
4. Select the storage system that you want to remove and click **Remove**.
5. Click **Remove** in response to the confirmation prompt.

Overriding clustered Data ONTAP management pack rules

After you verify that the clustered Data ONTAP management pack rules have been successfully imported into System Center Operations Manager (SCOM), you can override any rules to enable or disable, alter the frequency, or change the start time for a rule.

Steps

1. Click **Authoring**.
2. In the navigation pane, select **Management Pack Objects > Rules**.
3. In the search field, type **`Clustered Data ONTAP`** and click **Find Now**.
4. Select the rule that you want to view or override.
5. Right-click the selected rule and click **Overrides > Override the Rule > For all objects of class: Clustered Data ONTAP: Rule**.

   You can set the overrides for all objects or specific objects, or to the entire group.
6. Select the overrides that you want to set depending on whether you want to enable or disable the rule, alter the frequency, or change the start time for the rule.
7. Save the changes to the management pack.

   You can create a new management pack for your overrides or one management pack for all of your overrides. However, you should not save changes to the default management pack.

Related tasks

Viewing and overriding clustered Data ONTAP monitors on page 38

Related information

Microsoft TechNet web site

Lists of clustered Data ONTAP management pack rules

OnCommand Plug-in for Microsoft includes virtualization and other management server rules that enable you to more effectively manage your storage resources.

Clustered Data ONTAP: LUN rule

- Clustered Data ONTAP: LUN Average Latency Rule

Clustered Data ONTAP: Management Server Resource Pool rules

- Clustered Data ONTAP: Discovery Rule
- Clustered Data ONTAP: Virtualization Discovery Rule

Clustered Data ONTAP: Node rules

- Clustered Data ONTAP: Aggregate Performance Data Collection Rule
- Clustered Data ONTAP: Node Disk State Monitoring Rule
- Clustered Data ONTAP: Node State Monitoring Rule
- Clustered Data ONTAP: Port State Rule

Clustered Data ONTAP: Performance rules

- Clustered Data ONTAP: Average Latency Performance Rule
- Clustered Data ONTAP: CIFS Operations Peformance Rule
- Clustered Data ONTAP: CPU Average Utilization Peformance Rule
- Clustered Data ONTAP: CPU Resource Utilization Peformance Rule
- Clustered Data ONTAP: CPU Total Utilization Peformance Rule
- Clustered Data ONTAP: Disk Data Read Peformance Rule
- Clustered Data ONTAP: Disk Data Written Peformance Rule
- Clustered Data ONTAP: Enclosure State Monitoring Rule
- Clustered Data ONTAP: FCP Operations Peformance Rule
- Clustered Data ONTAP: HTTP Operations Peformance Rule
- Clustered Data ONTAP: iSCSI Operations Peformance Rule
- Clustered Data ONTAP: Network Data Received Peformance Rule
- Clustered Data ONTAP: Network Data Sent Peformance Rule
- Clustered Data ONTAP: NFS Operations Peformance Rule
- Clustered Data ONTAP: Read Latency Peformance Rule
- Clustered Data ONTAP: Read Operations Peformance Rule
- Clustered Data ONTAP: SNMP Trap Peformance Rule
- Clustered Data ONTAP: Total Operations Peformance Rule
- Clustered Data ONTAP: Write Latency Peformance Rule
- Clustered Data ONTAP: Write Operation Performance Rule

Clustered Data ONTAP: SMB Server rule

- Clustered Data ONTAP: SMB Server State Rule

Clustered Data ONTAP: Storage System rules

- Clustered Data ONTAP: LIF Performance Data Collection Rule
- Clustered Data ONTAP: LIF State Rule
- Clustered Data ONTAP: Storage System Connection Rule
- Clustered Data ONTAP: Storage Efficiency Rule

Clustered Data ONTAP: Storage Virtual Machine (SVM) rules

- Clustered Data ONTAP: Storage Virtual Machine (SVM) FCP Performance Statistics Collection Rule
- Clustered Data ONTAP: Storage Virtual Machine (SVM) iSCSI Performance Statistics Collection Rule
- Clustered Data ONTAP: Storage Virtual Machine (SVM) Performance Statistics Collection Rule
- Clustered Data ONTAP: Storage Virtual Machine (SVM) SMB Performance Statistics Collection Rule
- Clustered Data ONTAP: Storage Virtual Machine (SVM) State Monitoring Rule
- Clustered Data ONTAP: Storage Virtual Machine (SVM) Volume LUN State Rule
- Clustered Data ONTAP: Storage Virtual Machine (SVM) Volume State Monitoring Rule
- Clustered Data ONTAP: Volume Performance Data Collection Rule

Clustered Data ONTAP Virtualization: Hyper-V Virtual Hard Disk rules

- Clustered Data ONTAP: Virtual Hard Disk LUN Monitoring Rule
- Clustered Data ONTAP: Virtual Hard Disk SMB Share Monitoring Rule
- Clustered Data ONTAP: Virtual Hard Disk Volume Monitoring Rule

Clustered Data ONTAP Virtualization: Virtual Hard Disk on LUN rules

- Clustered Data ONTAP: Virtual Hard Disk LUN Monitoring Rule
- Clustered Data ONTAP: Virtual Hard Disk SMB Share Monitoring Rule
- Clustered Data ONTAP: Virtual Hard Disk Volume Monitoring Rule

Clustered Data ONTAP Virtualization: Virtual Hard Disk on SMB Share rules

- Clustered Data ONTAP: Virtual Hard Disk LUN Monitoring Rule
- Clustered Data ONTAP: Virtual Hard Disk SMB Share Monitoring Rule
- Clustered Data ONTAP: Virtual Hard Disk Volume Monitoring Rule

Storage discovery for clustered Data ONTAP

You must first discover your clustered Data ONTAP storage before you can view all of your clustered Data ONTAP storage objects such as, Storage Virtual Machines (SVMs), volumes, aggregates, and disks. Then you can monitor your entire cluster storage infrastructure in System Center Operations Manager (SCOM).

You can launch the discovery process from the Manage Storage Systems dialog box or run discovery for a selected storage system from the Management Servers view.

Some monitored storage object properties such as the state, total space, or used space might be out of sync until the next time storage discovery is run with the default time set at four hours.

Initiating storage discovery in SCOM

You can initiate the process of discovering your clustered Data ONTAP storage in case the discovery of a management server fails because OnCommand Plug-in for Microsoft is not installed on the System Center Operations Manager (SCOM) management server or the server was not added to the resource pool.

Steps

1. Click **Monitoring**.
2. In the navigation pane, select **Clustered Data ONTAP > Management Servers**.
3. In the **Tasks** pane, click **Clustered Data ONTAP: Manage Storage System**.
   The Manage Storage Systems dialog box opens.
4. Click **Discover**.
5. Select the storage targets that you want to run discovery on and click **Run**.

Related tasks

Adding a storage system on page 28

Types of clustered Data ONTAP discovery

There are two types of discovery that you can use to configure your plug-in: clustered Data ONTAP storage discovery and clustered Data ONTAP virtualization discovery.

You can use both clustered Data ONTAP storage discovery and clustered Data ONTAP virtualization discovery to discover storage controllers and their objects connected to servers that are recognized by System Center Virtual Machine Manager (SCVMM). Clustered Data ONTAP virtualization discovery alone discovers storage on all Hyper-V hosts that SCVMM manages.

Related tasks

Running discovery on clustered Data ONTAP on page 33
Running virtualization discovery on clustered Data ONTAP on page 34

Running discovery on clustered Data ONTAP

You must run discovery for the plug-in to recognize your clustered Data ONTAP systems and add them to the System Center Operations Manager (SCOM) database. All storage objects must be discovered before you can monitor them.

About this task

If one node of a multinode cluster is down, the discovery task displays `Failed` in the `Task Status` view because the storage system is in an unhealthy state. However, the discovery process continues for other storage objects.

Steps

1. Click **Monitoring**.
2. In the navigation pane, select **Clustered Data ONTAP > Management Servers**.
3. In the **Tasks** pane, click **Clustered Data ONTAP: Discovery Task**.

   The Clustered Data ONTAP: Discovery Task dialog box opens.
4. Select the storage targets that you want to run discovery on and click **Run**.

Running virtualization discovery on clustered Data ONTAP

You must run clustered Data ONTAP virtualization discovery to find storage on all Hyper-V hosts in System Center Virtual Machine Manager (SCVMM) before you can manage that storage.

Before you begin

You must have established a connection between System Center Operations Manager (SCOM) and SCVMM prior to running virtualization discovery.

You must have added all of your Hyper-V hosts to SCVMM before you run discovery, because clustered Data ONTAP virtualization discovery discovers only those Hyper-V hosts that are monitored by SCVMM.

About this task

If there are Hyper-V hosts not in the same domain as the SCOM and SCVMM servers, the virtualization discovery task status displays `Failed` but the plug-in discovers and monitors all Hyper-V hosts within the domain.

Virtualization discovery runs automatically after you run discovery or add a new storage system. When you add a new storage system, the discovery task does not appear in the `Task Status` view but a virtualization discovery task does appear. The virtualization discovery task status displays more than once in the `Task Status` view.

Steps

1. Click **Monitoring**.
2. In the navigation pane, select **Clustered Data ONTAP > Management Servers**.
3. In the **Tasks** pane, click **Clustered Data ONTAP: Virtualization Discovery Task**.

   The Clustered Data ONTAP: Virtualization Discovery Task dialog box opens.
4. Select the storage targets that you want to run discovery on and click **Run**.

What a resource pool is

A resource pool is a collection of management servers that you can use to distribute work. The management group contains all management servers in the management group, not only the members

of the resource pool. System Center Operations Manager (SCOM) uses resource pools for load balancing and high availability among management servers.

When you install OnCommand Plug-in for Microsoft on a management server in the management group, the management server is automatically added to the OCPM resource pool. You can also choose other management servers in the group to add to the OCPM resource pool.

You can use the Management Server View monitor to determine the management servers that are part of the OCPM resource pool and have the plug-in installed on the server.

Adding a management server to the resource pool

When you add a management server to the resource pool, OnCommand Plug-in for Microsoft is automatically installed on the selected management server. You can add more management servers to the resource pool if the servers in the pool are overloaded.

About this task

You should not use the **Resource Pools** task from the list of **Administration** tasks in the System Center Operations Manager (SCOM) console to add or remove management servers from the OCPM resource pool because it might cause the OCPM resource pool to become out of synch.

Steps

1. Click **Monitoring**.
2. In the navigation pane, select **Clustered Data ONTAP** > **Management Servers**.
3. In the **Tasks** pane, click **Clustered Data ONTAP: Add Management Server to OCPM Resource Pool**.

   The Management Server Credentials dialog box opens.
4. Type the required information and click **Next**.

   The Status window opens.
5. Click **Close** after you verify the status of the management server.

Removing a management server from the resource pool

You can remove a management server from the resource pool if the servers are underutilized and OnCommand Plug-in for Microsoft is uninstalled from it.

About this task

You should not use the **Resource Pools** task from the list of **Administration** tasks in the System Center Operations Manager (SCOM) console to add or remove management servers from the OCPM resource pool.

Steps

1. Click **Monitoring**.
2. In the navigation pane, select **Clustered Data ONTAP > Management Servers**.
3. Select a management server from those displayed.
4. In the **Tasks** pane, click **Clustered Data ONTAP: Remove Management Server from OCPM Resource Pool**.
5. Click **Remove** on the confirmation prompt to remove the management server from the resource pool.

Remotely installing OnCommand Plug-in for Microsoft using the Management Servers view

You can use the Management Servers view to install OnCommand Plug-in for Microsoft on a remote management server. You can either install the plug-in using the installation wizard or you can use the Management Servers view to install on remote management servers without running the installation wizard.

Before you begin

You have added the management server to the management group in System Center Operations Manager (SCOM).

About this task

If you have a version earlier than OnCommand Plug-in 4.0 for Microsoft installed, you cannot use this task to install the plug-in on a remote management server. You must first upgrade to plug-in version 4.0.

Steps

1. Click **Monitoring**.
2. In the navigation pane, select **Clustered Data ONTAP > Management Servers**.
3. Select a management server that does not have the plug-in installed on it.
4. In the **Tasks** pane, click **Clustered Data ONTAP: Add Management Server to OCPM Resource Pool**.

   The Management Server Credentials dialog box opens.
5. Type the user name and password of an account with administrator privileges for the remote management server and click **OK**.
6. Click **Task Status** to verify the status of the installation.

Related tasks

Upgrading OnCommand Plug-in for Microsoft on page 23

List of OnCommand Plug-in for Microsoft monitors for cluster environments

You can use the state and performance monitors for cluster environments to track and report alerts and events related to your clustered Data ONTAP infrastructure. The monitors advise you of events that you can view using the event log. Then you can determine a way to mitigate any problems.

A *state monitor* maps a storage object's status, state, or properties to a health state in SCOM. For a volume, a value of “online” would map to a healthy SCOM volume state monitor, a value of “restricted” would map to a warning, and a value of “offline” would map to a critical state.

A *performance monitor* maps a storage object's value to a health state in SCOM. For the volume space utilization, the percentage value is added to the SCOM database and the volume space utilization monitor checks if the value in the database is greater than the acceptable thresholds. The thresholds are set to default values, but you can override them per storage object.

The following monitors are contained in the clustered Data ONTAP management pack:

- Aggregate Available Space (GB) Monitor
- Aggregate Space Utilization (%) Monitor
- Aggregate State Monitor
- Average Processor Utilization (%) Monitor
- Cluster Connection Monitor
- Cooling Element State Monitor
- CPU Resource Utilization (%) Monitor
- Data Protection Lag Time Monitor
- Data Protection State Monitor
- Disk Data Read (Gbps) Monitor
- Disk State Monitor
- Disk Data Written (Gbps) Monitor
- Enclosure State Monitor
- FCP Read Operations/sec Monitor
- FCP Total Operations/sec Monitor
- FCP Write Operations/sec Monitor
- HTTP Operations/sec Monitor
- iSCSI Read Operations/sec Monitor
- iSCSI Write Operations/sec Monitor
- LIF Network Data Received (Gbps) Monitor
- LIF Network Data Sent (Gbps) Monitor
- LIF State Monitor
- LUN Latency Monitor

- LUN State Monitor
- NFS Operations/sec Monitor
- Node Disk Data Read Monitor
- Node Disk Data Written Monitor
- Node Global Status Monitor
- Node HA Status monitor
- Node Latency Monitor
- Node Processor Utilization Monitor
- Port State Monitor
- Power Supply State Monitor
- Qtree Quota Monitor
- SMB Operations/sec Monitor
- SMB State Monitor
- Storage Virtual Machine (SVM) Connection Monitor
- Storage Virtual Machine (SVM) FCP Service Monitor
- Storage Virtual Machine (SVM) HTTP Operations Per Second Monitor
- Storage Virtual Machine (SVM) iSCSI Service Monitor
- Storage Virtual Machine (SVM) Network Data Received (Gbps) Monitor
- Storage Virtual Machine (SVM) Network Data Sent (Gbps) Monitor
- Storage Virtual Machine (SVM) NFS Operations Per Second Monitor
- Storage Virtual Machine (SVM) SMB Service Monitor
- Storage Virtual Machine (SVM) State Monitor
- Storage Virtual Machine (SVM) Total Operations Per Second Monitor
- Volume Available Space (GB) Monitor
- Volume Latency Monitor
- Volume Quota Monitor
- Volume SnapMirror Monitor
- Volume Space Utilization (%) Monitor
- Volume State Monitor
- Volume Used Inodes (%) Monitor

Viewing and overriding clustered Data ONTAP monitors

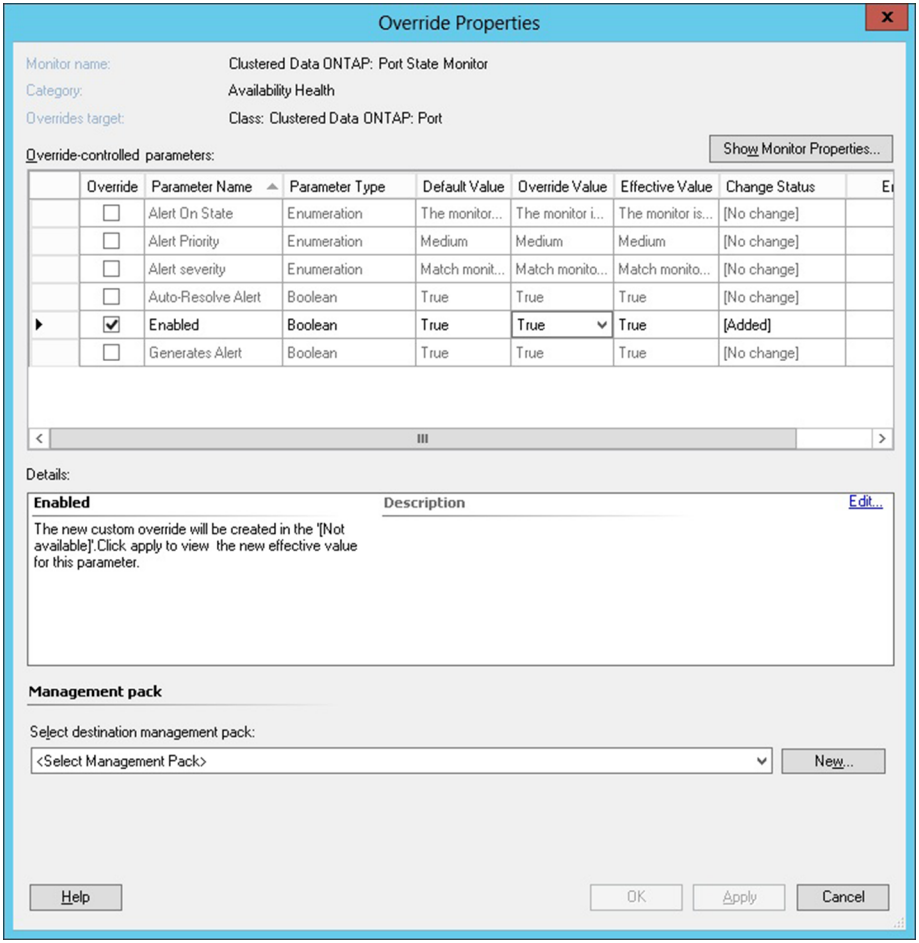
You can modify or override the threshold values of the clustered Data ONTAP monitors to trigger alerts based on specified threshold values.

Steps

1. Click **Authoring**.
2. In the navigation pane, click **Monitors**.
3. In the search field, type **`Clustered Data ONTAP`** and click **Find Now**.

4. Select the monitor that you want to view or override.
5. Right-click the selected monitor and click **Overrides > Override the Monitor > For all objects of class: Clustered Data ONTAP: Object name**.

   You can set the overrides for all objects or specific objects, or to the entire group.
6. In the **Override Properties** dialog box, click the Override check box and specify an override value from the Override Value list.



7. Save the changes to the management pack.

   You can create a new management pack for your overrides or one management pack for all of your overrides. However, you should not save changes to the default management pack.

Related tasks

Overriding clustered Data ONTAP management pack rules on page 30

Related information

Microsoft TechNet web site

Understanding views for cluster environments

You can use different views in OnCommand Plug-in for Microsoft to monitor the state of your clustered Data ONTAP storage objects and to identify usage patterns. You can use the tasks listed in the Actions pane to perform specific tasks related to managing your clustered Data ONTAP storage.

If you right-click a storage object and select **Open > Event View**, no events are generated and displayed in the Events window because all System Center Operations Manager (SCOM) events appear only in the Windows event log.

If you right-click a storage object and select **Open > Performance View**, performance information might not be displayed in the Performance window because some objects do not have performance information.

What performance counters are

You can use the performance counters in OnCommand Plug-in for Microsoft to monitor the state of your storage controllers. After these counters collect information, the information is displayed in a performance graph in the System Center Operations Manager (SCOM) Console.

The plug-in monitors CPU and space utilization, as well as I/O operations, throughput, latency, and protocols, so that you can monitor and identify performance trends over time.

If you save a performance graph as an image in the SCOM Console, a performance counter such as `Operations/sec` displayed in the graph's title does not appear in the saved image. Each axis of the saved graph does not display a counter, which only appears in the title of the graph.

What the Cluster Topology Diagram view is

The Cluster Topology Diagram view enables you to see a pictorial representation of all of the clusters currently being monitored by the plug-in, so that you can more easily isolate problems to a specific storage object.

You can expand this view to display storage hierarchy, so that you can isolate problems to the exact component on which they occur. When you select a cluster, you can view information about it in the Detail View window.

What the Storage Virtual Machine (SVM) Topology Diagram view is

The Storage Virtual Machine (SVM) Topology Diagram view enables you to see a pictorial representation of all of the SVMs currently being monitored by the plug-in, so that you can more easily isolate problems to a specific storage object.

You can expand this view to display storage hierarchy, so that you can isolate problems to the exact component on which they occur. When you select an SVM, you can view information about it in the Detail View window.

Attributes displayed in the Aggregates view

You can view different attributes of an aggregate in cluster environments so that you can monitor the aggregate's health and diagnose any issues.

The following attributes display in the Aggregates view:

State	Displays the state of the aggregate, according to System Center Operations Manager (SCOM). States include Healthy, Warning, and Critical.
Aggregate Name	Displays the name of the aggregate.
Node Name	Displays the name of the storage system containing the aggregate.
Total Space	Displays the total size of the aggregate.
Used Space	Displays the total amount of used space.
Used Space (%)	Displays the amount of used space as a percentage of the total space available.

Attributes displayed in the Clusters view

The Clusters view displays the name of the systems running clustered Data ONTAP and its health.

The following attributes display in the Clusters view:

State	Displays the state of the storage system, according to System Center Operations Manager (SCOM). States include Healthy, Warning, and Critical.
Abstract Storage System Name	Displays the name of the systems running clustered Data ONTAP.

Attributes displayed in the Dashboard view

You can use the Dashboard view to examine the overall state and health of your clustered Data ONTAP storage resources. This enables you to diagnose any potential issues regarding health and utilization.

The following attributes display in the Dashboard view:

Health Summary	Displays the number and state of all clusters, nodes, and virtual machines.
Cluster Storage Efficiency	Displays how efficiently the storage is currently being used by all clusters that are monitored by the plug-in.
Cluster Alerts	Displays the severity of the alerts for all clusters that are monitored by the plug-in.

Attributes displayed in the Disks view

You can view different attributes of a disk in cluster environments so that you can monitor the disk's health and diagnose any issues.

The following attributes display in the Disks view:

State	Displays the state of the disk, according to System Center Operations Manager (SCOM). States include Healthy, Warning, and Critical.
Disk Name	Displays the name of the disk.
Node Name	Displays the name of the storage system that contains the disk.
Aggregate Name	Displays the name of the aggregate containing the disk.
Size	Displays the size of the disk.
Disk State	Displays the state of the disk.
Type	Displays the type of disk. Types include the following: • ATA • BSAS • EATA • FCAL • LUN • MSATA • SAS • SATA • SCSI • SSD • XATA • XSAS • FSAS • Unknown
Firmware Version	Displays the firmware version.
Rotational Speed	Displays the rotational speed of the disk.
Pool	Displays the pool the disk belongs to.
Shelf	Displays the shelf that contains the disk.
Bay	Displays the drive bay number within the shelf that contains the disk.
Serial Number	Displays the serial number of the disk.

Attributes displayed in the LIFs view

You can view different attributes of a logical interface in cluster environments so that you can monitor the interface's health and diagnose any issues.

The following attributes display in the LIFs view:

State	Displays the state of the logical interface, according to System Center Operations Manager (SCOM). States include Healthy, Warning, and Critical.
Interface Name	Displays the name of the logical interface.
IP Address	Displays the IP address of the logical interface.
Owner	Displays the owner of the storage system.
Owner Type	Displays the type of storage system.
Current Node	Displays information about logical interfaces that are currently located on the node that you specify.
Current Port	Displays information about logical interfaces that are currently located on the port or interface group that you specify.
Is Home	Displays `True` or `False`, depending on whether or not logical interfaces are currently located on their home node and port.
Role	Displays information about logical interfaces that are associated with network ports that have the role you specify.

Attributes displayed in the LUNs view

You can view different attributes of a LUN in cluster environments so that you can monitor the LUN's health and diagnose any issues.

The following attributes display in the LUNs view:

State	Displays the state of the LUN, according to System Center Operations Manager (SCOM). States include Healthy, Warning, and Critical.
LUN Path	Displays the location or path for the specified LUN.
Multiprotocol Type	Displays the type of operating system environment for the LUN, such as Windows or Linux.
Volume	Displays the name of the volume containing the LUN.
Storage Virtual Machine (SVM)	Displays the name of the SVM containing the volume.
Total Size	Displays the total size of the LUN.

Is Space Reservation Enabled	Displays `True` or `False`, depending on whether or not the LUN has space reservation enabled.
Total Size (Bytes)	Displays the total size of the LUN in bytes.

Attributes displayed in the Management Servers view

You can view different attributes of a management server in cluster environments and verify whether the server is contained in a resource pool.

The following attributes display in the Management Servers view:

State	Displays the state of the management server, according to System Center Operations Manager (SCOM). States include Healthy, Warning, and Critical.
Display Name	Displays the name of the management server.
Is In Clustered Data ONTAP Management Server Resource Pool	Displays `In Resource Pool` or `Not in Resource Pool`, depending on whether or not the management server is in the resource pool.
Is Configured For Clustered Data ONTAP Management Server Resource Pool	Displays `Configured` or `Not Configured`, depending on whether the management server is configured for the resource pool.

Attributes displayed in the Nodes view

The Nodes view displays node attributes such as the state of the node and the name of the systems running clustered Data ONTAP.

The following attributes display in the Nodes view:

State	Displays the state of the node, according to System Center Operations Manager (SCOM). States include Healthy, Warning, and Critical.
Abstract Storage System Name	Displays the name of the systems running clustered Data ONTAP.
Is Node Eligible	Displays `True` or `False`, depending on whether or not the node is eligible for a cluster.
Is Node Epsilon	Displays `True` or `False`, depending on whether or not the node has been designated as epsilon. In a cluster, only one node can be designated as epsilon at any given time.
Path	Displays the full path for the Storage Virtual Machine (SVM). The path remains empty if the storage object is not hosted.

Attributes displayed in the Ports view

The Ports view displays node attributes such as the name of the node and its health.

The following attributes display in the Ports view:

State	Displays the state of the port, according to System Center Operations Manager (SCOM). States include Healthy, Warning, and Critical.
Port Name	Displays the name of the port.
Node Name	Displays the name of the storage system.

Attributes displayed in the Qtrees view

You can view different attributes of a qtree in cluster environments so that you can monitor the qtree's health and diagnose any issues.

Information about qtrees from offline volumes is not displayed because of a clustered Data ONTAP limitation. The following attributes display in the Qtrees view:

State	Displays the state of the qtree, according to System Center Operations Manager (SCOM). States include Healthy, Warning, and Critical.
Name	Displays the name of the qtree.
Qtree ID	Displays the ID of the qtree.
Qtree	Displays the name of the qtree. This column is blank if the qtree is the volume.
Volume	Displays the name of the volume containing the qtree.
Storage Virtual Machine (SVM) Name	Displays the name of the SVM containing the qtree.
Security Style	Displays the security style of the qtree. Security styles include UNIX, NTFS, or mixed.
Status	Displays the status of the qtree. Status includes SnapVaulted, SnapMirrored, normal, or readonly.

Attributes displayed in the Storage Virtual Machine (SVM) Dashboard view

You can use the Storage Virtual Machine Dashboard view to monitor the overall state and health of your clustered Data ONTAP storage resources.

The following attributes display in the Storage Virtual Machine Dashboard view:

Storage Virtual Machines (SVMs) with Highest Used Space	Displays information about the SVMs with the highest amount of used space as a percentage of the total space available.
Storage Virtual Machines (SVMs) Used Space Recent Trend	Displays information about the recent trends in space utilization for the monitored SVMs.
New Storage Virtual Machine (SVM) Alerts	Displays all alerts for newly added SVMs.

Attributes displayed in the Storage Virtual Machines (SVMs) view

The Storage Virtual Machines view displays storage system attributes.

The following attributes display in the Storage Virtual Machines view:

State	Displays the state of the SVM, according to System Center Operations Manager (SCOM). States include Healthy, Warning, and Critical.
Abstract Storage System Name	Displays the name of the systems running clustered Data ONTAP.
Root Volume	Displays the name of the root volume of the SVM.
Allowed Protocols	Displays a list of the protocols allowed on the SVM. Protocols include NFS, CIFS, FC/FCoE, iSCSI, and NDMP.
Deduplication Coverage	Displays the number of volumes with deduplication enabled
Deduplication and Compression Efficiency (%)	Displays in percentages how efficiently the deduplication feature is able to reduce the amount of physical storage space that is required

Attributes displayed in the Volumes view

You can view different attributes of a volume in cluster environments so that you can monitor the volume's health and diagnose any issues.

The following attributes display in the Volumes view:

State	Displays the state of the volume, according to System Center Operations Manager (SCOM). States include Healthy, Warning, and Critical.
Volume Name	Displays the name of the volume.
Storage Virtual Machine (SVM) Name	Displays the name of the SVM containing the volume.
Aggregate Name	Displays the name of the aggregate.
Total Space	Displays the total size of the volume.

Used Space	Displays the total amount of used space.
Used Space (%)	Displays the amount of used space as a percentage of the total space available.
Deduplication Coverage	Displays `Yes` or `No`, depending on whether the deduplication features is enabled on the virtual machine.
Deduplication and Compression Efficiency (%)	Displays in percentages how efficiently the deduplication feature is able to reduce the amount of physical storage space that is required

Attributes displayed in the Data Protection Policies view

You can view all data protection policies for the virtual machines that are monitored by the plug-in.

The following attributes display in the Data Protection Policies view:

Storage Virtual Machine (SVM) Name	Displays the name of the SVM.
Policy Name	Displays the name of the data protection policy for this SVM.
Owner	Displays the owner of the storage system.
Total Rules	Displays the total number of data protection rules for the SVM.

Attributes displayed in the Data Protection Status view

You can view the status of all SnapMirror relationships that are monitored by the plug-in.

In the Detail View for the Data Protection Status view, some fields might not contain data and appear as `-NA-`. The `Source Cluster` and `Destination Cluster` fields contain data only when the relationship control plane is v1. The following attributes display in the Data Protection Status view:

State	Displays the state of the virtual machine, according to System Center Operations Manager (SCOM). States include Healthy, Warning, and Critical.
Destination Storage Virtual Machine (SVM)	Displays the destination SVM.
Source	Displays the source location of the SnapMirror pair.
Destination	Displays the destination location of the SnapMirror pair.
SnapMirror State	Displays the state of the SnapMirror pair. The possible SnapMirror states include the following: • Initialized • SnapMirrored

- Broken-Off
- Quiesced
- Source
- Unknown

Lag Time	Displays the amount of time since the most recent SnapMirror transfer.

Attributes displayed in the Peering Clusters view

You can view the cluster peer relationship and the availability of the cluster peer connection for the cluster peers that are monitored by the plug-in.

The following attributes display in the Peering Clusters view:

Peer Cluster	Displays the name of the cluster peer.
Availability	Displays the status of the cluster peer connection. The possible connection states are `unavailable` and `available`.

Attributes displayed in the Peering Storage Virtual Machines (SVMs) view

You can view the cluster peer relationships for all SVMs that are monitored by the plug-in.

The following attributes display in the Peering Storage Virtual Machines view:

Storage Virtual Machine (SVM) Name	Displays the name of the SVM.
Peer Storage Virtual Machine (SVM) Name	Displays the name of the peer SVM.
Peer Cluster	Displays the name of the cluster peer.
Peer State	Displays the state of the cluster peer.

Attributes displayed in the SMB Permissions view

You can monitor SMB activity by displaying information about SMB permissions.

The following attributes display in the SMB Permissions view:

Storage Virtual Machine (SVM) Name	Displays the name of the SVM.
Share Name	Displays the name of the SMB share.
Permission	Displays permissions for the SMB share.
User or Group	Displays the user or group authorized to access the data.
Windows Security Identifier	Displays the unique identifier that provides access to the SMB share.

Attributes displayed in the SMB Server view

You can monitor SMB activity by displaying information about the SMB server.

The following attributes display in the SMB Server view:

State	Displays the state of the SMB connections, according to System Center Operations Manager (SCOM). States include Healthy, Warning, and Critical.
Storage Virtual Machine (SVM) Name	Displays the name of the SVM.
SMB Server	Displays the name of the SMB server.
Authentication Style	Displays the authentication method used to authenticate domain users.
Domain Name	Displays the name of the Windows domain.
Domain Workgroup	Displays the name of the domain workgroup.

Attributes displayed in the SMB Shares view

You can monitor SMB activity by displaying information about SMB shares.

Information about SMB shares from offline and restricted volumes is not displayed because of a clustered Data ONTAP limitation. The following attributes display in the SMB Shares view:

Storage Virtual Machine (SVM) Name	Displays the name of the SVM.
Volume Name	Displays the name of the volume.
Share Name	Displays the name of the SMB share.
Share Path	Displays the directory path to the SMB share.
Share Properties	Displays the properties of the SMB share.
Share Symlink Access	Displays information about sharing access to symlinks.
SMB Server	Displays the name of the SMB server.

Attributes displayed in the Hyper-V Hosts view

You can use the Hyper-V Hosts view to view all Hyper-V hosts and the number of virtual machines being hosted by each.

The following attributes display in the Hyper-V Hosts view:

FQDN	Displays the fully qualified domain name (FQDN) for the Hyper-V host.
Number of VMs	Displays the number of virtual machines hosted by the Hyper-V host.

Attributes displayed in the Hyper-V Virtual Hard Disks on LUNs view

The Hyper-V Virtual Hard Disks on LUNs view shows the location of all Hyper-V virtual hard disks on a LUN so that you can monitor the health of the virtual hard disks and diagnose any issues.

The following attributes display in the Hyper-V Virtual Hard Disks on LUNs view:

State	Displays the state of the LUN, according to System Center Operations Manager (SCOM). States include Healthy, Warning, and Critical.
VM Name	Displays the name of the virtual machine.
VHD Path	Displays the VHD path.
LUN Path	Displays the LUN path.

Attributes displayed in the Hyper-V Virtual Hard Disks on SMB shares view

You can monitor Hyper-V over SMB activity by displaying information about SMB statistics.

The following attributes display in the Hyper-V Virtual Hard Disks on SMB shares view:

State	Displays the state of the SMB connections, according to System Center Operations Manager (SCOM). States include Healthy, Warning, and Critical.
VM Name	Displays the name of the virtual machine.
VHD Path	Displays the VHD path.
Share Name	Displays the name of the SMB share.
SMB Server	Displays the name of the SMB server.

Attributes displayed in the Hyper-V VMs view

You can view different attributes of a monitored Hyper-V virtual machine so that you can monitor the VM's health and diagnose any issues.

The following attributes display in the Hyper-V VMs view:

VM Name	Displays the name of the virtual machine.
VM FQDN	Displays the fully qualified domain name (FQDN) of the virtual machine.
Host FQDN	Displays the fully qualified domain name (FQDN) of the Hyper-V host that is hosting the virtual machine.

What an alert is

OnCommand Plug-in for Microsoft includes numerous rules that monitor the health of various discovered clustered Data ONTAP storage objects. If the conditions of a rule are broken,

OnCommand Plug-in for Microsoft generates an alert and sends it to System Center Operations Manager (SCOM).

You can view active alerts from any of the following SCOM interface locations:

Active Alerts view

You can view all alerts in the Active Alerts view. You can view information about an individual alert in the Alert Details view and you can view the cause of the problem in Health Explorer in SCOM.

Cluster Alerts view

You can view alerts specific to clustered Data ONTAP storage in the Cluster Alerts view of the Dashboard.

Storage Virtual Machine (SVM) Dashboard

You can view alerts specific to SVMs in the New Storage Virtual Machine Alerts view of the Storage Virtual Machine Dashboard.

For more information about formatting the email notification for an alert, refer to the Microsoft TechNet web site.

Related information

Microsoft TechNet web site

Types of clustered Data ONTAP reports available through the plug-in

Using OnCommand Plug-in for Microsoft, you can view reports about different aspects of your clustered Data ONTAP storage over a specific period of time. These reports can help you to make decisions about the health of your storage system.

Reports from the data warehouse might take some time to populate.

The default reporting time period is from the first day of the month to the current day. You can view the following reports from the Reporting pane:

Aggregate Committed Space (%) report

The Aggregate Committed Space (%) report displays up to 50 aggregates with the highest (default) or lowest committed space (%) on all monitored aggregates over a specific period of time. The default time period is from the first day of the month to the current day, and the default number of aggregates is five.

Storage Virtual Machine (SVM) Average Latency (ms) report

The Storage Virtual Machine (SVM) Average Latency (ms) report displays up to 50 SVMs with the highest (default) or lowest average latency (ms) on all monitored SVMs over a specific period of

time. The default time period is from the first day of the month to the current day, and the default number of SVMs is five.

Storage Virtual Machine (SVM) Deduplication and Compression (%) report

The Storage Virtual Machine (SVM) Deduplication and Compression (%) report displays up to 50 SVMs with the highest (default) or lowest storage efficiency (%) on all monitored SVMs over a specific period of time. The default time period is from the first day of the month to the current day, and the default number of SVMs is five.

Volume Overwrite Reserve Used Rate (KB/day) report

The Volume Overwrite Reserve Used Rate (KB/day) report displays up to 50 volumes with the highest or lowest overwrite reserve used space (KB/day) on all monitored volumes over a specified period of time. The report defaults to the highest overwrite reserve used space (KB/day). The default time period is from the first day of the month to the current day, and the default number of volumes is five.

Volume Used Space (%) report

The Volume Used Space (%) report displays up to 50 volumes with the highest (default) or lowest used space (%) on all monitored volumes over a specific period of time. The default time period is from the first day of the month to the current day, and the default number of volumes is five.

How the plug-in works with the management pack for Data ONTAP (7-Mode environments)

There are several tasks you can perform with the management pack for Data ONTAP operating in 7-Mode. These tasks include adding controllers, discovering and configuring the controllers, and defining the management pack rules.

Related tasks

Adding Data ONTAP storage controllers (7-Mode environments) on page 53
Adding Data ONTAP storage controller credentials (7-Mode environments) on page 54
Running discovery on page 59
Running virtualization discovery on page 60
Running PRO discovery on page 60
Overriding Data ONTAP management pack rules on page 55

Management pack features for Data ONTAP (7-Mode environments)

When you install OnCommand Plug-in for Microsoft, the installation wizard installs the components that you select. Each management pack and its associated features are installed on the specified server.

You can install the following management packs, to use its associated features:

Management pack	Feature	Subfeature
System Center Operations Manager (SCOM) Management Packs	Storage Monitoring	Reporting
	Hyper-V storage Monitoring and Management	Reporting

Monitoring your Data ONTAP storage

The System Center Operations Manager (SCOM) monitors the health and performance data that it collects from the discovered storage systems running Data ONTAP. SCOM generates events when the status is abnormal or when a predefined threshold has been reached. If configured to do so, SCOM sends a notification when an event triggers an alert.

Adding Data ONTAP storage controllers (7-Mode environments)

Before you can monitor the performance and health of your storage, you must first add a storage controller that must be discovered in System Center Operations Manager (SCOM).

Steps

1. Click **Monitoring**.
2. In the navigation pane, select **Data ONTAP > Storage Systems > Management Server**.
3. In the **Tasks** pane, click **Data ONTAP: Add Controller**.

   The Add Controller dialog box opens.
4. Type the name or IP address and the SNMP string of the controller that you want to add.
5. Click **Add**.

After you finish

You can use the Credentials Manager dialog box to set the credentials for the controller.

Adding Data ONTAP storage controller credentials (7-Mode environments)

After you add Data ONTAP (7-Mode) controllers to the plug-in, you must ensure that the access credentials to those controllers are added to secure your data.

About this task

The user interface for managing controller credentials is running on the System Center Operations Manager (SCOM) account and the SCOM account might be different from the login user account.

The default protocol that the plug-in uses to communicate with the controller is HTTPS to ensure a secure connection. For vFiler units, you can use only HTTP.

Steps

1. Click **Monitoring**.
2. In the navigation pane, select **Data ONTAP > Storage Systems > Management Server**.
3. In the **Tasks** pane, click **Data ONTAP: Manage Controller Credentials**.

   The Credentials Manager dialog box opens.
4. Select a storage system for which you want to add the user credentials.
5. To add the user credentials for the selected storage system, type the user name or password for the system and click **Apply**.

Removing Data ONTAP storage controllers (7-Mode environments)

You can remove storage controllers and their objects such as aggregates, volumes, and LUNs from OnCommand Plug-in for Microsoft when you no longer need to monitor their health and performance.

About this task

If you remove a storage controller or other object from the plug-in, you also remove it from the list of network devices. When you run the discovery process, the storage controller is no longer discovered.

Steps

1. Click **Monitoring**.
2. In the navigation pane, select **Data ONTAP > Storage Systems > Controllers**.
3. Select the storage system that you want to remove.
4. In the **Tasks** pane, click **Data ONTAP: Remove Controller**.
5. Click **Remove** when prompted to confirm removal of the storage system.

How to deploy the plug-in for use in multiple server environments

In System Center Operations Manager (SCOM) 2012, a multiple management server environment consists of management servers that have peer-to-peer relationships. Each management server can communicate directly with the SDK service and database of the other servers, on the condition that all servers in the environment are running OnCommand Plug-in 3.2 for Microsoft or later.

Even though you can install the plug-in on as many SCOM management servers as you like, only one management server can be actively collecting data at any time in multiserver environments. Because discovery is not enabled by default, you should only enable it on one SCOM server at a time.

You can override and enable the Data ONTAP discovery rule for each SCOM server.

Related tasks

Overriding Data ONTAP management pack rules on page 55

Overriding Data ONTAP management pack rules

After you verify that the Data ONTAP management pack rules have been successfully imported into System Center Operations Manager (SCOM), you can override any rules to enable or disable, alter the frequency, or change the start time for a rule.

Steps

1. Click **Authoring**.
2. In the navigation pane, select **Management Pack Objects** > **Rules**.
3. In the search field, type **`Data ONTAP`** and click **Find Now**.
4. Right-click the selected rule and click **Overrides** > **Override the Rule** > **For all objects of class: Rule**.

   You can set the overrides for all objects or specific objects, or to the entire group.
5. Select the overrides that you want to set depending on whether you want to enable or disable the rule, alter the frequency, or change the start time for the rule.
6. Save the changes to the management pack.

   You can create a new management pack for your overrides or one management pack for all of your overrides. However, you should not save changes to the default management pack.

Related tasks

Viewing and overriding Data ONTAP monitors on page 73

Related information

Microsoft TechNet web site

Lists of Data ONTAP management pack rules

OnCommand Plug-in for Microsoft includes rules that enable you to more effectively manage your storage resources: Data ONTAP: Management Server rules, Data ONTAP: Management Server Reporting rules, Data ONTAP PRO: Hyper-V Host rules, and Data ONTAP Virtualization: Management Server rules.

Data ONTAP: Management Server rules

- Data ONTAP: Aggregate Space Utilization Rule
- Data ONTAP: Aggregate State Rule
- Data ONTAP: Collect Events Rule
- Data ONTAP: Collect SnapMirror Lag Time Counter Rule
- Data ONTAP: Controller Connection Check Rule
- Data ONTAP: Controller Global Status Rule
- Data ONTAP: Controller HA Status Rule
- Data ONTAP: Controller Storage Utilization Rate of Change Rule
- Data ONTAP: Discover Recent Network Devices Rule
- Data ONTAP: Discovery Rule
- Data ONTAP: Disk State Rule
- Data ONTAP: Enclosure State Rule
- Data ONTAP: LUN Latency Rule
- Data ONTAP: LUN State Rule
- Data ONTAP: Quota Limits Rule
- Data ONTAP: Refresh Dashboard Rule
- Data ONTAP: SnapMirror Status Rule
- Data ONTAP: Storage Statistics Rule
- Data ONTAP: Trigger Controller Discovery Rule
- Data ONTAP: Trigger vFiler Discovery Rule
- Data ONTAP: vFiler Status Rule
- Data ONTAP: Volume Space Utilization Rule
- Data ONTAP: Volume State Rule
- Data ONTAP: Volume Used Inodes Rule

Data ONTAP: Management Server Reporting rules

- Data ONTAP Reporting: Aggregate Committed Space Percentage Rule
- Data ONTAP Reporting: Average Total Latency on All Controllers Rule
- Data ONTAP Reporting: Controller Committed Space Percentage Rule
- Data ONTAP Reporting: Controller Rate of Change on Storage Utilization Rule
- Data ONTAP Reporting: Controller Storage Efficiency Rule
- Data ONTAP Reporting: Group Average System Latency Rule

- Data ONTAP Reporting: Group Committed Space Percentage Rule
- Data ONTAP Reporting: LUN Average Latency Rule
- Data ONTAP Reporting: SnapMirror Average Lag Time Per Controller Rule
- Data ONTAP Reporting: SnapMirror Longest Lag Time Rule
- Data ONTAP Reporting: Volume Average Latency Rule
- Data ONTAP Reporting: Volume Storage Efficiency Rule
- Data ONTAP Reporting: Volume Storage Utilization Rule

Data ONTAP PRO: Hyper-V Host rules

- Data ONTAP PRO: Collect Hyper-V Host Events Rule
- Data ONTAP PRO: Hyper-V Replication Status PRO Tip Recovery Rule
- Data ONTAP PRO: Hyper-V Virtual Machine Thin Provisioning Volume Auto Grow PRO Tip Recovery Rule
- Data ONTAP PRO: LUN Online PRO Tip Recovery Rule
- Data ONTAP PRO: LUN Space Reservation PRO Tip Recovery Rule
- Data ONTAP PRO: Volume Deduplication Status PRO Tip Recovery Rule
- Data ONTAP PRO: Volume Online PRO Tip Recovery Rule
- Data ONTAP PRO: Volume Snapshot Autodelete PRO Tip Recovery Rule
- Data ONTAP PRO: Volume Space Utilization PRO Tip Recovery Rule

Data ONTAP Virtualization: Management Server rules

- Data ONTAP Virtualization: Collect Events Rule
- Data ONTAP Virtualization: Hyper-V Virtual Machine Replication Status Rule
- Data ONTAP Virtualization: Hyper-V Virtual Machine Space Utilization Rate Rule
- Data ONTAP Virtualization: Hyper-V Virtual Machine Thin Provisioning Volume Autogrow Rule
- Data ONTAP Virtualization: Hyper-V Virtual Machine Thin Provisioning Volume Snapshot auto delete Rule
- Data ONTAP Virtualization: LUN Alignment Rule
- Data ONTAP Virtualization: LUN Igroup Type Configuration Rule
- Data ONTAP Virtualization: LUN Online Rule
- Data ONTAP Virtualization: LUN Space Reservation Rule
- Data ONTAP Virtualization: LUN Space Utilization Rule
- Data ONTAP Virtualization: Usage Records Update Controllers Registry Rule
- Data ONTAP Virtualization: Usage Records Update Database Rule
- Data ONTAP Virtualization: VHD Alignment Rule
- Data ONTAP Virtualization: VHD Discovery Rule
- Data ONTAP Virtualization: Volume Deduplication Status Rule
- Data ONTAP Virtualization: Volume Online Rule
- Data ONTAP Virtualization: Volume Space Utilization Rule

Related tasks

Overriding Data ONTAP management pack rules on page 55

Configuring SNMP traps

SNMP traps can automatically send you an unsolicited SNMP message or trap to inform you of significant events. If you want to use the plug-in to receive SNMP traps, you must first configure SNMP.

Before you begin

- If you use Windows 2008, you must have installed SNMP Service and SNMP WMI Provider.
- If you use Windows 2008 SP1, you must have installed Microsoft hotfixes 958936 and 967718.
- If you use Windows Server 2008 R1, you must have installed Microsoft hotfixes 958936 and 967718.

About this task

For detailed information about how to complete the following tasks, see the *Data ONTAP System Administration Guide* for your Data ONTAP version.

Steps

1. Navigate to **Server Manager** > **Configuration** > **Services** > **SNMP Service** > **Properties** > **Security** tab.
2. Ensure that **Accepted community names** contains the names of the SNMP communities that you are configuring the storage systems to use, and ensure that they have read and create privileges.
3. Select **Accept SNMP packets from any host**.
4. On each managed storage system, enable SNMP.
5. If necessary, set up the community.
6. Configure the trap destination as your System Center Operations Manager server on which you installed the plug-in.

   The SNMP monitors are targeted at the Data ONTAP Controller class.
7. Enable the non-emergency trap monitors using monitor overrides.

What storage discovery is

Storage discovery is the process by which OnCommand Plug-in for Microsoft utilizes rules that discover controllers, their associated objects, and their configurations so that you can monitor the state of each object and troubleshoot when necessary.

If your storage system is running a Data ONTAP version earlier than 7.3, you must use SNMP version 1 for discovery rule support. If your storage system is running Data ONTAP 7.3 or later, SNMP versions 1, 2C, and 3 support discovery rules.

Some monitored storage object properties such as the state, total space, or used space might be out of sync until the next time storage discovery is run with the default time set at four hours.

Related concepts

Controller discovery using Data ONTAP: Discovery Rule on page 59

Types of Data ONTAP discovery (7-Mode environments)

There are three types of discovery that you can use to configure your plug-in; Data ONTAP storage discovery, Data ONTAP virtualization discovery, and Data ONTAP PRO discovery.

You can use Data ONTAP storage discovery and Data ONTAP virtualization discovery to discover storage controllers and their associated objects on System Center Virtual Machine Manager (SCVMM). Data ONTAP virtualization discovery discovers storage on all Hyper-V hosts that SCVMM manages.

You can also run Data ONTAP PRO discovery to discover Hyper-V hosts with PRO integration in SCVMM. PRO discovery enables PRO tips to be triggered on your Hyper-V hosts.

Related tasks

Running discovery on page 59
Running PRO discovery on page 60
Running virtualization discovery on page 60

Controller discovery using Data ONTAP: Discovery Rule

Although the Data ONTAP: Discovery Rule is disabled by default, it is important that you enable it. Discovery using the Data ONTAP: Discovery Rule is the only way to enable scheduled discovery of your controllers, their associated objects, and their configurations, so that you can monitor and troubleshoot object status when necessary.

After you import the Data ONTAP management packs, you can enable this rule on a Microsoft System Center Operations Manager (SCOM) management server by overriding the default setting and selecting the management server that manages the Data ONTAP objects that you want to discover.

Running discovery

You must run discovery to discover all of your storage. Discovery is required for the plug-in to recognize your controllers and begin the management of your storage.

Steps

1. Click **Monitoring**.
2. In the navigation pane, select **Data ONTAP > Storage Systems > Management Server**.
3. In the **Tasks** pane, click **Data ONTAP: Run Discovery Task**.

The Data ONTAP: Run Discovery Task dialog box opens.

4. Select the storage targets that you want to run discovery on and click **Run**.

Running PRO discovery

You can run Data ONTAP PRO discovery to discover Hyper-V hosts with PRO integration in System Center Virtual Machine Manager (SCVMM). PRO discovery enables PRO tips to be triggered on your Hyper-V hosts.

Before you begin

The OnCommand management pack must be installed and you must have typed valid credentials for the newly added storage systems.

You must have added all of your Hyper-V hosts to SCVMM before you run discovery, because Data ONTAP PRO discovery discovers only those Hyper-V hosts that are on SCVMM.

Steps

1. Click **Monitoring**.
2. In the navigation pane, select **Data ONTAP > Storage Systems > Management Server**.
3. In the **Tasks** pane, click **Data ONTAP: Run PRO Discovery Task**.

   The Data ONTAP: Run PRO Discovery Task dialog box opens.
4. Select the storage targets that you want to run discovery on and click **Run**.

Running virtualization discovery

You can run Data ONTAP virtualization discovery to discover storage on all Hyper-V hosts in System Center Virtual Machine Manager (SCVMM).

Before you begin

You must have added all of your Hyper-V hosts to SCVMM before you run discovery, because Data ONTAP virtualization discovery discovers only those Hyper-V hosts that are monitored by SCVMM.

You must have the OnCommand Discovery Agent installed on a Hyper-V host if:

- If the Hyper-V host has LUNS with a Data ONTAP version earlier than 7.3.1
- If the Hyper-V host has Fibre Channel mapped LUNs

About this task

The Data ONTAP Virtualization: Discovery Rule targets the management server and has a default interval of four hours and a default timeout of one hour. It automatically discovers storage on Hyper-V hosts, Hyper-V LUNs, Hyper-V virtual machines, and Hyper-V virtual hard disks.

Steps

1. Click **Monitoring**.
2. In the navigation pane, select **Data ONTAP > Storage Systems > Management Server**.
3. In the **Tasks** pane, click **Data ONTAP: Run Virtualization Discovery Task**.
   The Data ONTAP: Run Virtualization Discovery Task dialog box opens.
4. Select the storage targets that you want to run discovery on and click **Run**.

Performance monitoring

OnCommand Plug-in for Microsoft is designed to scale to large numbers of controllers. As the number of storage controllers increases, you can manage the monitoring load by changing the run frequency of the various discovery and monitoring rules.

If you run discovery and monitoring rules less frequently, you place less burden on the Microsoft Operations Manager (SCOM) infrastructure, but you receive less timely alert information. You should run discovery rules less frequently than monitoring rules to avoid situations where rules overlap and conflict with each other.

Types of performance metrics

OnCommand Plug-in for Microsoft monitors CPU and space utilization, as well as I/O operations, throughput, latency, and protocols, so that you can monitor and identify usage patterns.

CPU utilization

You can use the **CPU utilization** graph to determine how much processing space you have used, how you have used it, and how much space you have left on your storage controllers.

The CPU utilization graphs display the following information:

Average processor utilization	Displays the average processor utilization percentage at specified time intervals and generates a threshold alert if two successive measurements are above the threshold specified.
CPU resource utilization	Displays the system CPU resource utilization percentage at specified time intervals.
Total processor utilization	Displays the total processor utilization percentage at specified time intervals.

Additional details are displayed in the Legend.

I/O operations

You can use the I/O operations graph to monitor the communication between your storage controllers and servers.

The I/O operations graph displays the following information:

Reads	Displays the read operations per second at specified time intervals.
Writes	Displays the write operations per second at specified time intervals.
Total reads/writes	Displays the total operations per second at specified time intervals.

Additional details are displayed in the Legend.

I/O throughput

You can use the **I/O throughput** graph to monitor the productivity of your storage controllers.

The I/O throughput graphs display the following information:

Disk data read	Displays the disk data read, in kilobytes per second, at specified time intervals.
Disk data written	Displays the disk data written, in kilobytes per second, at specified time intervals.
Network data received	Displays the network data received, in kilobytes per second, at specified time intervals.
Network data sent	Displays the network data sent, in kilobytes per second, at specified time intervals.

Additional details are displayed in the Legend.

Latency

You can use the **Latency** graph to monitor for any unusual delays among your storage controllers.

The latency graph displays the following information:

LUN latency	Displays the LUN read, write, and average latency at specified time intervals.
Read latency	Displays the average read latency, in milliseconds, at specified time intervals.
Write latency	Displays the average write latency, in milliseconds, at specified time intervals.
Total latency	Displays the average total latency, in milliseconds, at specified time intervals.
Volume latency	Displays the volume read, write, and average latency at specified time intervals.

Additional details are displayed in the Legend.

What the Diagram view is

The Diagram view enables you to see a pictorial representation of all of the storage and hardware currently being monitored by the plug-in, so that you can more easily isolate problems to a specific storage object.

You can expand this view to display storage hierarchy, so that you can isolate problems to the exact component on which they occur. When you select a storage object, you can view information about it in the Detail View window.

If you right-click a storage object and select **Open > Event View**, no events are generated and displayed in the Events window because all System Center Operations Manager (SCOM) events appear only in the Windows event log.

What the Controllers View is

You can view a list and overall health of the storage controllers that OnCommand Plug-in for Microsoft is currently monitoring. When you select a controller, you can also view information about it in the Controllers View window. If a controller is in either a warning or critical state, you can launch the **Health Explorer** in System Center Operations Manager (SCOM) to find the root of the problem.

Performance monitoring views

You can use different views in OnCommand Plug-in for Microsoft to monitor the state of your storage resources and to identify usage patterns. You can use the tasks listed in the Actions pane to perform specific tasks related to managing your storage.

Attributes displayed in the Aggregates view

You can view different attributes of an aggregate so that you can monitor the aggregate's health and diagnose any issues.

The following attributes display in the Aggregates view:

State	Displays the state of the aggregate, according to System Center Operations Manager (SCOM). States include Healthy, Warning, and Critical.
Aggregate	Displays the aggregate name.
Controller	Displays the fully qualified domain name (FQDN) of the controller containing the aggregate.
Total size	Displays the total size of the aggregate.
RAID type	Displays the RAID type of the aggregate.
Disk count	Displays the number of disks that belong to the aggregate.

Committed (%)	Displays information about the percentage of space committed to the aggregate.
Current Savings (%)	Displays information about the current space savings for the controller.

Controller attributes displayed in the Controllers view

You can view the different attributes of your storage controllers to monitor controller health and to diagnose any controller issues. OnCommand Plug-in for Microsoft displays only those storage controllers that are running supported versions of Data ONTAP.

The following attributes display in the Controllers view:

State	Displays the state of the storage controller, according to System Center Operations Manager (SCOM). States include Healthy, Warning, and Critical.
Fully Qualified Domain Name (FQDN)	Displays the fully qualified domain name of the storage controller.
IP Address	Displays the IP address of the storage system.
Model	Displays the model type of the storage system.
Version	Displays the version of Data ONTAP that the storage system currently runs.
Clustered	Displays whether the controller is in a high-availability configuration.
Current Savings (%)	Displays information about the current space savings for the controller.
Storage Efficiency (%)	Displays information about how efficiently the controller is currently being used.

Attributes displayed in the Dashboard view

You can use the Dashboard view to provide you with an overall picture of the state and health of your storage resources. This enables you to diagnose any potential issues regarding health and utilization.

The following attributes display in the Dashboard view:

Health Summary	Displays the number and state of all storage controllers and SnapMirror relationships.
Alerts	Displays the icon, name, and created date of the alerts.
Controllers	Displays information about all storage controllers that are currently monitored by the plug-in.

vFilers	Displays information about all vFiler units that are currently monitored by the plug-in.
Storage Efficiency	Displays how efficiently the storage is currently being used by all storage controllers that are monitored by the plug-in.
Storage Utilization	Displays the percentage of storage that is currently being used, broken down by aggregates, disks, spare disks, LUNs, qtrees, volumes, and deduplication volumes.

Attributes displayed in the LUNs view

You can view different attributes of a LUN so that you can monitor the LUN's health and diagnose any issues.

The following attributes display in the LUNs view:

State	Displays the state of the LUN, according to System Center Operations Manager (SCOM). States include Healthy, Warning, and Critical.
LUN	Displays the full path of the LUN.
Controller/vFiler	Displays the fully qualified domain name (FQDN) of the controller or vFiler unit containing the LUN.
Type	Displays the type of operating system environment for the LUN, such as Windows or Linux.

Attributes displayed in the Management Server view

You can use this view for a variety of tasks, including starting the manual storage discovery or PRO discovery processes, and managing the servers and controller credentials.

The following attribute displays in the Management Server view:

Name	Displays the name of the management server.

Attributes displayed in the Qtrees view

You can view different attributes of a qtree so that you can monitor the qtree's health and diagnose any issues.

The following attributes display in the Qtrees view:

State	Displays the state of the qtree, according to System Center Operations Manager (SCOM). States include Healthy, Warning, and Critical.
Qtree	Displays the full name of the qtree.
Volume	Displays the name of the volume containing the qtree.

Controller/vFiler	Displays the fully qualified domain name (FQDN) of the controller or vFiler unit containing the qtree.
Security Style	Displays the security style of the qtree. Security styles include UNIX, NTFS, or mixed.

Attributes displayed in the SnapMirror Status view

You can view the status of all SnapMirror relationships that are monitored by the plug-in.

The following attributes display in the SnapMirror Status view:

State	Displays the state of the SnapMirror relationship, according to System Center Operations Manager (SCOM). States include Healthy, Warning, and Critical.
Source	Displays the source location of the SnapMirror pair.
Destination	Displays the destination location of the SnapMirror pair.
SnapMirror State	Displays the state of the SnapMirror pair. The possible SnapMirror states include the following: • Initialized • SnapMirrored • Broken-Off • Quiesced • Source • Unknown
Status	Displays the status of the most recent SnapMirror transfer.
Lag	Displays the amount of time since the most recent SnapMirror transfer.

Attributes displayed in the Storage Utilization view

You can use the Storage Utilization view to monitor how much space you have used at the controller, aggregate, and volume levels. The Storage Utilization view provides you with the information you need to make any necessary changes to utilize your space more efficiently.

The following attributes display in the Storage Utilization view:

Controller Committed Space (%)	Displays, at specified time intervals, the percentage of total used controller space.
Aggregate Committed Space (%)	Displays, at specified time intervals, the aggregate used-space percentage.
Volume Used Space (%)	Displays, at specified time intervals, the volume used-space percentage.

Legend	Displays a list of all controllers, aggregates, and volumes for which you can track space utilization.

vFiler attributes displayed in the vFilers view

A vFiler unit is an individual object with different characteristics than a physical controller. The vFilers view displays vFiler attributes, including the vFiler unit's storage, health, and utilization.

The following attributes display in the vFilers view:

State	Displays the state of the vFiler unit, according to System Center Operations Manager (SCOM). States include Healthy, Warning, and Critical.
FQDN	Displays the fully qualified domain name (FQDN) of the vFiler unit.
IP Address	Displays the IP address of the vFiler unit.
Controller FQDN	Displays the fully qualified domain name (FQDN) of the physical controller.
Status	Displays whether the vFiler unit is running.
Total Volumes	Displays the total number of volumes on the vFiler unit.
Total Volume Size	Displays the total size of the volumes.
Total Qtrees	Displays the total number of qtrees.
Total LUNs	Displays the total number of LUNs.
Total LUN Size	Displays the total size of the LUNs.
Data ONTAP Qtree	Displays the Data ONTAP qtree on the vFiler unit.

Attributes displayed in the Volumes view

You can view different attributes of a volume so that you can monitor the volume's health and diagnose any issues.

The following attributes display in the Volumes view:

State	Displays the state of the volume, according to System Center Operations Manager (SCOM). States include Healthy, Warning, and Critical.
Volume	Displays the name of the volume.
Aggregate	Displays the name of the aggregate.
Controller/vFiler	Displays the fully qualified domain name (FQDN) of the controller or vFiler unit containing the volume.
Total Size	Displays the total size of the volume.
Used Space	Displays the total amount of used space.

Current Savings (%)	Displays the amount of used space as a percentage of the total space available.
Storage Efficiency (%)	Displays how efficiently the storage is currently being used by all storage controllers that are monitored by the plug-in.

Attributes displayed in the Hyper-V Hosts view

You can use the Hyper-V Hosts view to view all Hyper-V hosts that have monitored LUNs mapped to them.

The following attributes display in the Hyper-V Hosts view:

State	Displays the state of this Hyper-V host, according to System Center Operations Manager (SCOM). States include Healthy, Warning, and Critical.
FQDN	Displays the fully qualified domain name (FQDN) for the Hyper-V host.
Number of VMs	Displays the number of virtual machines hosted by the Hyper-V host.
Number of LUNs	Displays the number of LUNs hosted by the Hyper-V host.

Attributes displayed in the Hyper-V LUNs view

You can use the Hyper-V LUNs view to see all of the monitored LUNs that are mapped to Hyper-V hosts. You can use this information to monitor the health of the LUNs and diagnose any issues.

The following attributes display in the Hyper-V LUNs view:

State	Displays the state of the LUN, according to System Center Operations Manager (SCOM). States include Healthy, Warning, and Critical.
Host	Displays the fully qualified domain name (FQDN) of the Hyper-V host to which LUN is mapped.
LUN Path	Displays the LUN path: for example, `mycontroller:/vol/vol2/lun1`.
iGroup	Displays the name of the initiator group.
Controller	Displays the name of the controller. If there is no controller name, this field displays the IP address.
Windows Path	Displays the Windows drive path, mount point, or volume GUID: for example, `C:\ClusterStorage\Volume1`.
Cluster Name	Displays the name of the cluster or `N/A`.
CSV Path	Displays the path of the CSV or `N/A`.
Alignment Status	Displays `Aligned` or `Unknown` if the alignment cannot be determined.
Last Alignment Check	Displays the timestamp of the last alignment check.

Available Space	Displays the space available on this LUN in the host-side file system.
Used (%)	Displays the used space percentage for this LUN in the host-side file system.
Total Space	Displays the total space in the host-side file system.

Attributes displayed in the Hyper-V Virtual Hard Disks view

The Hyper-V Virtual Hard Disks view shows all Hyper-V virtual hard disks so that you can monitor their health and diagnose any issues.

The following attributes display in the Hyper-V Virtual Hard Disks view:

State	Displays the alignment of the VHDs and whether they are attached to a virtual machine. There are three possible states: • Healthy The VHD is aligned. • Critical The VHD is misaligned but attached to a virtual machine. • Warning The VHD is misaligned but not attached to a virtual machine.
Virtual Hard Disk Path	Displays the path to the VHD.
Host	For an attached VHD, displays the name of the Hyper-V host that is hosting the virtual machine. For an unattached VHD, displays the name of the host where the VHD resides.
Attached VM Name	Displays the name of the attached virtual machine.
Controller Name	Displays the name of the controller.
LUN Path	Displays the VHD path key.
Alignment Status	Displays `Aligned` or `Unknown` if the alignment cannot be determined.
Last Alignment Check	Displays the timestamp of the last alignment check.
Virtual Hard Disk Type	Displays the type of VHD.

Attributes displayed in the Hyper-V VMs view

You can view different attributes of your monitored Hyper-V virtual machines so that you can monitor their health and diagnose any issues.

The following attributes display in the Hyper-V VMs view:

State	Displays the state of this Hyper-V host, according to System Center Operations Manager (SCOM). States include Healthy, Warning, and Critical.
VM Name	Displays the name of the virtual machine.
VM FQDN	Displays the fully qualified domain name (FQDN) of the virtual machine.
Host	Displays the fully qualified domain name (FQDN) of the Hyper-V host that is hosting the virtual machine.
VM GUID	Displays the GUID of the virtual machine that was assigned by Hyper-V.

Managing storage controllers

There are many tasks that you must perform to maintain your storage controllers, including adding, removing, and configuring storage controllers. You also must manage the storage controller credentials and modify that credential information. Finally, you must configure SNMP if you want to receive SNMP traps.

Managing controller credentials

You can set credentials for all of the controllers and vFiler units that you want to monitor from either the Diagram View or the Controllers View in the Monitoring pane. You can change these credentials as necessary.

About this task

If you have socket security layer (SSL) set up and enabled, the connection uses the HTTPS protocol to connect to the storage controller. If SSL is not set up and enabled, the connection uses the HTTP protocol. Regardless, if you want to connect to a vFiler unit, you must use the HTTP protocol.

Steps

1. From the **Monitoring > Discovered Inventory** window, change the target type to **Management Server**.
2. Go to **Actions > Health Services Tasks > Data ONTAP: Manage Controller Credentials**.
3. Enter credentials for each storage controller that you want OnCommand Plug-in for Microsoft to monitor.

   You can select multiple controllers at one time and set their passwords if they use the same credentials, but you should not select both vFiler units and controllers when you select multiple credentials.

   If you have domain credentials for the storage controller, you should type the domain name in the Domain field and type the domain user name in the **User Name** field.
4. Click **OK**.

Launching System Manager from the plug-in

To use the System Manager interface to change controller configuration information, you can select the storage controllers that are monitored by OnCommand Plug-in for Microsoft and then launch System Manager.

Before you begin

You must have installed and configured OnCommand Plug-in for Microsoft. You also must have System Manager installed on the System Center Operations Manager server on which the plug-in is installed.

It is strongly recommended that you have System Manager installed to perform active management tasks on your system.

Steps

1. Navigate to the **Controllers** view or the **Diagram** view.
2. Select a storage controller group or storage controller.
3. From the **Actions** pane, go to the **Data ONTAP Controller Tasks** pane.
4. Select **Data ONTAP: Launch OnCommand System Manager**.

   Refer to your System Manager documentation for more information about System Manager tasks.

Remote operation of SCOM tasks

You can run System Center Operations Manager (SCOM) tasks from a remote machine that has only the SCOM Console installed, so that you do not have to log in to the plug-in management server to perform the same tasks. You can perform any tasks through the remote console that you perform from the management server.

Linking to DataFabric Manager server

Using the plug-in, you can enable Microsoft System Center Operations Manager (SCOM) to launch DataFabric Manager from the plug-in. You can set HTTPS options, and configure DataFabric Manager server cluster nodes.

Before you begin

You must have installed and configured OnCommand Plug-in for Microsoft.

Steps

1. Select a storage controller.
2. In the **Tasks** pane, click **Data ONTAP: Manage DFM Servers**.

   The DataFabric Manager dialog box opens.

3. Type the name of the DataFabric Manager server and click **Add** > **OK**.

List of OnCommand Plug-in for Microsoft monitors

You can use the monitors to track and report alerts and events related to storage controllers and virtualization objects that are provided by System Center Virtual Machine Manager (SCVMM). The monitors advise you of events that you can view through the event log. Then you can determine a way to mitigate any problems. You can also use overrides to change the values of the various monitors.

The following list displays all of the OnCommand Plug-in for Microsoft base management pack monitors:

- Aggregate Space Utilization Monitor
- Aggregate State Monitor
- Controller Connection Monitor
- Controller Global Status Monitor
- Controller HA Status Monitor
- Critical Trap Monitor
- Disk State Monitor *
- Emergency Trap Monitor
- Enclosure State Monitor
- Fan State Monitor
- Informational Trap Monitor
- LUN State Monitor
- Power Supply State Monitor
- Processor Utilization Monitor
- Qtree Quota Monitor
- Qtree SnapMirror Monitor
- SnapMirror Status Monitor
- vFiler Monitor
- Volume Inode Utilization Monitor
- Volume Quota Monitor
- Volume SnapMirror Monitor
- Volume Space Utilization Monitor
- Volume State Monitor
- Warning Trap Monitor

* If a disk is unhealthy, the Disk State Monitor generates an unhealthy event. The Disk State Monitor, instead of generating an `OK` event each time a disk is healthy, generates an `OK` event only if a disk is healthy but was previously in an unhealthy state.

List of Data ONTAP PRO monitors

The Data ONTAP PRO management pack monitors monitor the functions of the volumes, virtual machines, and LUNs.

Following is a list of all of the Data ONTAP PRO management pack monitors:

- Data ONTAP PRO: Hyper-V Virtual Machine Replication Not Replicated Monitor
- Data ONTAP PRO: Hyper-V Virtual Machine Replication Status Monitor
- Data ONTAP PRO: Hyper-V Virtual Machine Thin Provisioning Configuration Monitor
- Data ONTAP PRO: Hyper-V Virtual Machine Used Space Rate Monitor
- Data ONTAP PRO: LUN Online Monitor
- Data ONTAP PRO: LUN Used Space Monitor
- Data ONTAP PRO: Snapshot Auto-Delete Disabled Monitor
- Data ONTAP PRO: Space Reservation Monitor
- Data ONTAP PRO: Volume ASIS Enabled Monitor
- Data ONTAP PRO: Volume ASIS Licensed Monitor
- Data ONTAP PRO: Volume Online Monitor
- Data ONTAP PRO: Volume Space Utilization Monitor

Viewing and overriding Data ONTAP monitors

You can modify or override the threshold values of the Data ONTAP monitors to trigger alerts based on specified threshold values.

Steps

1. Click **Authoring**.
2. In the navigation pane, click **Monitors**.
3. In the search field, type **`Data ONTAP`** and click **Find Now**.
4. Select the monitor that has threshold values that you want to view or override.
5. Right-click the selected monitor, click **Overrides > Override the Monitor > For all objects of class: Data ONTAP: Object name**.

   You can set the overrides for all objects or specific objects, or to the entire group.

   The Override Properties dialog box opens.
6. Click the Override check box and specify an override value from the Override Value list.
7. Save the changes to the management pack.

   You can create a new management pack for your overrides or one management pack for all of your overrides. However, you should not save changes to the default management pack.

Related tasks

Overriding Data ONTAP management pack rules on page 55

Related information

Microsoft TechNet web site

Alerts and the health of your storage system

You can monitor alerts to locate and isolate problems with your storage systems and storage objects. You can also customize many rules, such as the volume latency rule and the LUN latency rule, to meet your specific needs.

Related references

Types of PRO Tips on page 77

Latency rule customization

You can customize two rules, the volume latency rule and the LUN latency rule, to meet your specific needs.

You can find alerts, as well as locate the source of the alert, by looking at the Alerts View, Diagram View, or Controllers View windows.

You can modify the following two customizable rules to better meet your needs:

Data ONTAP: Volume Latency Rule

This rule triggers an alert based on when the average volume latency exceeds a critical threshold. This rule runs by default every 30 minutes but can be customized to meet your needs.

Data ONTAP: LUN Latency Rule

This rule triggers an alert based on when the average LUN latency exceeds a critical threshold (the default is 500 ms and 1000 ms). This rule runs by default every hour but can be customized to meet your needs.

Locations to view active alerts

The Alerts view displays a list of every active alert found by OnCommand Plug-in for Microsoft. You can also view specific alerts corresponding to your Data ONTAP storage or Hyper-V hosts and virtual machines.

You can view active alerts from any of the following SCOM interface locations:

Active Alerts view

You can view all alerts in the Active Alerts view. You can view information about an individual alert in the Alert Details view and you can view the cause of the problem in Health Explorer in System Center Operations Manager (SCOM).

Alerts view

You can view the alerts in the Alerts view for Storage Systems.

Alerts view in Dashboard

You can view alerts specific to Data ONTAP storage in the Alerts view of the Dashboard.

Virtualization alerts

You can view alerts specific to Hyper-V hosts and virtual machine storage in the Alerts view for Virtualization.

For more information about formatting the email notification for an alert, refer to the Microsoft TechNet web site.

Related information

Microsoft TechNet web site

Checking the alignment of your VHDs

To ensure the best performance of those virtual machines that are hosted on VHDs, it is important that you run the alignment check on a regular schedule. You can also periodically check the alignment of the VHDs on demand.

About this task

You must have enabled PowerShell remoting on all Hyper-V hosts to monitor your VHDs for alignment issues.

Steps

1. Navigate to the **Hyper-V VHDs** view and select the names of all of the VHDs that you want to check for misalignment.
2. Click **Data ONTAP Virtualization: Check VHD Alignment Status** in the **Actions** panel.

   The SCOM Run Task dialog box opens.
3. Click **Run** to begin the misalignment check on the selected VHDs.

   You can dismiss the Run Task dialog box and monitor the progress of the VHD alignment check in the Task Status view to see the output of the tasks upon completion.

After you finish

You can navigate to the Hyper-V VHDs view, in which the `State` attribute displays the alignment of the VHDs.

Related information

Microsoft TechNet web site

Checking the alignment of your Hyper-V LUNs

To ensure the best performance of those virtual machines that are hosted on Hyper-V LUNs, it is important that the alignment check runs on a regular schedule. You can also periodically check the alignment of your Hyper-V LUNs on demand.

Steps

1. From the **Hyper-V LUNs** view, select the names of all of the LUNs that you would like to check for misalignment.
2. Click **Data ONTAP Virtualization: Check LUN Alignment Status** in the **Actions** pane.

   The SCOM Run Task dialog box opens.
3. Click **Run** to begin the misalignment check on the selected LUNs.

After you finish

You can dismiss the Run Task dialog box and monitor the progress of the LUN alignment check in the Task Status view to see the output of the tasks upon completion.

You can navigate to the Hyper-V LUNs view and launch the Health Explorer to view the details if any misaligned LUNs were found.

What PRO Tips are

OnCommand Plug-in for Microsoft PRO Tips are a type of alert that you can use on System Center Virtual Machine Manager (SCVMM) to notify you when storage-related problems occur in your virtual environment. If you choose, you can also enable PRO Tips to automatically repair many of those problems.

You must have a subscription to the SCVMM event log to receive notification of problems related to virtual machines and CSVs. When OnCommand Plug-in for Microsoft receives these events, PRO rules are triggered in the management pack to immediately generate PRO Tips.

PRO Tips are part of the OnCommand Plug-in for Microsoft management pack. The **PRO Tips** button in the SCVMM toolbar displays the number of tips that are currently available. Optionally, you can configure PRO Tips to display in a pop-up window whenever a new tip is added.

Types of PRO Tips

OnCommand Plug-in for Microsoft includes several types of PRO Tips to help you identify storage-related issues that occur between Data ONTAP LUNs, Cluster Shared Volumes (CSVs), and Hyper-V virtual machines. Some of the PRO Tips offer automatic remediation so that you can enable OnCommand Plug-in for Microsoft to fix the issue automatically.

The PRO Tips are generated at the host level unless the description states otherwise. The following PRO Tips are generated on the OnCommand Plug-in for Microsoft:

High LUN space utilization

This tip is generated when space utilization on a LUN that is hosting one or more virtual machines crosses a specified threshold. The default threshold is 95 percent. All nodes in a Hyper-V cluster must be monitored by Microsoft System Center Operations Manager (SCOM). Information about the virtual cluster is collected from the active node. The LUN must be mapped to one or more drives on a host but must not be mapped to any other host.

Hyper-V protection is broken or long lag time

This tip is generated when the volume in which a LUN resides has a broken SnapMirror relationship or a long lag time. This tip offers automatic remediation to perform a SnapMirror update.

Hyper-V VM space utilization rate

This tip is generated when OnCommand Plug-in for Microsoft determines that storage space might soon be depleted on the volume on which a LUN resides. The default threshold rate is two percent, indicating that the storage could be consumed within approximately 50 days. The default setting for displaying this tip is once a day. A sampling rate of one day is used for the storage usage calculation. You can configure both the threshold percentage rate and the frequency that the tip is displayed. There is no automatic remediation for this tip.

Hyper-V LUN not replicated

This tip is generated when SnapMirror is licensed but is not enabled on a volume that contains LUNs that are hosting virtual machines.

LUN offline

This tip is generated for a virtual machine if one or more storage system LUNs that serve that virtual machine is offline. This tip offers automatic remediation to bring the LUNs back online.

LUN-type igroup-type misconfiguration

This tip is generated when the Hyper-V LUN type and the igroup type are mapped incorrectly between the storage system and the Hyper-V host for either Windows or non-Windows types. If OnCommand Plug-in for Microsoft determines that the igroup type and LUN type are the incorrect

Windows types, the plug-in generates a warning tip. If the plug-in determines that the LUN type and igroup type are the incorrect non-Windows types, it generates a critical tip. This PRO Tip is generated only when the installed version of Data ONTAP supports Hyper-V LUN and igroup types.

Misaligned LUNs or misaligned unattached VHDs

These are two separate PRO Tips: the misaligned LUNs PRO Tip is at the host level; the misaligned VHDs PRO Tip is at the virtual machine level if the VHDs are attached or the host level if the VHDs are unattached.

Thin provisioning LUN space reservation enabled

This tip is generated when the LUN space reservation setting is enabled on LUNs that are hosting virtual machines. To provide thinly provisioned LUNs, the LUN space reservation must be disabled. This tip offers automatic remediation to disable LUN space reservation.

Thin provisioning Snapshot auto delete disabled

This tip is generated when automatic deletion of Snapshot copies is not set for volumes that contain LUNs hosting virtual machines. This tip offers automatic remediation to enable automatic Snapshot copy deletion on the volumes.

Thin provisioning volume autogrow for volumes hosting Hyper-V VMs

This tip is generated when the `volume autogrow` option is not set for volumes that contain LUNs that are hosting virtual machines. This tip offers automatic remediation to enable `volume autogrow`.

Volume deduplication not enabled

This tip is generated for a virtual machine when deduplication is licensed but not enabled on a storage controller that hosts storage system volumes that serve two or more virtual machines. This tip offers automatic remediation to enable deduplication on the affected volumes.

Volume deduplication not licensed

This tip is generated for a virtual machine when deduplication is not licensed on a storage controller that hosts storage system volumes that serve two or more virtual machines. This tip does not provide automatic remediation, but it recommends that you install a deduplication license in virtualized environments.

Volume offline

This tip is generated for a virtual machine when one or more storage system volumes serving that virtual machine is offline. This tip offers automatic remediation to bring the volumes back online.

Volume space utilization exceeded threshold

This tip is generated for a virtual machine when one or more storage system volumes that serve that virtual machine is full. This tip offers two configurable thresholds: a warning level that defaults to 95 percent and a critical level that defaults to 99 percent. This tip offers automatic remediation to increase the volume size so that space utilization is reduced to 85 percent. The tip also recommends that the virtual machine be paused by the SCVMM administrator to avoid running out of space.

Related concepts

Alerts and the health of your storage system on page 74

Related tasks

Implementing PRO Tips automatically on page 80
Implementing PRO Tips manually on page 80

Related references

Performance and resource optimization issues on page 137

Enabling PRO Tips

You can enable PRO Tips to discover objects in your virtual environment and to automatically repair many of the storage-related problems that are detected.

Before you begin

All requirements for SCOM and SCVMM PRO integration have been met.

About this task

SCVMM can take up to six hours to enable PRO Tips.

Steps

1. In SCVMM, open the **Properties** dialog box in Operations Manager server.

   The Properties dialog box displays the Add Operations Manager Introduction window.
2. Click **Next**.
3. On the **Connection to Operations Manager** page, enter the name of the root management server (RMS) emulator.
4. Select the **Enable Performance and Resource Optimization (PRO)** check box.
5. On the **Connection to VMM** page, enter the user name and password.
6. Click **Next** to confirm the settings.
7. Click **Finish** to launch a jobs window and create a PRO connection.

8. Optional: Track the progress of this process from **PRO Diagnostics** task in the **Jobs** window.
9. Click **Test PRO** in the **Properties** window to verify the status of the operation.

Related information

Microsoft TechNet web site

Implementing PRO Tips automatically

To ensure that problems are resolved quickly, you can configure PRO Tips to automatically implement solutions for storage-related problems in your virtual environment.

Before you begin

You must have installed the OnCommand Plug-in for Microsoft PRO management pack and enabled the Data ONTAP PRO discovery rule.

Steps

1. Navigate to the **Fabric** pane of **SCVMM Console**.
2. Select **Servers** and select the **All Hosts** menu.
3. Click **All Hosts** and select **Properties.**
4. Select **PRO Configuration**.
5. Select **Remediate** for the appropriate PRO Tip.
6. Click **OK**.

Related tasks

Implementing PRO Tips manually on page 80

Related references

Types of PRO Tips on page 77
Performance and resource optimization issues on page 137

Implementing PRO Tips manually

You can implement PRO Tips manually to resolve one or more storage-related problems when you choose, rather than waiting for PRO Tips to run automatically. You can use this option to control when a solution is implemented.

Before you begin

You must have met the following requirements:

- You must have installed the OnCommand Plug-in for Microsoft PRO management pack.

- You must have enabled the Data ONTAP discovery rule.
- You must have enabled PRO Tips.

Steps

1. From the SCVMM toolbar, select **PRO Tips**.
2. In the **PRO Tips** window, select one or more tips to implement.
3. Click either **Implement** or **Dismiss**.

Related tasks

Implementing PRO Tips automatically on page 80

Related references

Types of PRO Tips on page 77
Performance and resource optimization issues on page 137

Information displayed in the Events window

You can use the Events window to view information about the events that OnCommand Plug-in for Microsoft has logged. The plug-in monitors rules and logs events based on how you have configured the rules.

The Details view in the Events window displays standard Microsoft System Center Operations Manager details that summarize the event information.

For each event, the following information is displayed:

Level	The event level: Information, Warning, or Critical
Date and Time	The date and time, in the format `mm/dd/yyyy hh:mm:ss tt`
Source	The service or originator of the event
Name	The name of the Operations Manager server on which the event occurred
User	The account the event used
Event Number	The unique number for the event type
Log Name	The name of the log to which the event was sent: either the Data ONTAP MP Log or the Data ONTAP Debug Log

Availability events

You can view availability events that are triggered by rules that you have configured to run. A monitor sends out an event to show you the state of your storage resources.

The Availability Events view displays events triggered by the following rules:

- LUN state rule
- Disk state rule
- Aggregate state rule
- Controller global status rule
- Volume state rule
- Shelf state rule
- Fan state rule
- Power supply state rule
- High availability state rule
- SnapMirror state rule
- SNMP trap rule

Configuration Events view

You can view information about the discovery and configuration rules in effect when you receive an event that has been triggered by one of these rules.

The Configuration Events view displays information about the following rules:

- Discovery rule
- Controller connection configuration rule
- High availability (HA) configuration rule
- SnapMirror configuration rule

Types of Data ONTAP reports available through the plug-in (7-Mode environments)

Using OnCommand Plug-in for Microsoft, you can view reports about different aspects of your storage over a specific period of time. These reports can help you to make decisions about the health of your storage system.

The default time period is from the first day of the month to the current day. You can view the following reports from the Reporting pane:

Data ONTAP Aggregate Storage Utilization Report

Displays up to 50 aggregates with the highest (default) or lowest storage utilization on all monitored controllers over a specific period of time. The default number of aggregates is five.

Data ONTAP Controller Average System Latency Report

Displays the average I/O or network latency of the top five of all monitored systems (including 7-Mode systems and virtual machines for clustered Data ONTAP) over a specific period of time. This report helps you to determine if you can load-balance more effectively.

Data ONTAP Controller Rate Of Storage Utilization Report

Displays the rate at which storage controller utilization changes over a specific period of time.

Data ONTAP Controller Storage Utilization Report

Displays the amount of free space of the top five of all monitored systems (including 7-Mode systems and virtual machines for clustered Data ONTAP) over a specific period of time.

Data ONTAP Controllers Availability Report

Displays the controller availability of one or more monitored storage controllers over a specific period of time. The report selects all monitored storage controllers if none are selected.

Data ONTAP Group Average System Latency Report

Displays the average I/O or network latency of all monitored storage controllers over a specific period of time.

Data ONTAP Group Storage Utilization Report

Displays the storage utilization for all monitored storage controllers over a specific period of time.

Data ONTAP Most Common Alerts Report

Displays up to 50 of the most common alerts on all monitored storage controllers over a specific period of time. The default number of alerts shown is five.

Data ONTAP SnapMirror Average Lag Time Per Controller Report (Unit: Hours)

Displays the average lag time, in hours, of all SnapMirror relationships per storage controller over a specific period of time.

Data ONTAP SnapMirror Longest Lag Time Report (Unit: Hours)

Displays the five SnapMirror relationships with the longest lag time, in hours, over a specified period of time. Both the source and destination storage controllers must be monitored.

Data ONTAP Virtualization LUN Alignment Report

Displays a summary of alignment statuses for Hyper-V LUNs over a specific period of time.

Data ONTAP Virtualization VHD Alignment Report

Displays a summary of alignment statuses for Hyper-V VHDs over a specific period of time.

Data ONTAP Volume Storage Utilization Report

Displays up to 50 volumes with the highest or lowest storage utilization on all monitored controllers over a specific period of time. The report defaults to the highest volume storage utilization. The default number of volumes is five.

Related concepts

Custom reports on page 84

Related tasks

Viewing reports on page 84

Viewing reports

You can view reports generated by OnCommand Plug-in for Microsoft by using the **Reports** tab of System Center Operations Manager (SCOM).

Before you begin

You must have installed and imported the Data ONTAP Reports Management Pack.

Steps

1. From the **Reporting** pane, click **Data ONTAP Reports**.
2. Right-click the report you want to view.

Custom reports

With OnCommand Plug-in for Microsoft, you can create custom reports to monitor your system.

You can create reports to monitor the status of the LUNs, virtual machines, and cluster-shared volumes (CSVs) on your system, including but not limited to the following statistics:

- Volume space utilization
- Volume latency
- LUN space utilization
- LUN latency

If you want to generate reports specific to only the CSVs on your system, you can write a Microsoft System Center Operations Manager filter for the LUNs that you want to use in the reports. Alternatively, you can manually select the CSVs as objects to report on by using the Reporting window.

What the SCVMM Console add-ins are

SCVMM Console add-ins enable partners to extend the System Center Virtual Machine Manager (SCVMM) Console by adding new actions or additional configurations for SCVMM objects and new views to help create a more fully integrated user experience. You can use the SCVMM Console add-ins to perform tasks, such as cloning virtual machines or managing controller credentials, through the user interface rather than through the command line.

Remotely installing and uninstalling OnCommand Plug-in for Microsoft using the Manage OCPM Hosts Add-in

You can use the System Center Virtual Machine Manager (SCVMM) **Manage OCPM Hosts** Add-in to remotely install and uninstall OnCommand Plug-in for Microsoft on multiple hosts, including hosts in a cluster environment.

Before you begin

You have OnCommand Plug-in for Microsoft installed on your SCVMM server.

About this task

If OnCommand Plug-in for Microsoft is not installed on your SCVMM server, the add-ins do not work and you are prompted to install the plug-in whenever an add-in is loaded. You can do this installation remotely and for a clustered SCVMM server.

Steps

1. In the **Manage OCPM Hosts** Add-in, click the names of the unconfigured hosts you want to remotely install.

   Choose from the available hosts in the **Host Configuration** screen.

2. Configure OnCommand Plug-in for Microsoft web service.

   Use the same user name, password, and port number that you provided for web services during the OnCommand Plug-in for Microsoft installation.

3. Configure or connect to the OnCommand Plug-in for Microsoft database.

   Specify the local or remote SQL server instance on which the OnCommand Plug-in for Microsoft database resides. When you have finished, click **OK** to complete the remote installation.

Configuring the SCVMM server with the Manage OCPM Hosts add-in for the SCVMM Console

If the SCVMM server does not have OCPM installed and configured, you can install the plug-in and configure the server by using the Manage OCPM Hosts add-in for the SCVMM Console. If the SCVMM server is not configured, the plug-in presents a warning. None of the add-ins function if the SCVMM server is not configured.

Steps

1. In SCVMM, click the **Manage OCPM Hosts** add-in on the toolbar.
2. In the **Configure SCVMM Server** dialog box, type the user name, password, and port number.
3. Click **Configure.**

   The status of the host changes from Not Configured to Configured in the Hosts view. You might need to refresh the Hosts view.

After you finish

To view the controller credentials that are stored in the database, you must configure the web service server so that your storage system can communicate with a web server.

Importing console Add-ins to the SCVMM Console

Before you can create clones, manage controllers, or manage hosts with the System Center Virtual Machine Manager (SCVMM) Console Add-ins, you must import the Add-ins to the SCVMM Console.

About this task

The installation folder contains one zip file called Addins_for_NetApp_OCPM.zip from which you can select an Add-in package.

Steps

1. In SCVMM, click **Settings** in the **VMs and Services** pane.
2. In the navigation pane, click **Console Add-ins**.
3. Click **Import Console Add-in**.
4. Follow the steps of the **Import Console Add-in** wizard to import the Add-ins from the OnCommand Plug-in for Microsoft installation directory.

Removing console add-ins from the SCVMM Console

When you no longer need an add-in, you can remove it from the System Center Virtual Machine Manager (SCVMM) Console. The add-ins must be removed manually; they are not removed when you uninstall the plug-in.

Steps

1. In SCVMM, click **Settings** in the **VMs and Services** pane.
2. In the navigation pane, click **Console Add-ins**.
3. Select an add-in from the list.
4. Click **Remove** to remove the add-in.

   A dialog box opens to confirm that you want to remove the add-in.
5. Click **Yes** to confirm and remove the add-in from the list.

What the Jobs view is

When an action is launched from a System Center Virtual Machine Manager (SCVMM) Console add-in, you can check the progress of the operation in the SCVMM Jobs view.

If a host is managed by SCVMM 2012 SP1, the status of a cloning operation is displayed in the Job Status window in the SCVMM Console by specifying the `VMMServer` parameter.

The SCVMM Jobs view lists all active operations and displays their status. The status includes the percentage of the operation that is complete and whether completed operations have succeeded or failed.

If there is an error noted in the Jobs view, the entry specifies a log location where further details are provided and a corrective action, if any, is described.

Tasks you can perform with the Clone Virtual Machine add-in for the SCVMM Console

The Clone Virtual Machine add-in for the System Center Virtual Machine Manager (SCVMM) Console enables you to clone a virtual machine from the remote console so that you can perform cloning tasks remotely.

Cloning a virtual machine with the Clone a VM add-in for the SCVMM Console

The Clone a Virtual Machine add-in for the SCVMM Console provides you a GUI interface from which you can clone a virtual machine. This is an advantage for users who prefer using a GUI rather than the PowerShell command-line interface.

Steps

1. Go to the navigation pane and select **VMs and Services**.
2. Select a host from the list of hosts that appears in the navigation pane.
3. Select a virtual machine from the list of virtual machines in the **VMs** view.
4. From the **Virtual Machine** tab on the SCVMM toolbar, click **Clone VM**.
5. In the **Clone VM** dialog box, type or select the following information:
   - The clone base name
   - The number of clones
   - One of the following locations for the cloned virtual machine:
     - An existing mount point
     - The source LUN
6. Select **Start VMs after clone** if you want to start the virtual machine after it is created.

After you finish

You can track the progress of the cloning operation in the Jobs window.

Tasks that you can perform with the Clone VM from a Template add-in for the SCVMM Console

You can use the Clone VM from a Template add-in for the SCVMM Console on the host to clone a virtual machine from a template that resides on NetApp storage. The plug-in must be installed on the same host as the library server where the template resides.

Cloning virtual machines from a template with the Clone VM from a Template add-in for the SCVMM Console

The SCVMM Clone VM from a Template add-in for the SCVMM Console provides you a GUI interface from which you can create a clone of a virtual machine from a template. Cloning a virtual machine from a template enables you to create the clone without shutting down a virtual machine.

Steps

1. Go to the navigation pane and select **VMs and Services**.
2. Select a host from the list of hosts that appears in the navigation pane.
3. From the **Host** tab on the SCVMM toolbar, click **Clone VM from Template**.
4. In the **Clone VM from Template** dialog box, type or select the following information:
   - The template name
   - The clone base name
   - The number of clones
   - An existing mount point
5. Select **Start VMs after clone** if you want to start the virtual machine after it is created.

After you finish

You can track the progress of the cloning operation in the Jobs window.

Tasks you can perform with the Manage Controllers add-in for the SCVMM Console

The Manage Controllers add-in for System Center Virtual Machine Manager (SCVMM) Console enables you to manage remote controllers that you start from an SCVMM Console. The add-in enables you to add, modify, and remove controllers, and to check controller credentials, without using cmdlets.

Checking controller credentials using the Manage Controllers add-in for the SCVMM Console

You can use the Manage Controllers add-in for the System Center Virtual Machine Manager (SCVMM) Console to check your controller credentials with the SCVMM Console rather than with cmdlets.

Steps

1. In your SCVMM Console, click **Fabric > Storage**.

The **Manage Controllers add-in** icon appears on the SCVMM toolbar.

2. Click **Manage Controllers add-in**.

   In the Manage Controllers view, a list of controllers appears.

3. Select the name of the controller for which you want to check the credentials.

   The details for that controller, including controller name, IP address, validity status, and protocol, appear in the lower pane of the Manage Controllers view.

Modifying controller credentials with the Manage Controllers add-in for the SCVMM Console

You can use the Manage Controllers add-in for the System Center Virtual Machine Manager (SCVMM) to modify your controller credentials through a GUI rather than through the CLI, which simplifies the process and reduces the risk of error. You can use this procedure to change the user name, password, and protocol.

About this task

The credentials that you create for a controller are used only for actions that involve the plug-in, not for other SCVMM actions.

Steps

1. In your SCVMM Console, select **Fabric > Storage**.

   The Manage Controllers add-in icon appears on the SCVMM toolbar.

2. Click **Manage Controllers add-in**.

   In the Manage Controllers view, a list of credentials appears.

3. Select the name of the controller for which you want to modify the credentials.

   The details for that controller, including the controller name, IP address, validity status, and protocol, appear in the lower pane of the Manage Controllers view.

4. Click **Modify**.

5. In the **Modify Controller** dialog box, type the user name, password, and protocol.

6. Click **Confirm**.

Removing controller credentials with the Manage Controllers add-in for the SCVMM Console

You can use the Manage Controllers add-in for the System Center Virtual Machine Manager (SCVMM) Console to remove controller credentials through a GUI rather than by using the CLI. Using the add-in simplifies the process and reduces the risk of error.

Steps

1. In your SCVMM Console, click **Fabric** > **Storage**.

   The Manage Controllers add-in icon appears on the SCVMM Console toolbar.

2. Click **Manage Controllers add-in**.

   In the Manage Controllers view, a list of controllers appears.

3. Select the name of the controller that you want to remove.
4. Click **Yes** in the confirmation dialog box.

Adding controllers using the Manage Controllers add-in for the SCVMM Console

You can use the Manage Controllers add-in for the System Center Virtual Machine Manager (SCVMM) Console to add a controller to your SCVMM system through a GUI, which saves time and minimizes errors. The credentials that you create for that controller are used only for actions that involve the plug-in.

Steps

1. In your SCVMM Console, click **Fabric** > **Storage**.

   The **Manage Controllers add-in** icon appears on the SCVMM Console toolbar.

2. Click **Manage Controllers add-in**.

   In the Manage Controllers view, a list of credentials appears.

3. Click **Add.**
4. In the **Add Controller** dialog box, enter the controller name, user name, and password.
5. Optional: Select the **Require HTTPS** check box if you want to use HTTPS only.
6. Click **Confirm**.

   The new controller is added to the list of controllers in the Manage Controllers view and is available to all plug-in products.

Tasks you can perform using the Manage OCPM Hosts add-in for SCVMM Console

With the Manage OCPM Hosts add-in for System Center Virtual Machine Manager (SCVMM) Console, you can configure the web service server in the SCVMM Console, install the plug-in remotely on the host or remove the plug-in and the host configuration from a host.

Additionally, you can refresh the Manage Hosts view to check the configuration status of all the hosts, and check if any new hosts have been added to SCVMM.

Invoking the Manage OCPM Hosts Add-in installs only cmdlets and associated web services on the target server. To install any other component, you must use the OnCommand Plug-in for Microsoft installer to install the plug-in manually on the target server.

Configuring hosts using the Manage OCPM Hosts add-in for SCVMM Console

You can install the plug-in remotely and configure the host with the credentials that you specify for the web service.

Steps

1. In SCVMM, click the **Manage OCPM Hosts** add-in on the SCVMM toolbar.
2. In the **Host Configuration** pane, select a host from the list to configure.
3. In the **Configure Host** dialog box, enter the user name, password, and port number and click **Next**.

   The port box is automatically populated with port 808, the recommended port number.
4. In the **Configure OCPM Database** dialog box, enter the server name, port number, SQL server instance name, and authentication method.

   If the credentials that you enter for authentication are invalid, the configuration operation finishes but also returns an error.

   The Configure Host Status dialog box opens and shows the progress of the operation.

Configuring clusters with the Manage OCPM Hosts add-in for the SCVMM Console

You can configure the nodes of a cluster with the Manage OCPM Hosts add-in for the SCVMM Console so that you can perform cloning operations with the cluster.

Before you begin

All the nodes of a cluster must have been installed so that you can configure them, and you must configure all unconfigured nodes of the cluster.

About this task

The parameters that you choose are used for all nodes that you configure.

Steps

1. In SCVMM, click the **Manage OCPM Hosts** add-in on the toolbar.
2. In the **Hosts** view, select a cluster that does not have the plug-in installed.
3. In the **Configure Cluster** wizard, enter the parameters to install the plug-in.

   The plug-in is installed on all nodes of the cluster that do not have a supported version of the plug-in. The Configure Cluster Status dialog box opens and shows the progress of the installation on each of the nodes.

Removing the plug-in configuration from a host

When you no longer need them, you can remove the plug-in from a host using the Manage OCPM Hosts add-in.

About this task

A remote uninstall operation freezes SCVMM and disables access to any objects until the operation finishes. It could take several seconds before access is restored.

Steps

1. In the SCVMM Console, click the **Manage OCPM Hosts** add-in on the toolbar.
2. In the **Hosts** view, select the host from which you want to remove the plug-in.
3. In the confirmation dialog box, click **Remove** to remove the plug-in.

   The name of the host remains in the Hosts view but appears as `Not Configured`.

Refreshing the Manage Hosts view with the Manage OCPM Hosts add-in for the SCVMM Console

You can use the Manage OCPM Hosts add-in for the System Center Virtual Machine Manager (SCVMM) Console to refresh the Manage Hosts view, to check the configuration status of all hosts, and to discover if any new hosts have been added to the SCVMM Console.

Step

1. From the **Configure Hosts** view in the SCVMM Manage OCPM Hosts add-in user interface, click **Refresh**.

   All SCVMM hosts and the latest configuration status appear in the Manage Hosts view. This process might take a few seconds.

How the plug-in works with Orchestrator

System Center 2012 Orchestrator is a workflow management solution for your storage system. You can use the Orchestrator graphical user interface, Runbook Designer, to automate the creation, monitoring, and deployment of resources in your environment.

What OIPs are

In a Microsoft System Center Orchestrator (SCO) environment, you can register and deploy the Orchestrator integration packs (OIPs), which contain activities that you can use to create workflows to automate complex processes. There is an OIP for provisioning and cloning, one for disaster recovery, and another for commonly used data storage operations.

To use the Orchestrator integration packs, you must have an Orchestrator installation configured to Microsoft's specifications. For information about Microsoft's specifications, see the Microsoft TechNet web site.

Related information

Microsoft TechNet web site

Preparing the OIPs for use

Before you can use the Orchestrator user interface and the Orchestrator activities to create workflows and automate tasks, you must register and deploy the Orchestrator integration packs (OIPs) for disaster recovery and provisioning and cloning.

Registering the OIPs with the integration server

You must register the Orchestrator integration packs with the integration server before you can use the Orchestrator activities.

Before you begin

You must have met the following requirements:

- You must have downloaded the OnCommand Plug-in for Microsoft software.
- You must have the System Center Orchestrator 2012 SP1 license and have met all of the requirements for Orchestrator 2012 SP1.

  If you are not sure what the requirements are, refer to the Microsoft TechNet web site.

- You must have an integration (management) server with which to register the integration packs and an action server on which to deploy the integration packs.

Steps

1. Navigate to **Orchestrator Integration Server Deployment Manager** by clicking **Start > All Programs > Microsoft System Center 2012 > Orchestrator > Deployment Manager**.
2. Right-click **Integration Packs** in the left panel and select **Register IP with the Orchestrator management server**.
3. In the **Integrations Pack Registration** wizard, click **Next**.
4. Complete the steps in the wizard.

   You can register multiple integration packs using the wizard by adding multiple integration packs when prompted.

Result

A green check mark appears in the Log Entries panel of the Orchestrator integration server window, indicating that the registration of the OnCommand Plug-in for Microsoft OIPs with the integration server was successful.

After you finish

Next you must deploy the OIPs to the Orchestrator Runbook Designer.

Related information

Microsoft TechNet web site

Deploying Orchestrator integration packs to the Orchestrator Runbook Designer and server

You must deploy the OIPs to the Runbook Designer or the runbook server before you can run activities.

Before you begin

The OIPs must have been registered on the integration server.

Steps

1. Navigate to **Orchestrator Integration Server Deployment Manager** by going to **Start > All Programs > Microsoft System Center 2012 > Orchestrator > Deployment Manager**.

2. Right-click **Integration Packs** in the upper right panel and select **Deploy IP to Runbook Designer**.
3. Complete the steps of the wizard.

   A green check mark appears in the Log Entries panel of the Orchestrator integration server window, indicating that the deployment of the OnCommand Plug-in for Microsoft OIPs to the integration server or client was successful.

After you finish

You must install the Virtual Infrastructure Management (VIM) web service to use the Orchestrator activities.

Unregistering the OIPs from the runbook server

When you no longer need the Data ONTAP Toolkit integration pack, disaster recovery integration pack, or provisioning and cloning integration pack, you can use the Orchestrator integration server deployment manager to unregister them from the runbook server. When you unregister these Orchestrator integration packs, they are removed from the server.

For more information about unregistering the OIPs from the runbook server, refer to the Microsoft TechNet web site.

Related information

Microsoft TechNet web site

What VIM web service configurations are

The Virtual Infrastructure Management (VIM) web service is used only with System Center Orchestrator integration packs. You can create configurations to set options for the VIM web service so that you do not have to set the options manually each time that you use the VIM web service with a particular Orchestrator activity.

You can also create multiple web service configurations, based on your needs.

Configuring VIM web service

You can configure the Virtual Infrastructure Management (VIM) web service for cloning and provisioning activities. You cannot use the Data ONTAP configurations with provisioning and cloning activities, however.

Before you begin

You must have installed VIM web service on your storage system.

Steps

1. From the **Start** menu, select **Runbook Designer**.
2. From the **Options** menu, select the name of the integration pack for which you want to create a configuration.
3. Click **Add** to open the **Add Configuration** window.
4. Type a name for your new configuration and select the type of controller.
5. In the **Properties** pane, type the server name and the port number, and then click **OK.**

   The new configuration is added to the list.

Specifying VIM web service configurations for activities

After you configure the Virtual Infrastructure Management (VIM) web service, you must apply the configuration to plug-in activities to ensure that your runbook functions correctly.

Before you begin

You must have installed VIM web service on your storage system.

Steps

1. From the Orchestrator workspace, double-click the icon for an activity.
2. From the **Properties** dialog box for the selected activity, click **Configuration**.
3. In the **Configuration** dialog box, select the ellipsis (...) to specify a configuration for the activity.
4. Click **Finish.**

Editing configurations for VIM web service

You can edit the configuration of the Virtual Infrastructure Management (VIM) web service so that you do not have to change the options manually each time that you use VIM web service with a particular activity.

Before you begin

You must have installed VIM web service on your storage system.

Steps

1. From the Start menu, select **Runbook Designer**.
2. From **Runbook Designer**, go to the **Options** menu.
3. From the **Options** menu, select the name of the integration pack for which you want to edit a configuration.

The options window for that integration pack opens and displays a list of configurations.

4. In the **Properties** dialog box, select the configuration that you want to edit.

   The properties for that configuration appear in the lower pane.

5. Click **Edit** to edit the configuration.
6. Click **OK** in the options window.
7. Click **Finish** in the **Prerequisite Configuration** window.

Removing configurations for VIM web service

You can remove the Virtual Infrastructure Management (VIM) web service configuration when it is no longer required to run activities.

Before you begin

You must determine that none of your activities require the configuration to operate.

Steps

1. From the **Start** menu, select **Runbook Designer**.
2. From **Runbook Designer**, go to the **Options** menu.
3. Select the OnCommand Plug-in VIM web service for which you want to remove a configuration.

   The options window opens and displays a list of configurations.

4. Select a configuration and click **Remove**.

   The configuration is removed from the list on the options window.

How the plug-in works with PowerShell cmdlets

The Windows PowerShell interface is a task-based command-line shell that you can use to manually call cmdlets in the plug-in to manage, administer, and protect your data.

Windows PowerShell execution policies and administration profiles

To be able to run cmdlets from Windows PowerShell, you must first set execution policies to the correct levels and create administrator profiles on your local host.

PowerShell execution policy values	You must set the proper execution policies to run cmdlets in the plug-in. The following list includes the possible values for Windows PowerShell execution policies: **AllSigned** — Allows scripts that have been verified with security certificates to run. To run the cmdlets securely, you should set the Windows PowerShell execution policy to AllSigned. **Restricted** — Restricts any scripts from being run, downloaded, or installed. Restricted is the default policy. **RemoteSigned** — Allows scripts to be run, downloaded, or installed. This policy is not secure, and malicious code can easily exploit and damage any PowerShell .ps1 or VB script files.
Bypass	Nothing is blocked and there are no warnings or prompts.
Undefined	There is no execution policy set in the current scope.
PowerShell Administration Profiles	You must import the OC.Cmdlets module into your local Windows PowerShell profile if you want the cmdlets to be available from any Windows PowerShell session. This enables you to use the OC.Cmdlets module through PowerShell sessions from Microsoft applications, such as System Center Virtual Machine Manager (SCVMM) and System Center Operations Manager (SCOM).

You can run the following command from Windows PowerShell to get complete information about execution policies:

```
get-help about_execution_policies
```

For more information about how to set Windows PowerShell execution policies, see the Microsoft TechNet web site.

Related information

Microsoft TechNet web site

Common cmdlet parameters

The Windows PowerShell cmdlets include both common cmdlet parameters and risk-mitigation parameters that you can use to customize the operation that the cmdlet performs.

Cmdlets and parameters are not case-sensitive.

Cmdlet parameters

You can use the following parameters with all cmdlets:

[`-Debug` {`True` | `False`}]

Displays information about the operation.

[`-ErrorAction` {`SilentlyContinue` | `Continue` | `Inquire` | `Stop`}]

Determines how the cmdlet responds to a warning when performing the operation. The following list describes what each value means:

SilentlyContinue	Suppresses the warning message and continues the operation.
Continue	Displays the warning message and continues the operation. This is the default value for this parameter.
Inquire	Displays the warning message and asks if you want to continue the operation.
Stop	Displays the warning message and stops the operation.

`-ErrorVariable` | *`Variable_name`*

Stores errors about the cmdlet in the specified variable.

`-OutBuffer` | *`Object_number`*

Determines the number of objects that can reside in the buffer before they are sent.

`-OutVariable` | *`Variable_name`*

Displays objects output by the cmdlet and then stores them in the specified variable.

[`-Verbose` {`True` | `False`}]

Displays detailed information about the operation.

[-WarningAction {SilentlyContinue | Continue | Inquire | Stop}]

Determines how the cmdlet responds to a warning when performing an operation. The following list describes what each value means:

SilentlyContinue	Suppresses the warning message and continues the operation.
Continue	Displays the warning message and continues the operation. This is the default value for this parameter.
Inquire	Displays the warning message and asks if you want to continue.
Stop	Displays the warning message and stops the operation.

-WarningVariable | *Variable_name*

Stores warnings about the cmdlet in the specified variable.

Risk mitigation parameters

You can add the following parameters to cmdlets to request confirmation before cmdlets perform the specified action:

[-Confirm {True | False}]

Prompts you for input before executing the operation.

[-WhatIf {True | False}]

Displays a message that describes the effects of running the cmdlet before that action is performed.

Related information

Microsoft TechNet web site

Running provisioning and cloning cmdlets as a user other than the Windows administrator

You can avoid running the provisioning and cloning cmdlets as the built-in Windows administrator and run them as a user in the Administrators group.

Before you begin

You must have installed the provisioning and cloning cmdlets.

Steps

1. Open the Windows **Start** menu.

2. Select **Run**, type `secpol.msc`, and click **OK**.
3. From the **Local Security Settings** window, click **Local Policies** and then **Security Options**.
4. Double-click **User Account Control: Run all administrators in Admin Approve Mode**.
5. Select **Disabled** and click **OK**.
6. Close the **Local Security Settings** window.
7. Restart the Windows host.

Result

After you restart the Windows 2008 R2 server, you can run the provisioning and cloning cmdlets without being the Windows built-in administrator.

What Data ONTAP Toolkit activities are

The Data ONTAP Toolkit activities enable you to invoke Data ONTAP commands from System Center Orchestrator. You can also use the activities individually as an alternative to using the Data ONTAP command-line interface and PowerShell scripting workflows.

Purpose of storage system credential cmdlets and activities

You use the storage system credential cmdlets and activities to add storage systems to the storage systems database. These cmdlets and activities add, retrieve, or remove user credentials to and from a local database so that you can use other cmdlets without entering credential information.

Provisioning storage

By using provisioning cmdlets with Microsoft System Center Virtual Machine Manager (SCVMM) applications, you can use your existing storage resources to perform faster and more space-efficient provisioning of Hyper-V virtual machines.

Requirements for provisioning

Before you can implement provisioning in your Hyper-V environment, you must meet requirements such as those relating to access, architecture, and available software.

You must meet the following requirements to use provisioning:

- For Fibre Channel, initiators must be logged in to the target port.
- For cmdlets to operate on remote hosts, the following factors must be true:
  - You must have local administrator privileges on the remote host.
  - The remote host must be in a trusted domain or in the same domain as the system from which the cmdlet is launched.
- Microsoft Virtual Disk Service (VDS) must be installed and enabled.
- Microsoft Remote Procedure Call (RPC) Server must be enabled and started.
- Microsoft Distributed Component Object Model (DCOM) must be configured to allow VDS access from the remote computer.
- The host name must be the FQDN (fully qualified domain name) or a short name that is DNS resolvable.
- The storage system name must be the FQDN, the short name, or the IP address.
- Provisioning operations with Cluster Shared Volumes (CSVs) can be initiated only on the CSV owner node of the cluster.
- The computer name must not contain invalid characters; otherwise, the plug-in is not able to create software initiators.
- DNS host names cannot contain the following characters:
  - ampersand (&)
  - apostrophe (')
  - at sign (@)
  - braces ({})
  - caret (^)
  - colon (:)
  - comma (,)
  - dollar sign ($)
  - exclamation point (!)

- number sign (#)
- parentheses (())
- percent (%)
- period (.)
- tilde (~)
- underscore (_)

Related information

Microsoft TechNet web site

Differences between the Connect Storage activity and the Provision Storage activity

Although both the **Connect Storage** and the **Provision Storage** activities connect storage to the host, only the **Provision Storage** activity also creates storage: **Connect Storage** can connect only storage that is already created.

Only LUNs already created with the **Provision Storage** activity can be connected using the **Connect Storage** activity.

WMI warnings appear in the event logs

When you see Windows Management Instrumentation (WMI) warnings in the event log, you should check the administration events in the Hyper-V Virtual Machine Management Service (VMMS) event log for more information.

If the WMI warnings contain the Microsoft synthetic Ethernet port error, you should check and reconfigure the virtual machine network configurations for those cloned virtual machines that produced the warnings.

Because you do not know what other WMI warnings, issues, or errors Microsoft WMI might produce, you should always be vigilant in checking Microsoft administration events in the Hyper-V VMMS event log and look in the Microsoft event log for more information.

Cloning storage with OCPM

By using cloning cmdlets with Microsoft System Center Virtual Machine Manager (SCVMM) applications, you can use your existing storage resources to perform faster and more efficient use of the space on your Hyper-V virtual machines.

Requirements for cloning

Before you can implement cloning in your Hyper-V environment, you must meet requirements such as those relating to access, architecture, and available software.

You must meet the following requirements to use cloning:

- For Fibre Channel, initiators must be logged in to the target port.
- For cmdlets to operate on remote hosts, the following factors must be true:
  - You must have local administrator privileges on the remote host.
  - The remote host must be in a trusted domain or the same domain as that from which the cmdlet is launched.
- Microsoft Virtual Disk Service (VDS) must be installed and enabled.
- Microsoft Remote Procedure Call (RPC) Server must be enabled and started.
- Microsoft Distributed Component Object Model (DCOM) must be configured to allow VDS access from the remote computer.
- The host name must always be the FQDN (fully qualified domain name) or a short name that can be resolved by DNS.
- The storage system name must be the FQDN, the short name, or the IP address.
- Cloning operations with cluster shared volumes (CSVs) can be initiated only on the CSV owner node of the cluster.
- The destination NTFS or cluster shared volume file system (CSVFS) for the cloning operation must have enough space to hold the cloned virtual machine data.
- To monitor your VHDs for alignment issues, you must have enabled PowerShell remoting on all Hyper-V hosts.

Related information

Microsoft TechNet web site

What Sub-LUN cloning is

Sub-LUN cloning is a process by which you can create clones of one file or a few files that are stored on a LUN. Sub-LUN cloning enables you to create exact duplicates of existing files without copying.

Within the controller, Data ONTAP uses pointers to the individual files, thereby representing multiple files to Windows while keeping only one copy of the duplicates on the storage in the controller.

Cmdlets and activities for creating clones

You can use any of the following operations to create clones: the `New-OCCloneFile` cmdlet (**Clone NTFS File** activity) or the `New-OCClone` cmdlet (the **Clone VM** and the **Clone VM from SCVMM Template** activities). It is important to understand the differences among these three operations and the guidelines for using each.

Cmdlets and activities to use for file cloning operations

After making sure that your environment meets certain requirements, you can use the `New-OCCloneFile` cmdlet (**Clone NTFS File** activity) to replicate your storage. These operations clone an existing file on a mounted file system or cluster-shared volume (CSV) on a LUN to another mounted file system or CSV.

These operations support Windows LUNs or CSV LUNs within a Windows cluster.

To use the `New-OCCloneFile` cmdlet (**Clone NTFS File** activity), your environment must meet the following requirements:

- If the source or destination path is on a CSV, the CSV must be owned by the node from which the operation is run.
- The directory of the destination path must exist.
- The existing NTFS or cluster shared volume file system (CSVFS) must have enough space to hold the new cloned file.

Sub-LUN cloning with cmdlets and activities

The `New-OCClone` cmdlet (the **Clone VM** activity) clones a virtual machine from an existing Hyper-V virtual machine that is currently in an off state. The cloned virtual machines can be deployed on either the same host or to a different host or host cluster.

To clone an existing virtual machine with the `New-OCClone` cmdlet (or **Clone VM** activity), you must enter either a virtual machine name or the GUID of an existing virtual machine in the operation's properties.

The `New-OCClone` cmdlet (or **Clone VM** activity) performs a sub-LUN clone operation first and then uses the cloned file to create the virtual machine.

Related concepts

Cmdlets and activities to use for virtual machine cloning from an SCVMM template on page 110

Cmdlets and activities to use for virtual machine cloning from an SCVMM template

The `New-OCClone` cmdlet (**Clone VM from SCVMM Template** activity) clones a virtual machine from an SCVMM virtual machine template. Cloning from a template allows you to create the clone without shutting down a virtual machine, and you can deploy the template at any time without interrupting other virtual machines.

To clone from a template with the `New-OCClone` cmdlet (**Clone VM from SCVMM Template** activity), you must observe the following requirements:

- You must enter an SCVMM server name and template name in the properties.
- The template must be configured correctly in SCVMM.

The cloned virtual machines can be deployed on the same host as that on which the activity is run or to a different host or host cluster.

The `New-OCClone` cmdlet (**Clone VM from SCVMM Template** activity) performs a sub-LUN clone operation first and uses the cloned file to create the virtual machine.

When to use the Clone VM activity

There are several situations in which you can use the Clone VM activity to clone a virtual machine. These situations include cloning into the same source LUN, cloning into a new single LUN, and cloning into an existing CSV on a LUN.

Creating clones of a virtual machine from a LUN into a new LUN

You can use the **Clone VM** activity to replicate your storage by creating clones of a virtual machine in an off state from an existing LUN, storing them on a new LUN, and then starting the cloned virtual machines on a specified Hyper-V host.

Before you begin

The web service must be installed in the same location as the virtual machine and the **Clone VM** activity must be configured with the name of the web service server.

Steps

1. In the activity properties area, specify the following information:
   - The virtual machine name
   - The number of clones
   - The virtual machine clone name prefix
   - The Hyper-V host name
2. Run the **Clone VM** activity.

Storage for the virtual machine is cloned on the storage array and the cloned virtual machines are started.

Creating and storing clones in the same LUN

You can use the **Clone VM** activity to clone a virtual machine that is in an off state and store it in the same LUN in which you created it. You can then start the cloned virtual machine on the same Hyper-V host or on another Hyper-V host that is sharing the LUN.

Steps

1. Specify the following information in the activity properties:
   - The virtual machine name
   - The number of clones
   - The virtual machine clone name prefix
   - The Hyper-V host name
   - The `AllinSingleLUN` property or `AllinSourceLUN` property
2. Run the **Clone VM** activity.

   Storage for the virtual machines is cloned on the storage array and the cloned virtual machines are started on the same Hyper-V host.

Creating a clone of a LUN into an existing CSV on another LUN

You can use the **Clone VM** activity to create a clone of a virtual machine from a LUN, place that clone into another existing cluster-shared volume (CSV) on another LUN, and start the cloned virtual machine on the same Hyper-V host to replicate your data across your storage.

About this task

If you create clones in a CSV, then you can start those virtual machines on another Hyper-V host that shares that destination CSV. This operation is useful for replicating your data across your storage and avoiding a single point of failure.

Steps

1. To run the **Clone VM** activity in the activity properties, specify the following information:
   - The virtual machine name
   - The number of clones
   - The virtual machine clone name prefix
   - The Hyper-V host name
   - The mount point of another LUN, the existing CSV reparse point (a collection of user-defined data), or the CSV parameter to create a virtual machine on a new CSV
2. Run the **Clone VM** activity.

Storage for the virtual machine is cloned on the storage array in an existing CSV or in another LUN or CSV. The cloned virtual machine is started on either the same Hyper-V host or another Hyper-V node that is sharing the same CSV, if the destination is a CSV.

New-OCClone might result in excess free space

The `New-OCClone` cmdlet might leave free space when you create or clone a new LUN for a virtual machine. If the free space is larger than 8 MB, it shows up in the Disk Management view. Disk Management is a windows tool that is used to manage system disks, both local and remote.

When you create or clone the LUN, the full space is not used in the partitioning and formatting of the LUN. You can leave the space as it is, and all the applications on the system that use formatted NTFS on the LUN still perform correctly.

Managing crash-consistent disaster recovery using cmdlets and activities

Crash-consistent disaster recovery uses the SnapMirror feature to replicate data across primary and secondary sites following a disaster.

To properly implement disaster recovery, you must be familiar with the SnapMirror feature, the requirements for disaster recovery, and several disaster recovery cmdlets and activities, including composite cmdlets and automated activities and their properties.

Related concepts

What the disaster recovery plan is on page 115

Requirements for disaster recovery

Your environment must meet some important requirements to enable crash-consistent disaster recovery.

The following list includes the requirements to enable disaster recovery:

- All disaster recovery virtual machines must be on NetApp storage.
- The secondary site must be used for the sole purpose of disaster recovery.
- Only a host administrator can invoke disaster recovery objects.
- The Data ONTAP version on the secondary storage system must be the same version or later than that on the primary storage system.
- For each volume on the primary storage system, a corresponding volume of equal or greater size must exist on the secondary storage system.
- You must invoke all replication objects from the Hyper-V host rather than a source or destination storage system.
- The web service login account must have administrative privileges on the local and remote hosts or clusters on both the primary and secondary sites.
- If you are using Orchestrator to perform the disaster recovery tasks, the Orchestrator server must have administrative rights on the hosts and clusters on which you want to perform any restore operations.
- Access to the disaster recovery plans requires that the proper permissions are provided for the ACL and NTFS folders.
- All virtual machines must be in the off state before you create or update your disaster recovery plans if you are in a Windows 2008 R2 environment.

  This requirement does not apply to virtual machines on a Windows 2012 host.
- You must invoke the disaster recovery cmdlets on the primary and secondary site nodes on which the web service is installed.

- Invoking disaster recovery cmdlets or operations remotely is not supported.
- The storage system credentials on both the primary and the secondary sites must be configured on all storage systems and must be present on the nodes on which the plug-in is installed and disaster recovery cmdlets are invoked.
- All DNS, nslookup, ping, and forward and reverse lookups must be configured properly for disaster recovery and for live or quick migration of Hyper-V virtual machines in a Windows failover cluster setup.
- All virtual machines in a cluster need to be moved to the owner node so that when you create the disaster recovery plan all the virtual machine configuration files are in the disaster recovery plan folder.
- If the primary and secondary sites are in different Domains, you must properly establish two-way cross-domain trust policies across the primary and the secondary sites.
- You must ensure that firewalls do not interfere with disaster recovery operations.

Related information

Microsoft TechNet web site

SnapMirror requirements for disaster recovery

Your environment must meet some important requirements to enable crash-consistent disaster recovery and SnapMirror.

When you plan your SnapMirror configuration, you should consider the SnapMirror requirements for disaster recovery. See the Microsoft SnapMirror documentation for more details.

The following list includes the requirements for the use of SnapMirror with disaster recovery:

- You should use the short host name to configure SnapMirror on the storage system side and you should be able to use the short host names to ping the source and destination filers from each other.
- You must enable HTTP or HTTPS access across the source and destination storage systems.
- You should not use IP addresses to configure your SnapMirror relationships.
- The source volume must be online.

  For information about how to bring a volume online, see the *Data ONTAP Storage Management Guide for 7-Mode*.
- For SnapMirror volume replication, the capacity of the destination volume must be greater than or equal to the capacity of the source volume.

  For information about how to add disks to a volume, see the *Data ONTAP Storage Management Guide for 7-Mode*.

Because you might want more than one physical path for a SnapMirror relationship, SnapMirror supports up to two paths for a particular SnapMirror relationship. When you use multiple paths, you must set up the configuration in one of the following ways:

- Set up static routes to ensure that different routes are used for different IP connections.

- Use different subnets for the two connections.

The paths can be Ethernet, Fibre Channel, or a combination of Ethernet and Fibre Channel.

The two paths can be used in one of these two modes:

Multiplexing mode	SnapMirror uses both paths at the same time, essentially load balancing the transfers. If one path fails, the transfers occur on the remaining path. After the failed path is repaired, the transfers resume using both paths.
Failover mode	SnapMirror uses the first specified path as the desired path and uses the second specified path only after the first path fails. Failover using only one pair of connections is not supported with SnapMirror network compression.

Related information

Microsoft TechNet web site

What the disaster recovery plan is

The disaster recovery plan describes disaster recovery objects and determines how they behave during failover and failback. The plan is stored in a user-specified location as an XML file and can be replicated to your secondary site.

The naming convention is for the plan is `PrimaryServerOrCluster_SecondaryServerOrCluster_DRPlan.xml`.

You create the plan on the primary site and it captures information about the primary setup so that the information can be used to replicate the configuration on the secondary site upon failover. The plan captures only the information that is required to perform failover and failback, including the following information:

- A list of the virtual machines on the primary site
- Details about virtual machine properties
- Storage information about virtual machine configuration, VHDs, and Snapshot data
- Information about the SnapMirror relationships for all volumes on the primary storage system on which the virtual machines are running
- The primary and secondary host-related or cluster-related information

In Windows Server 2008, the virtual machine configurations are exported to the disaster recovery plan folder prior to a failover or failback operation.

In Windows Server 2012, the virtual machine configurations are replicated from the secondary site and not imported to the plan folder.

Disaster recovery plan guidelines

You must follow certain guidelines when you update or create a new disaster recovery plan, because the disaster recovery plan plays a vital role in the success of the failover or failback of your storage system.

You must have performed the following tasks when you create or update a disaster recovery plan:

- Moved all virtual machines to the local node on which web service is installed
- For cluster shared volume configurations, verified that the local node on which you are running the cmdlet is also the owner of the cluster group resource

  The available storage can be owned by other nodes.

It is important to run the disaster recovery plan on the appropriate site (Site A or Site B):

- You must run the New-DRPlan cmdlet on Site A.
- You must run the Update-OCDRPlan cmdlet (in the failover direction) on Site A.
- You must run the Update-OCDRPlan with the failback property on Site B.

If you perform the failover operation using Orchestrator, the **Create Plan** and **Update Plan** activities are executed automatically on the primary server indicated in the activity properties.

The role of cmdlets and activities in disaster recovery

There are three configuration cmdlets and three configuration activities that you can use to help you create, validate, and update your disaster recovery plan.

New-OCDRPlan cmdlet and Create DR Plan activity

You use the `New-OCDRPlan` cmdlet or the **Create DR Plan** activity to create a new disaster recovery plan.

Confirm-OCDRPlan cmdlet and Validate DR Plan activity

You use the `Confirm-OCDRPlan` cmdlet or the **Validate DR Plan** activity to validate the current state of the secondary host against the data captured in the specified disaster recovery plan whenever the primary or secondary site configuration changes. The `Confirm-OCDRPlan` cmdlet and the `Validate DR Plan` activity provide information about the following in the disaster recovery plan:

- The operating system of the secondary host is Windows 2008 R2 or later.
- The secondary site where virtual machine LUNs are to be connected have valid LUN paths and SnapMirror relationships.
- The status appears as

  `snapmirrored`

  for all the SnapMirror relationships.
- The virtual machine cluster and configuration resources against the live virtual machine
- The cluster and configuration resources on the secondary host do not conflict.

If a conflict is found in the mount points, the `Confirm-OCDRPlan` cmdlet checks the mount point that is connected in the secondary host to determine if it is connected to the required LUN on the secondary storage system.

- The storage system credentials are configured for all the storage systems in the disaster recovery process on the secondary site.
- The Hyper-V role is enabled on the secondary host or cluster.
- The cluster shared volume is active on the secondary cluster, and a valid cluster name and IP address resources are present and online if the disaster recovery plan is created in the context of a cluster.

What live virtual machine disaster recovery is

On the Windows 2008 R2 and Windows 2012 platforms, you can recover your live (online) virtual machines and bring them online on your secondary site. Doing this enables you to restore all of your online primary virtual machines to secondary sites with just one click and very limited down-time.

There are two important differences between disaster recovery in Windows 2008 R2 and in Windows 2012:

- With Windows 2012, you can create and update your disaster recovery plan, which is required to perform failover and failback, by running the cmdlets `New-OCDRplan` and `Update-OCDRplan` while the virtual machines are online.

  With Windows 2008 R2, all the virtual machines must be turned off or shut down to update the disaster recovery plan.
- For Windows 2012 servers, the virtual machine configuration files are not generated; however on Windows 2008 R2 servers, virtual machine configuration files are generated along with the disaster recovery plan file.

Differences between granular and composite cmdlets and activities

You can use individual (“granular”) cmdlets or Orchestrator activities to perform individual actions. Alternatively, you can use a “composite” cmdlet or activity, which performs the actions of several granular cmdlets or activities automatically, in a preset order.

The fact that you can choose whether to use granular or composite cmdlets and activities means that you have increased flexibility in performing disaster recovery tasks.

Failover and failback requirements

With crash-consistent disaster recovery, when you experience a complete site failure, you can fail over from a primary site to a secondary site, after which you must perform a failback to restore the

SnapMirror relationships. There are different requirements depending on whether you want to perform a failover operation or a failback operation.

Failover requirements

You must have performed the following tasks on your system before a failover operation:

- Created a disaster recovery plan and stored it in a central location
  You can also replicate the plan to your secondary site.
- Established SnapMirror relationships from the primary to the secondary site
- Updated the SnapMirror relationships
  This ensures that the latest data is transferred from the primary to the secondary site before the actual disaster recovery failover is performed.
- Run the `Update-OCDRPlan` cmdlet or the **Update DR Plan** activity on the primary site (site A)

Failback requirements

You must have performed the following tasks on your system after a failover operation has finished and before you initiate a failback operation:

- Ensured that proper mirror relationships are established across your primary and secondary sites
- Run the `Update-OCDRPlan` cmdlet or the **Update DR Plan** activity indicating failback as the operational direction on the primary site (Site B) to update the disaster recovery plan with the latest configuration information
- Used the `Invoke-OCDRMirrorReverseResync` cmdlet or the **Reverse Resync SnapMirror** activity on the secondary site (Site A) to reverse all of the relationships from Site B to Site A if there is no data loss
- Used the `Initialize-OCDRMirror` cmdlet or the **Initialize SnapMirror** activity to create new SnapMirror relationships from Site B to Site A if there is data loss.
- Updated mirror relationships

Note: All transfers, initializations, and updates to your system are performed asynchronously, so you must wait and ensure that an operation is complete before you perform any additional operations.

Failover workflow phases

To understand failover workflow, you must understand the various cmdlets and their options; where to use the cmdlets; the role of those sites at that stage of the workflow; and any additional information that you need about that stage.

Preparation for failover

The following table outlines the cmdlet or cmdlets that you must run to prepare to perform a failover operation. The site where each cmdlet should be performed and the role of that site (either primary or secondary) is included in the table.

Cmdlet	Site	Role	Notes
`Initialize-OCDRMirror -sourceloc filerA:sourcevol -destloc filerB:destvol -verbose`	Any site		You can run the `Initialize-OCDRMirror` cmdlet for failback in the event of loss of Site A.
`New-OCDRPlan -drf\\suny\cher -drn p1.xml -prisvr <siteA> -secsvr <siteB> -ver`	Site A	Primary	
`Confirm-OCDRPlan -drp\\suny\cher\p1.xml -ver`	Any site		

The failover operation

The following table presents the cmdlet or cmdlets that you must run to perform a failover operation. The site where the cmdlet should be performed and the role of that site (either primary or secondary) is included in the table.

Cmdlet	Site	Role	Notes
`Invoke-OCDRFailover`	Site B	Secondary	

Following the failover

The following table outlines the cmdlet or cmdlets that you must run after the failover operation. You must perform a failback and then a second failover operation. The site where each cmdlet should be performed and the role of that site (either primary or secondary) is included in the table.

Cmdlet	Site	Role	Notes
`Update-OCDRPlan -Failback -prisvr <siteB> -secsvr <siteA>`	Site B	Secondary > Primary	
`Invoke-OCDRMirrorReverseResync`	Site A	Secondary	This cmdlet establishes Site B as the mirror source, and takes the LUNs offline on Site A.
`Reset-OCDRSite -force`	Site A	Secondary	This step is optional and is part of the composite failback cmdlet. It removes the virtual machines and leaves the LUNs on Site A.
`Confirm-OCDRPlan`	Any site		This step is for failback and it reports conflicts because Site A contains the virtual machines and LUNs.
`Invoke-OCDRFailback -Force`	Site A	Secondary	The Site B to Site A failback was executed. You must include the `Force` parameter because the `Full` parameter was not used in the preceding `Reset-OCDRSite` cmdlet.

Cmdlet	Site	Role	Notes
`Update-OCDRPlan`	Site A	Secondary > Primary	Site A is staged to fail over to Site B.
`Reset-OCDRSite -force -full`	Site B	Secondary	This cmdlet removes all virtual machines and LUNs in the disaster recovery plan on Site B.
`Invoke-OCDRMirrorResync`	Site B	Secondary	Site A is set as the mirror source.
`Confirm-OCDRPlan`	Any site		This step validates the Site A to Site B failover. It does not report conflicts.
`Invoke-OCDRFailover`	Site B	Secondary	The Site A to Site B failover is executed.

Performing consecutive failover operations

The following table outlines the cmdlet or cmdlets that you must run to perform consecutive failover operations. The site where each cmdlet should be performed and the role of that site (either primary or secondary) is included in the table.

Cmdlet	Site	Role	Notes
`Confirm-OCDRPlan`	Any site		Success confirms that the mirrors are synchronized.
`Start-OCDRSimulateFailover`	Site B	Secondary	This cmdlet gives the same result as `Invoke-OCDRFailover`.
`Update-OCDRPlan`	Site A	Primary	
`Stop-OCDRSimulateFailover -force`	Site B	Secondary	Conflicting virtual machines and LUNs are removed from Site B.
`Update-OCDRPlan`	Site A	Primary	

Cmdlet	Site	Role	Notes
`Start-OCDRSimulateFailover -force`	Site B	Secondary	The `Force` parameter is needed to successfully fail over because conflicting LUNs remain on the secondary site.
`Update-OCDRPlan`	Site A	Primary	
`Stop-OCDRSimulateFailover -force`	Site B	Secondary	Conflicting virtual machines and LUNs are removed from Site B.

Disaster recovery failover workflow

You use the `Invoke-OCDRFailover` composite cmdlet or **DR Failover** activity to run an automated workflow that fails over virtual machines from a primary site to a secondary site. With crash-consistent disaster recovery, when you experience a complete site failure of both the host and the storage, you can fail over from a primary site to a secondary site with limited and reasonable downtime.

About this task

The `Invoke-OCDRFailover` composite cmdlet (**DR Failover**) runs several individual operations to perform the failover.

The `Invoke-OCDRFailover` composite cmdlet (**DR Failover**) performs failover from the primary site to the secondary site. It must be run with the `-Force` property if any of the entities to be failed over already exist.

When the disaster recovery cmdlet or activity is run, the plug-in performs the following steps automatically:

Steps

1. The `Confirm-OCDRPlan` cmdlet (**Validate DR Plan**) is run to validate the secondary site (site B) before the failover begins.
2. The `Reset-OCDRSite` cmdlet (**Clean-up a DR Site**) is run with the `-Force` parameter specified to clean up conflicting cluster resources and LUNs on the secondary site (site B).
3. The `Invoke-OCDRMirrorBreak` cmdlet (**Release SnapMirror**) is run to break all the SnapMirror relationships on the secondary site (site B).

4. The `Connect-OCDRLUN` cmdlet (**Connect DR Storage**) is run with the `-Force` parameter specified to connect all the LUNs on the secondary site (site B).
5. The `Restore-OCDRVM` cmdlet (**Restore VMs activity**) is run to restore all virtual machines on the secondary site (site B).

   See the descriptions of the individual cmdlets or the activities in the *OnCommand Plug-in for Microsoft Windows PowerShell Cmdlet and Orchestrator Activity Reference Guide* for more details.

Disaster recovery failback workflow

With crash-consistent disaster recovery, after you fail over from a primary site to a secondary site, you must perform an `Update-SCDRPlan -Failback` operation on Site B and an `Invoke-OCDRMirrorReverseResync` operation on Site A to restore the SnapMirror relationships from the secondary site to the primary site.

About this task

The `Invoke-OCDRFailback` composite cmdlet (**DR Failback** activity) runs several individual activities to perform the failback, and it must be run with the `-Force` parameter to perform failback from the primary site (Site B) to the secondary site (Site A).

The following steps are run automatically, based on the disaster recovery plan.

Steps

1. The `Confirm-OCDRPlan` cmdlet (**Validate DR Plan** activity) is run to validate the current state of the secondary host against the data captured in the specified disaster recovery plan file before the failback begins.
2. The `Reset-OCDRSite` cmdlet (**Clean-up DR Plan** activity) is run with the `-Force` parameter to remove conflicting cluster resources and LUNs on the secondary site (Site A).

   This activity removes only the virtual machine conflicting resources from the secondary site.
3. The `Invoke-OCDRMirrorBreak` cmdlet (**Break SnapMirror** activity) is run to break all the SnapMirror relationships on the secondary site (Site A).
4. The `Connect-OCDRLUN` cmdlet (**Connect DR Storage** activity) or is run with the `-Force` parameter to connect all the LUNs on the secondary site (Site A).
5. The `Restore-OCDRVM` cmdlet (**Restore VMs** activity) is run to restore all virtual machines on the secondary site (Site A).

After you finish

After the failback operation is complete, you should update the disaster recovery plan for the next failover from Site A. Then you could run the `Reset-OCDRSite` cmdlet (**Clean-up a DR Site**

activity) with the `-Force` and `-Full` options specified on Site B to resolve conflicting cluster resources on the secondary site.

See the descriptions of the individual cmdlets in the *OnCommand Plug-in for Microsoft Windows PowerShell Cmdlet and Orchestrator Activity Reference Guide* for more details.

Why you should perform a consecutive failover workflow

For crash-consistent disaster recovery, you should run a second failover (a consecutive failover) after the failback operation. For example, after you fail back from Site B to Site A, you must reestablish the SnapMirror relationships (which switches the primary and secondary sites).

The consecutive failover prepares your system for a future failover from Site A to Site B.

Preparing for a consecutive failover

You must take action before you run the consecutive failover operation to ensure that you still have SnapMirror relationships from Site A to Site B.

Before you begin

Ensure that proper mirror relationships are established.

Step

1. Perform the appropriate step before you run the `Invoke-OCDRFailover` cmdlet (**DR Failover** activity) to initiate the consecutive failover operation, based on your circumstances:
   - If there is no data loss, use the `Invoke-OCDRMirrorResync` cmdlet (**Resync SnapMirror** activity) on the secondary site (Site B) to resynchronize the relationships from Site A to Site B.
   - If there is data loss, use the `Initialize-OCDRMirror` cmdlet (**Initialize SnapMirror** activity) to create new SnapMirror relationships from Site A to Site B.

What happens during consecutive failover

During the consecutive failover workflow that follows a disaster recovery failback, the disaster recovery plan is validated, conflicting resources and LUNs are removed, SnapMirror relationships are broken, and virtual machines are restored.

You must ensure that you have performed all the tasks to prepare to run the `Invoke-OCDRFailover` cmdlet (**DR Failover** activity) with the `-Force` property for the consecutive failover.

- The `Confirm-OCDRPlan` cmdlet (**Validate DR Plan** activity) validates the secondary site (Site B) before the failover begins.
- The `Reset-OCDRSite` cmdlet (**Clean-up a DR Site** activity) is run with the `Secondary` and `Force` properties specified to remove conflicting cluster resources and LUNs on Site B.

- The `Invoke-OCDRMirrorBreak` cmdlet (**Break SnapMirror** activity) is run to break all the SnapMirror relationships on the secondary site (Site B).
- The `Connect-OCDRLUN` cmdlet (**Connect DR Storage** activity) is run to connect all the LUNs on Site B.
- The `Restore-OCDRVM` cmdlet (**Restore VMs** activity) is run to restore all virtual machines on Site B.

After the consecutive failover operation finishes, all of the formerly existing SnapMirror relationships are broken; however, they can be reestablished using a resync operation, so that the system is prepared to recover from another failure.

What the simulate failover cmdlet and activity do

You can use the `Start-OCDRSimulateFailover` cmdlet or the **Start DR Simulate Failover** activity to simulate an automated workflow that fails over virtual machines from a primary site to a secondary site. It is important to simulate failover to ensure that a site can successfully fail over during an actual disaster.

The `Start-OCDRSimulateFailover` cmdlet and the **Start DR Simulate Failover** activity are composite operations that run several individual activities or cmdlets to perform one failover simulation.

You can use the `Stop-OCDRSimulateFailover` cmdlet or the **Stop DR Simulate Failover** activity to stop the failover simulation.

For more information about the simulated failover workflow, see the *OnCommand Plug-in for Microsoft Windows PowerShell Cmdlet and Orchestrator Activity Reference Guide*.

Preparing to simulate failover

Even though the simulate failover workflow is automated, you must ensure that your disaster recovery plan and SnapMirror relationships are updated so that the information about the primary setup is captured and it can be used to replicate the configuration on the secondary site upon failover.

Steps

1. Run the `New-OCDRPlan` cmdlet (**Create DR Plan** activity) on the primary site to create a disaster recovery plan, and store it in a central location.

   The default folder location is `C:\ProgramData\OnCommand\MS_Plugin`.

2. Replicate the disaster recovery plan to the secondary site.
3. Create new SnapMirror relationships from the primary site to the secondary site with the `Initialize-OCDRMirror` cmdlet (**Initialize SnapMirror** activity).
4. Update the SnapMirror relationships with the `Invoke-OCDRMirrorUpdate` cmdlet (**Update SnapMirror** activity).

This ensures that the latest data is transferred from the primary to the secondary site before the actual disaster recovery failover is performed.

5. Run the `Update-OCDRPlan` cmdlet (**Update DR Plan** activity) on the primary site to update the disaster recovery plan with the latest configuration information.

After you finish

You can now run the `Start-OCDRSimulateFailover` cmdlet (**Start Test DR Failover** activity).

Failover simulation by the Start Test DR Failover activity

The `Start-OCDRSimulateFailover` cmdlet (**Start Test DR Failover** activity) performs the steps necessary to simulate a failover operation from the primary site to the secondary site.

No user intervention is required after the `Start-OCDRSimulateFailover` cmdlet (**Start Test DR Failover** activity) is begun. You can see descriptions of the individual objects for more details.

The `Start Test DR Failover` activity performs the following actions:

1. The `Confirm-OCDRPlan` cmdlet (**Validate DR Plan** activity) validates the secondary site.
2. The `Reset-OCDRSite` cmdlet (**Clean-up a DR Site** activity) with the `Force` property specified removes conflicting cluster resources and LUNs on the secondary site.
3. The `Invoke-OCDRMirrorBreak` cmdlet (**Break SnapMirror** activity) breaks all the SnapMirror relationships on the secondary site.
4. The `Connect-OCDRLUN` cmdlet (**Connect DR Storage** activity) connects all the LUNs on the secondary site.
5. The `Restore-OCDRVM` cmdlets (**Restore VMs** activity) restores all virtual machines on the secondary site.

Preparing to repeat the simulate failover procedure

After you run the failover simulation, you must prepare the secondary sites for another failover operation. The `Stop-OCDRSimulateFailover` cmdlet (**End Test DR Failover** activity) resets the secondary site and performs a resynchronization on all the mirror relationships in the disaster recovery plan.

About this task

The `Stop-OCDRSimulateFailover` composite cmdlet (**End Test DR Failover** activity) comprises two individual operations to prepare your storage system to perform another failover simulation.

Steps

1. The `Stop-OCDRSimulateFailover` cmdlet (**End Test DR Failover** activity) with the `Force` property specified removes the virtual machines and cluster resources that were created in the previous failover operation.

2. The `Invoke-OCDRMirrorResync` cmdlet (**Resync SnapMirror** activity) resynchronizes all the SnapMirror relationships in the failover direction.

Related concepts

Differences between granular and composite cmdlets and activities on page 117

Related tasks

Preparing to simulate failover on page 125

Troubleshooting partial restore results following a failover or failback operation

Even though the system attempts to restore all virtual machines during failover and failback, sometimes only a subset of the total can be actually restored. It is important to know how to detect and address such partial operations.

About this task

You can scan the event log to determine the reasons for the partial restore results following a failover copy or failback operation. You can use either of two methods to remedy the problem.

Steps

1. Run the `Invoke-OCDRFailover` cmdlet using the `Force` parameter to connect the LUNs and restore virtual machines that were not successfully created.
2. Run the `Reset-OCDRSite` cmdlet with the `Force` parameter on the secondary site followed by the `Invoke-OCDRMirrorResync` cmdlet and reissue the `Invoke-OCDRFailover` cmdlet.

After you finish

Restore failures might also occur during a failback operation. Perform the corrective action in the failback direction.

For more information about restoring virtual machines, see the *OnCommand Plug-in for Microsoft Windows PowerShell Cmdlet and Orchestrator Activity Reference Guide*.

Related concepts

Information displayed in the Events window on page 81

Related tasks

Disaster recovery failover workflow on page 122
Disaster recovery failback workflow on page 123

How the -Force parameter works in disaster recovery failover

If there is a high-availability virtual machine on the primary site and another high-availability virtual machine with the same name but a different GUID on the secondary site, you must use the `-Force` parameter to perform a disaster recovery failover.

After you issue the `Invoke-OCDRFailover` cmdlet with the `-Force` parameter, the disaster recovery failover removes the existing cluster resource with the duplicated name from the secondary site, moves the resource disk to the available storage group, and leaves the existing virtual machine configuration untouched on Hyper-V Manager. Then the disaster recovery failover creates the same cluster resource group on the HA virtual machine.

After the disaster recovery failover operation finishes, there are two virtual machines with the same name in Hyper-V Manager. The disaster recovery failover does not remove the virtual machine with the duplicated name from Hyper-V Manager, because this virtual machine has a different GUID.

SCOM Console and storage controller usage tips

The usage tips are intended to assist you with challenging issues related to your use of the plug-in, the System Center Operations Manager Console, and your storage controller.

Tips for solving SCOM Console issues

If you experience an issue with OnCommand Plug-in for Microsoft and the Microsoft System Center Operations Manager (SCOM) Console, there are some tips you can use to find the source of the problem and solve it.

Console tasks fail consistently

The Data ONTAP Storage Systems pane does not appear in the SCOM Monitoring window.

You must ensure that you imported all the Data ONTAP management packs.

Changes that are made to storage configuration are not reflected in the SCOM Console

Run the Discovery rule again or wait for it to run automatically. By default, this rule runs once in a 24-hour period.

SNMP traps are not appearing in the SCOM Console

Enable the non-emergency trap monitors globally or per storage controller. By default, they are disabled.

Alerts do not reappear after an issue reoccurs

Open Microsoft Health Explorer and select **Reset Health**. As a Microsoft System Center Operations Manager best practice, do not dismiss an alert without resetting its underlying monitor.

Network devices are not discovered when discovery timeout is increased

Ensure that you have done the following:

- Used the correct SNMP version
- Used the default timeout value of two minutes or a value less than five minutes
- Run the System Center Operations Manager Discovery wizard

If you have done all of the items in the list and your storage system still has not discovered the network devices, contact Microsoft for further assistance.

Related information

Microsoft TechNet web site

Tips for solving storage controller issues

If you experience an issue with OnCommand Plug-in for Microsoft and your storage controllers, you can use these tips to help find the source of the problem and resolve it.

Storage systems not found using the Discovery wizard

Ensure that you have enabled SNMP on the storage controllers and that the SNMP community string matches the one that you set on the storage controllers.

Storage controllers appear in the Network Device Monitoring window but not in the Data ONTAP Storage Systems pane

Enable the Data ONTAP Discovery Rule for the Microsoft Operations Manager management server and set the credentials for that server.

Storage controllers appear in the Network Device Monitoring window but not in the Data ONTAP credentials tool

Select **Show all network devices** in the **Data ONTAP Storage Systems** pane. This identifies any devices that OnCommand Plug-in for Microsoft does not support.

Storage controllers do not appear after running Data ONTAP discovery

When you use the System Center Operations Manager Discovery wizard, ensure that you have selected **Network Devices**. After discovery finishes and finds the devices that are not managed, you can select these network devices to be managed by the host proxy agent. This allows OnCommand Plug-in for Microsoft to discover your Data ONTAP storage controllers.

Storage controllers are not found using the Discovery wizard

Ensure that you have enabled SNMP on the storage controllers and that the SNMP community string matches the one that you set on the storage controllers.

Troubleshooting

You should be familiar with certain OnCommand Plug-in for Microsoft issues and their causes so that you can solve problems with consoles, storage controllers, and performance and resource optimization.

Diagnostics using the Debug-OCHost cmdlet

The `Debug-OCHost` cmdlet runs diagnostics on the local machine that you can use to troubleshoot problems with the plug-in. The `Debug-OCHost` cmdlet enables you to check the host configurations.

Troubleshooting OnCommand Plug-in for Microsoft installation and setup

If you encounter unexpected behavior during the installation or when configuring OnCommand Plug-in for Microsoft, you can use specific troubleshooting procedures to identify and resolve the cause of such issues.

When you attempt to run the installer remotely, you get a fatal error

Description	This issue occurs when the plug-in detects that there is software missing.
Corrective action	If the log files do not provide enough information, run the installer using the remote system user interface.

OCPM is not installed

Description

This message occurs when you attempt to clone a virtual machine from the Clone VM from Template add-in for SCVMM Console under the following circumstances:

- SCVMM manages a remote cluster or node on which the plug-in is not installed.
- There are valid virtual machine templates on VHDs that reside on a NetApp LUN on the remote host or cluster.
- From the SCVMM server, you invoke the Clone VM from Template add-in.

When you click **OK** in the error message dialog box, the following additional error message, which is not correct, appears:

```
No valid VM Templates
```

Corrective action Install OnCommand Plug-in for Microsoft on the remote host.

Uninitialized LUNs cannot be connected to the host

Issue Attempts to connect LUNs to the host fail.

Cause This issue occurs when you attempt to use the `Connect-OCStorage` cmdlet or the **Connect Storage to Host** activity to connect to the host uninitialized LUNs that were created using System Manager or the storage system console.

Corrective action You must first map the LUN to the host and then use Windows Disk Management to initialize and format the disk before attempting to connect the LUN to the host.

Connect to controller failed: storage system credentials cannot be found

Description The following error can be encountered when the DNS contains multiple IP addresses for a host name and the host name does not always resolve to the same IP address:

```
Connect to controller failed: storage system credentials
cannot be found.
```

Corrective action You should add credentials for all IP addresses that a host name uses:

- If you add the storage system credentials with the IP address, the plug-in uses the IP address and DNS lookup for the fully qualified domain name (FQDN).
- If you add the storage system credentials with the host name, the plug-in looks up the IP addresses that are associated with the host and adds one of those IP addresses.
- If you perform a get or remove operation with one or more IP addresses, only those IP entries associated with the host name or names is displayed or removed from the OCPM database.
- If you have multiple IP addresses per host name and encounter this error, add the storage system credentials for all IP addresses that the host name can resolve, to ensure that any cmdlet and activity operations that are given host names succeed.

You need to format the disk in drive *x:* before you can use it

Description When you attempt to create a LUN on a machine that is running Windows 2008 R2 SP1, the New-OCStorage cmdlet succeeds but OnCommand Plug-in for Microsoft returns the following error message:

```
You need to format the disk in drive X: before you can use
it.
```

Corrective action Format the newly created disk using Microsoft Disk Management. Right-click the name of the primary partition and select **Format.**

Troubleshooting SCOM

You can use the System Center Operations Manager (SCOM) troubleshooting information to research an issue, view any error messages, determine the cause of that issue, and what the resolution or workaround for that issue is.

%OCSCOMPATH%/executable.exe not found

Message `%OCSCOMPATH%/executable.exe not found`

Cause This message occurs when System Center Operations Manager (SCOM) has not recognized the environment variable and the path to the executable file is missing.

Corrective action Log off and then log on to the system and reopen SCOM.

Errors occur in Eventvwr after discovery is run for a large cluster of Storage Virtual Machines (SVMs)

Issue When you add and run discovery for a large cluster of SVMs, the PowerShell scripts for monitoring are dropped and fail to execute, causing errors to occur in Eventvwr.

Cause This issue occurs when the script limits are exceeded by adding a large cluster of SVMs, which increases the number of monitoring rules that must run simultaneously.

Corrective action

1. Back up the current Windows registry settings.
2. Open the Windows registry editor by typing `regedit` at the Windows run prompt.
3. Navigate to the following registry key: `[HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Microsoft Operations Manager\3.0\Modules\Global\PowerShell]`.
4. Set the DWORD value for multinode storage management servers to `ScriptLimit=100` and `QueueMinutes=60`.
5. Set the DWORD value for a single node storage management server to `ScriptLimit=150` and `QueueMinutes=60`.
6. Exit the registry editor and restart the Windows host.

Health status does not change when an existing SnapMirror pair of controllers is added in SCOM

Issue When an existing SnapMirror pair of controllers is added, the pair's health status, as reported by SCOM, does not change from `Not Monitored` to `Healthy` even though the SnapMirror pair is healthy instead of being not monitored.

Cause This issue occurs when there is a problem with the cache file.

Corrective action

1. Click **Monitoring**.
2. In the navigation pane, select **Data ONTAP** > **Storage Systems** > **Management Server**.
3. In the **Tasks** pane, click **Flush Health Service State and Cache**.
   The health status of the controllers changes to `Healthy`.

SCOM interface appears distorted when scrolling horizontally across the screen

Issue When you select an item in the navigation pane for a storage object running clustered Data ONTAP, the System Center Operations Manager (SCOM) interface sometimes appears distorted when scrolling horizontally across the screen.

Cause This issue occurs when the SCOM user interface is not rendered correctly.

Corrective action Click anywhere in the SCOM user interface to resolve this issue.

Failed to enumerate the disk

Message

```
Failed to enumerate the disk. Discover Storage API failed to
execute, Reason An error occurred while executing the
EnumWindowsDisks. Creating the instance of VDS Loader failed
on the host: msohv02.pmp.local Reason: Access is denied.
```

Corrective action Ensure that the OCPM service account is an administrator on the Hyper-V hosts so that OCPM can discover and populate the hosts and virtual machines.

The root\MSCluster namespace is marked with the RequiresEncryption flag

Message

```
The root\MSCluster namespace is marked with the RequiresEncryption
flag. Access to this namespace might be denied if the script or
application does not have the appropriate authentication level.
```

```
Change the authentication level to Pkt_Privacy and run the script
or application again.
```

Description	This event log message occurs because the plug-in and the application are using different security levels. The plug-in uses packet-level security.
Corrective action	If the plug-in receives this warning, the application temporarily modifies the security to match. No corrective action is needed.

The alignment of some VHDs is not checked when selecting a large number of VHDs in SCOM for VHD alignment checking

Issue	If you select a large number of VHDs when you run the Data ONTAP Virtualization: Check VHD Alignment Status task, some of the VHDs might not be examined for alignment.
Cause	Microsoft restricts the number of PowerShell calls that you can be make.
Corrective action	You should run the Data ONTAP Virtualization: Check Host VHD Alignment Status for Hyper-V Hosts task instead, which examines all VHDs on all selected hosts. Another alternative is to wait for the VHD alignment checking rule to run.

OnCommand Virtual Infrastructure Management Service (VIM_Service) on the local computer started and then stopped

The following error is returned if you used `Ctrl + Break` to end a PowerShell session while a cmdlet was still running:

```
The Virtual Infrastructure Management Service on Local Computer started and
then stopped. Some services stop automatically if they are not in use by
other services or programs.
```

In this case, OnCommand Virtual Infrastructure Management Service (VIM_Service) might not start. If, before you ended the session, the cmdlet had sent any requests to Microsoft Virtual Disk Service (VDS), that service might be left in a state that would prevent restarting.

Workaround:

Restart the VDS service and then restart VIM_Service.

Data ONTAP virtualization objects are not discovered

Description	Data ONTAP Virtualization: Hyper-V Host, LUN, Virtual Machine, or VHD, or Data ONTAP PRO: Hyper-V Virtual Machine Storage objects are not discovered.
Cause	There could be a variety of causes for this issue. You should perform all of the corrective actions until you determine what the cause was.
Corrective action	Ensure that the following conditions exist:

- Data ONTAP management packs have been imported.
- If your Hyper-V host does not meet the requirements for agentless monitoring, you have installed the OnCommand Discovery Agent on these hosts.
- Your virtual machine VHD files reside on NetApp LUNs.
- Your virtual machines are on and appear in Microsoft System Center Virtual Machine Manager.

Troubleshooting SCVMM Console

You can use the System Center Virtual Machine Manager (SCVMM) Console troubleshooting information to research an issue, view any related error messages, determine the cause of that issue, and learn what the resolution or workaround for that issue is.

The OCPM add-ins for SCVMM Console require the plug-in be installed on the SCVMM server

Description	If you have a machine with the SCVMM Console installed and pointing to a SCVMM server on another node, when you attempt to manage controllers in the SCVMM Console machine, the plug-in instructs you to install OnCommand Plug-in for Microsoft on the SCVMM server machine also.
Cause	The OCPM add-ins for SCVMM Console are installed per console and require the OCPM web service on the SCVMM server.
Corrective action	Install OnCommand Plug-in for Microsoft on the SCVMM server.

SCVMM Console crashes after creating new virtual machines

Description	The SCVMM Console crashes if, after you create new virtual machines using Hyper-V or the OnCommand Plug-in for Microsoft add-ins for SCVMM, you return to SCVMM and refresh the virtual machines.
Cause	This is a Microsoft issue.
Corrective action	To correct this issue, install the latest Microsoft System Center 2012 SP1 roll-up updates.

Performance and resource optimization issues

If you experience an issue with OnCommand Plug-in for Microsoft performance and resource optimization (PRO) Tips, you can use troubleshooting tips to help find the source of the problem and resolve it. If your PRO Tips implementation fails, ensure that you have the necessary credentials.

Related information

Microsoft TechNet web site

PRO Tips do not appear if your system is not configured correctly

Description

Virtualization alerts do not show up as PRO tips if your system is not configured correctly.

Corrective action

You can perform the following tasks:

- Ensure that the Data ONTAP management packs have been imported.
- Ensure that the Data ONTAP PRO Discovery Rule for the Microsoft System Center Operations Manager (SCOM) management server has been enabled and that the credentials for that server have been set.
- Ensure that alerts appear in the Hyper-V virtual machines in the storage folder.

  If alerts appear, ensure that System Center Virtual Machine Manager is configured to receive PRO Tips from the System Center Operations Manager management server that runs OnCommand Plug-in for Microsoft.
- In multinode and Network Load Balancing (NLB) SCOM server deployments, ensure that the SCVMM server is connected to the SCOM server having the Root Management Server (RMS) Emulator set to Yes.

View PRO script is not visible for PRO Tips

Cause

View PRO script is visible only if you use the built-in Microsoft PRO module. In SCVMM 2012, this module runs on the SCVMM server so that **View PRO script** is not visible.

Corrective action

Use the Microsoft PRO module to view the PRO script.

Troubleshooting Orchestrator

You can use the Orchestrator troubleshooting information to research an issue, view any error messages, determine the cause of that issue, and learn what the resolution or workaround for that issue is.

The published data is not visible even though you subscribed

Issue

The published data is not visible even though you subscribed to it in the user interface.

Corrective action

1. Double-click the name of the Orchestrator activity for which you want to receive published data.
2. In the properties window, go to the **Run Behavior** tab, click the **Flatten** check box, and then click **Finish.**
3. Link the selected activity to another activity, such as the **Append Line** activity.
4. Right-click in one of the text boxes in the properties window and select **Subscribe** > **Published Data**.
   The Published Data window opens with the published data displayed.

You can go back to uncheck the **Flatten** check box. The properties remain.

VIM web service does not restart

Issue

If you try to halt an operation by restarting the VIM web service, the VIM web service might not restart.

Cause

A cmdlet operation was interrupted while the VIM web service was running.

Corrective action

Perform the following procedure:

1. Go to **Administrative Tools** > **Services**.
2. From **Virtual Disk service**, restart the VDS service.
3. Restart the VIM web service.

The Create Clone request is invalid

Message

When a user attempts to create a clone and the following error message is returned:

```
The create clone request is invalid. Reason : Error: - SCVMM
Administrator console not installed on the local host.
```

```
Exception: FaultException`1 Target site:
RealProxy.HandleReturnMessage Stack trace: ...
```

Description This message occurs when a user attempts to clone a virtual machine with an System Center Virtual Machine Manager (SCVMM) template on a system on which there is no SCVMM Console installed on the local host.

Corrective action

- Ensure that the correct web service server is specified in the activity properties where the template is located and the web service is installed.
- Ensure that the SCVMM Console is installed on the same server on which the template resides if it is not an SCVMM server.

The specified virtual machine is not found on your local host

Message

```
The specified Virtual machine <VM Name> is not found on your
local host <localhost>. Remote VM delete operations are not
supported. Please try the operation on the host where VM is
present.
```

Corrective action Ensure that when you build the **Delete VM** workflow, the VIM web service server used in the input field must be the server where the virtual machine is located and where you have installed the VIM web service.

Troubleshooting provisioning

You can use the provisioning troubleshooting information to research an issue, view any error messages, determine the cause of that issue, and learn what the resolution or workaround for that issue is.

Storage connection operations fail and request MPIO

Issue Storage connection operations fail and request multi-path I/O (MPIO) regardless of whether the multiple initiators belong to the same or different hosts.

Cause If the node on which you are running the `New-OCStorage` or the `Connect-OCStorage` cmdlet does not have MPIO enabled and you try to specify more than one FCP initiator in the `InitiatorName` parameter, the storage connection operation fails.

When two FCP initiators are enabled from each host (which does not have MPIO enabled and for which no FCP initiators are provided), the plug-in selects one FCP initiator from each node by default and succeeds in creating the cluster disk.

Corrective action Do not use the `InitiatorName` parameter when you provision new storage or when you connect LUNs to a host that has multiple FCP initiators.

Set-OCStorageSize cmdlet fails to resize the disks

Issue The `Set-OCStorageSize` cmdlet fails to resize the LUNs without multipath network I/O (MPIO).

Cause The LUNs were created before MPIO was installed but resized after MPIO was installed which caused the failure to resize the disks.

Corrective action You should either create and resize the LUNs under with MPIO installed, or create and resize the LUNs without MPIO installed. If you do one of the following two processes to resize your LUNs, the resize operation will fail:

1. With MPIO installed, create a new LUN. Uninstall MPIO and resize the LUN.
2. Without MPIO installed, create a new LUN, then install MPIO and resize the LUN.

An Unexpected Error occurred while adding disk to the Cluster

Description The `New-OCStorage` cmdlet fails with an unspecific error when you try to use an existing ResourceName value.

Corrective action Create a new ResourceName value when provisioning or connecting a LUN to the host.

Troubleshooting cloning

You can use the cloning troubleshooting information to research an issue, view any error messages, determine the cause of that issue, and learn what the resolution or workaround for that issue is.

When you try to create a clone from an SCVMM template, you receive an error

Issue When you try to create a clone from an SCVMM template, you receive an error.

Cause The specified destination server is not managed by an SCVMM server.

Corrective action Add the clone destination server to the SCVMM server.

Highly available virtual machines are not created because of conflicting VM names

Issue Clones created for CSV virtual machines with a name that is already in use are not highly available.

Cause The failure to create highly available virtual machines is caused by conflicting virtual machine names if all the virtual machines in the CSV are not on the node where the plug-in cmdlet is executed. A virtual machine that is first created with a particular name is highly available; a virtual machine that is subsequently created with the same name is not highly available.

Corrective action The plug-in does not create any virtual machine name conflicts if all the virtual machines that are created using the base name that is included in the cmdlet parameters are owned by the same node on which you run the operation.

ValidateCreateCloneRequest: Invalid mount point

Message When you attempt to create a clone, you receive the following error message: `ValidateCreateCloneRequest: Invalid mount point for create clone request.`

Description Either the specified mount point format is invalid or the mount point is in use on the clone destination server.

Corrective action Use another mount point or correct the mount point format.

ValidateLunOsType failed

Description This message occurs when you attempt to create a LUN that contains the source virtual machine or template VHD with an unsupported OS type. The supported OS types are `Windows_2008` and `Hyper_V`.

Corrective action Create a new LUN with the proper OS type and create a source virtual machine or template on it.

VMM is unable to complete the request

Message When you attempt to create a clone from a template, you receive the following error message: `VMM is unable to complete the request. The connection to the agent on machine has been lost.`

Description This message occurs when there is a connection problem from the System Center Virtual Machine Manager (SCVMM) server to the Hyper-V server on which the virtual machine was being deployed.

Corrective action Check the network access from the SCVMM server to the Hyper-V server.

Check that the DNS name resolves to the proper I/O address for the SCVMM server and the Hyper-V server.

Error (10608) Cannot create a highly available virtual machine

Message

The following error message appears in the System Center Virtual Machine Manager (SCVMM) 2012 Job Status window.

```
Error (10608) Cannot create a highly available virtual machine
because Virtual Machine Manager could not locate or access \\?
\Volume{47b16511-a9dd-4079-87bb-89ca6620cfc5}\. Recommended
Action Ensure that the path exists and that the path is for a
cluster disk in available storage, and then try the operation
again.
```

Description

If you want to use an SCVMM template to create one new shared disk and clone three new virtual machines into that new shared disk, you can run the following script:

```
New-OCClone -Verbose -BaseVMName TestNWSHRD -VMMServer ocpmh3 -
Template Win2K8R2SP2EE_High -AllInSingleLUN -NumberofClones 3
```

The cmdlet succeeds in creating the new shared disk and also succeeds in creating the first virtual machine into the new shared disk, but it fails to create the remaining two virtual machines and SCVMM returns an error.

Corrective action

If you want to clone multiple virtual machines into one single LUN, use the `-CSV` parameter along with the `-AllInSingleLun` parameter to create one new single CSV LUN and then clone all the virtual machines into it.

If you want to clone multiple virtual machines into new shared disks, do not use the `-AllinSingleLun` parameter, because it creates one new LUN for each virtual machine.

New-OCClone cmdlet fails when cloning one virtual machine to each new LUN for a total of more than 255 virtual machine clones

Issue

The `New-OCClone` cmdlet fails when you try to clone one virtual machine into one each new LUN for a total of more than 255 virtual machine clones.

Cause

When you try to clone more than 255 virtual machines into one single LUN, the clone operation is successful. But when you try to clone one virtual machine each into one single new LUN for a total of 255 new virtual machines, the cmdlet fails because of a limitation on the number of LUNs that can be cloned. The limitation states that for each target, Windows supports 254 LUNs.

Corrective action

- If you want to clone all the virtual machines into an existing LUN, you must use the `MountPoint` parameter to point to the existing LUN.

- If you want to clone all the virtual machines into a new LUN, you must use the `AllInSingleLun` parameter so that all the virtual machines are cloned into one new LUN.

Hyper-V virtual machine internal strings do not update consistently

Issue	Hyper-V virtual machine internal strings do not update consistently.
Cause	The multilingual user interface (MUI) settings on an internationalized version of Microsoft Windows 2008 R2 were changed.
Corrective action	None; the MUI settings are not supported.

Troubleshooting disaster recovery

You can use disaster recovery troubleshooting information to research an issue, view any error messages, determine the cause of that issue, and learn what the resolution or workaround for that issue is.

Matrix of error and warning events

Live disaster recovery requires that the virtual machine configuration data be stored on the secondary site for a restore operation to be successful. Consequently, the disks are disconnected prior to deleting the virtual machine, which then causes the creation of erroneous event log messages.

All the errors and warnings that are generated on a host from any log are also reported in the Administrative Events log, which can be found in the Custom Views folder of the Event Viewer. The following matrix lists some of the possible events by their ID names and sources, and describes them. You can refer to this matrix to determine which events that you do not need to troubleshoot.

Event ID	Event source	Type and description
4096	**Microsoft** > **Windows** > **Hyper-V** > **Config**	Error. The virtual machine's configuration is no longer accessible. The device is not ready.
4657	**Microsoft** > **Windows** > **Failover** > **ClusteringManager**	Error. An error occurred opening resource virtual machine configuration for the virtual machine being removed.
16150	**Microsoft** > **Windows** > **Hyper-V** > **VMMS**	Warning. Cannot delete directory. The directory is not empty.

Event ID	Event source	Type and description
16300	**Microsoft** > **Windows** > **Hyper-V** > **VMMS**	Error. Cannot load a virtual machine configuration. Cannot create a file when that file already exists.
16410	**Microsoft** > **Windows** > **Hyper-V** > **VMMS**	Error. Cannot access the data folder of the virtual machine that is in the process of being removed.
20848	**Microsoft** > **Windows** > **Hyper-V** > **VMMS**	Error. Failed to lock the virtual machine's configuration. The specified network resource or device is no longer available.

Remove-OCVM and Reset-OCDRSite cmdlets do not remove the virtual machine record from SCVMM 2012

Issue

Neither the `Remove-OCVM` nor the `Reset-OCDRSite` cmdlets remove the virtual machine record from the SCVMM 2012 VMs and Services view. You must manually delete the record.

Corrective action

To manually delete the record, perform the following steps:

1. Go to the VMs and Services view in System Center Virtual Machine Manager (SCVMM).
2. Select the appropriate cluster or host.
   A list of virtual machines appears. The status of the virtual machine is “missing”.
3. Right-click the name of the appropriate virtual machine and select **Delete**.

Reset-OCDRSite does not delete virtual machine configuration file and resource group

Issue

When you run the `Reset-OCDRsite` cmdlet with the `-Force` and `-Full` parameters, it should remove all virtual machines and LUNs that are in the disaster recovery plan from the secondary site. But when virtual machines are on mount points, sometimes the virtual machine configuration file and the cluster resource are not deleted, although the LUNs are removed.

Corrective action

After you run the `Reset-OCDRSite` cmdlet with the `Force` and `Full` parameters, perform the following steps:

1. Go to Failover Cluster Manager.
2. Perform one of the following steps, based on your operating system:

- If you are using Windows 2008 R2, in Services and Applications pane, manually delete the remaining virtual machine resource groups that are associated with the deleted virtual machine.
- If you are using Windows 2012 SP1, in the Nodes pane, manually delete the remaining virtual machine resource groups that are associated with the deleted virtual machine.

This removes both the virtual machine cluster resource and the virtual machine configuration file.

You can avoid this issue in the future if you perform the following steps:

1. Run the `Reset-OCDRsite` cmdlet with the `-Force` parameter.
2. Run the `Reset-OCDRsite` cmdlet with the `-Force` and `-Full` parameters.

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