



Technical Report

OnCommand Plug-In 4.0 for Microsoft Best Practices Guide

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1 Introduction

The NetApp® OnCommand® Plug-In 4.0 for Microsoft® is an enterprise-class storage monitoring application that provides integration with 2012 SP1 versions of Microsoft System Center Operations Manager (SCOM), System Center Virtual Machine Manager (SCVMM), and System Center Orchestrator (SCO). It enables administrators to monitor, manage, and report NetApp storage.

Table 1 lists the commonly used acronyms and abbreviations in this technical report.

Table 1) Acronyms and abbreviations.

Acronym or Abbreviation	Definition
OCPM	NetApp OnCommand Plug-In 4.0 for Microsoft.
SC	Microsoft System Center solutions are a set of management products that help IT pros manage physical and virtual IT environments.
SCOM	A member of the SC family, System Center Operations Manager is the end-to-end service management product that works with Microsoft software and applications, helping organizations increase efficiency while enabling greater control of the IT environment.
SCOM console/server	SCOM console refers to the software installation of SCOM, which allows the user to launch the console GUI to view managed objects and perform administrative SCOM tasks. SCOM server refers to the computer that has the SCOM console installed.
SCOM agent	SCOM agent refers to the software installation of SCOM in which the SCOM SDKs and connectors are installed on a system that does not have the SCOM console installed. This installation does not have the user interface (UI), and it is intended for systems that must communicate monitoring and other information to the SCOM server. This agent can be installed remotely on systems using the SCOM console on the SCOM server.
SCVMM	A member of the SC family, System Center Virtual Machine Manager is for IT professionals responsible for managing virtual infrastructures. SCVMM provides a solution for the following: <ul style="list-style-type: none"> • Unified management of physical and virtual machines • Performance and resource optimization (PRO) for dynamic and responsive management of virtual infrastructure • Consolidation of underutilized physical servers • Rapid provisioning of new virtual machines by leveraging the expertise and investments in Microsoft Windows Server® technology
PRO	Performance and resource optimization (PRO), a feature of System Center Suite that in SC 2012 SP1 can be implemented both in SCOM and SCVMM, ties specific alerts from System Center Operations Manager (SCOM) to remediation actions in SCVMM. Management packs that allow using this SCVMM PRO feature are referred to as Data ONTAP® PRO management packs.
MP	Management pack. It defines the author's definition of a healthy state for application, services, or hardware that SCOM monitors.
SCO	System Center Orchestrator is a workflow management solution for the data center. Orchestrator lets you automate the creation, monitoring, and deployment of resources in your environment.
SVM	Storage Virtual Machine (SVM) is a logical storage unit. Clusters are administered on a whole cluster rather than on a per-node basis and data is served from one or more SVMs.

Acronym or Abbreviation	Definition
	Each SVM is configured to own storage in the form of volumes provisioned from a physical aggregate and logical interfaces (LIFs).
Controller	A NetApp storage element that serves data.
MultiStore	MultiStore [®] technology is an abstraction in Data ONTAP that allows a controller to be partitioned into a set of relatively independent "virtual" controllers (vFiler [®] units). MultiStore needs to be licensed on the controller.

1.1 Target Audience

This technical report is intended for NetApp storage and Windows Server administrators who manage NetApp storage systems using the NetApp OnCommand Plug-In 4.0 for Microsoft (OCPM). OCPM is installed on the SCOM server, which gives Windows IT administrators a central interface to monitor NetApp storage systems using System Center Operation Manager. OCPM also includes an SCO integration pack (OIP) and PRO-enabled management packs and rapid provisioning cmdlets. OnCommand Plug-In 4.0 for Microsoft discovers hardware and storage layouts of your NetApp storage systems and provides alerts, health views, and various performance views. Customers can also dynamically manage their virtualized environment along with performance and resource optimization (PRO). PRO is a feature of System Center that enables dynamic management of virtualized infrastructure, providing alerts and events.

A good understanding of Windows[®] administration, SCOM, SCVMM, and SCO is necessary, as well as an understanding of NetApp storage concepts. The recommendations in this document are guidelines to assist with configuration of OnCommand Plug-In 4.0 for Microsoft. NetApp recommends that you refer to the following guides before using this technical report:

- [OnCommand Plug-In 4.0 for Microsoft Installation and Administration Guide](#)
- [OnCommand Plug-In 4.0 for Microsoft Release Notes](#)
- [OnCommand Plug-In 4.0 for Microsoft Cmdlet Reference Guide](#)

2 Installation and Basic Configuration

2.1 System Requirements

Table 2 provides the installation requirements to successfully run OnCommand Plug-In 4.0 for Microsoft.

Table 2) OCPM installation requirements.

Category	Requirements
Hardware requirements	<ul style="list-style-type: none"> • Microsoft System Center Operations Manager 2012 SP1 (SCOM) • Microsoft System Center Virtual Machine Manager 2012 SP1 (SCVMM) • Microsoft System Center Orchestrator 2012 SP1 (SCO) • Determine the hardware requirements. For more information, go to http://technet.microsoft.com/en-us/library/hh546785.aspx.
Data ONTAP requirements	<p>Data ONTAP 7 product family, Data ONTAP 7-Mode in the following:</p> <ul style="list-style-type: none"> • 7.3.4 or later • 7.3.3 or later for MultiStore support • 7.3.7 <p>Data ONTAP 8 product family, Data ONTAP 7-Mode in the following:</p>

Category	Requirements
	<ul style="list-style-type: none"> • 8.0.1, 8.0.2, 8.0.3, 8.0.4, 8.0.5 • 8.1.0, 8.1.1, 8.1.2 • Clustered Data ONTAP 8.2P4
Software requirements	<ul style="list-style-type: none"> • Windows PowerShell® V3, .NET 4.0 or later Microsoft System Center Operations Manager 2012 SP1 (SCOM) for management packs • Microsoft System Center Virtual Machine Manager 2012 SP1 (SCVMM) for cloning cmdlets and SCVMM add-ins • Microsoft System Center Orchestrator 2012 SP1 (SCORCH) for SCORCH integration packs <p>For more information, refer to the Microsoft TechNet website.</p>
SCOM configuration	<p>You must configure Microsoft System Center Operations Manager 2012 SP1 (SCOM) for reporting so that the reporting management pack appears with the other management packs. To do this, you need to correctly configure the SQL Server® reporting services. For more information, refer to the Microsoft TechNet website.</p>
SCOM library requirements	<p>The following System Center Operations Manager management packs are required for OnCommand Discovery Agent functionality:</p> <ul style="list-style-type: none"> • Microsoft.SystemCenter.Library • 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.Library • Microsoft.SystemCenter.VirtualMachineManager.Library <p>The following System Center Operations Manager libraries are required for reporting functionality:</p> <ul style="list-style-type: none"> • Microsoft.SystemCenter.DataWarehouse.Report.Library • Microsoft ODR Report Library • Microsoft.SystemCenter.DataWarehouse.ServiceLevel.Report.Library
Microsoft licenses	<ul style="list-style-type: none"> • Windows Server 2012, Windows Server 2008 R2 SP1 • Microsoft SQL Server 2008 R2 SP1 and above • Microsoft System Center Operations Manager 2012 SP1 • Microsoft System Center Virtual Machine Manager 2012 SP1
OCPM requirement	<ul style="list-style-type: none"> • To correctly install OnCommand Plug-In 4.0 for Microsoft, you must first uninstall earlier versions of OCPM 3.2.1. The installer informs the user that the installation cannot proceed and exits if older versions are found. • Make sure that firewalls, proxies, or other network devices do not interfere with traffic. The required ports are SNMP and HTTP or HTTPS.
OnCommand discovery agent requirements	<ul style="list-style-type: none"> • Hyper-V® server role is enabled. • Windows Server 2008 R2 SP1 or later is installed.
Orchestrator integration packs	<ul style="list-style-type: none"> • You must install System Center Orchestrator and deploy the integration packs to the runbook server.

Category	Requirements
	<ul style="list-style-type: none"> To enable cloning, provisioning, and disaster recovery functionality, OnCommand Plug-In VIM web services must be installed in the Windows Server 2008 R2 SP1 host or later. You must have .NET 4 or later version installed on the SCO runbook server.

2.2 OCPM Preinstallation Requirements

After Microsoft SCOM and SCVMM have been installed and properly configured, the administrator can continue with the OnCommand Plug-In 4.0 for Microsoft installation. SCOM and SCVMM must be properly integrated for virtual machine-based alerts and functionality. Hyper-V hosts must also be added to both SCOM and SCVMM servers to facilitate PRO functionality. The following procedures can help administrators determine if SCVMM has been properly integrated with SCOM.

- To confirm that SCVMM is configured with SCOM:

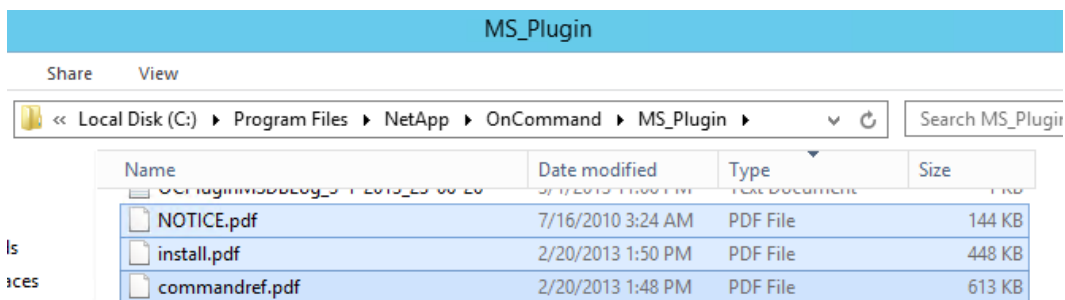
From SCVMM console:

 - Click the Administration tab.
 - Select System Center settings.
 - Right-click Operations Manager Server and type in the SCOM server name.
- Confirm that Hyper-V nodes are added to SCVMM:
 - Click the VMs and Services tab.
 - Select and expand "All Hosts."
 - Confirm that Hyper-V hosts are listed.
 - Use the Add Hyper-V Hosts and Clusters action to provide Hyper-V host and credential information.
- From the SCOM console:
 - Click the Monitoring tab.
 - Select the Virtual Machine Manager 2012 Views.
 - Select Diagram View and make sure that Hyper-V VMs are visible.

Refer to the Microsoft System Center documentation to facilitate smooth installation and configuration. For more information, refer to <http://technet.microsoft.com/en-us/library/hh205990.aspx>.

Refer to the [OnCommand Plug-In 4.0 for Microsoft Installation and Administration Guide](#) to facilitate smooth installation and configuration.

The NetApp Installation and Administration Guide (IAG) is in the installation directory for OCPM 4.0. You can also refer to the [Windows PowerShell Cmdlet Reference Guide](#).



2.3 NetApp Storage Minimal Access Control

In some IT environments, a detailed assignment of the minimal permissions is required. Table 3 lists the permissions that are needed to connect to the storage system from OnCommand Plug-In for Microsoft and gather monitoring data by using a local account on the storage system. This set of permissions is purely for monitoring the OnCommand Plug-In for Microsoft basic functions and does not include any of the advanced features.

This local Data ONTAP account needs to be assigned a customized role, and it contains the following permissions.

Note: These are the minimum required permissions for basic monitoring only. They do not contain any active management, cmdlets, or SCVMM PRO functionality.

Table 3) NetApp storage permissions for basic monitoring.

NetApp Storage Permissions
login-http-admin
api-system-get-version
api-system-get-info
api-system-get-vendor-info
api-cf-status
api-system-get-ontapi-version
api-vfiler-list-info
api-ems-autosupport-log
api-aggr-list-info
api-volume-list-info
api-lun-list-info
api-disk-list-info
api-storage-shelf-list-info
api-license-list-info
api-lun-map-list-info
api-volume-autosize-get
api-aggr-options-list-info
api-qtree-list
api-storage-shelf-environment-list-info
api-lun-get-space-reservation-info
api-volume-options-list-info
api-perf-object-get-instances
api-snmp-get

NetApp Storage Permissions

api-snapmirror-get-status

api-quota-report-iter-start

api-quota-report-iter-next

Example: Sample command to add/modify a custom role:

```
useradmin role modify scom-user-roles -a login-http-admin,api-system-get-version,api-system-get-info,api-system-get-vendor-info,api-cf-status,api-system-get-ontapi-version,api-vfiler-list-info,api-ems-autosupport-log,api-aggr-list-info,api-volume-list-info,api-lun-list-info,api-disk-list-info,api-storage-shelf-list-info,api-license-list-info,api-lun-map-list-info,api-volume-autosize-get,api-aggr-options-list-info,api-qtree-list,api-storage-shelf-environment-list-info,api-lun-get-space-reservation-info,api-volume-options-list-info,api-perf-object-get-instances,api-snmp-get,api-snapmirror-get-status, api-quota-report-iter-start, api-quota-report-iter-next
```

Sample Windows PowerShell command using the Data ONTAP PowerShell toolkit to add a new role with the preceding capabilities:

```
New-NaRole -Role scom-user-roles -Capabilities login-http-admin,api-system-get-version,api-system-get-info,api-system-get-vendor-info,api-cf-status,api-system-get-ontapi-version,api-vfiler-list-info,api-ems-autosupport-log,api-aggr-list-info,api-volume-list-info,api-lun-list-info,api-disk-list-info,api-storage-shelf-list-info,api-license-list-info,api-lun-map-list-info,api-volume-autosize-get,api-aggr-options-list-info,api-qtree-list,api-storage-shelf-environment-list-info,api-lun-get-space-reservation-info,api-volume-options-list-info,api-perf-object-get-instances,api-snmp-get,api-snapmirror-get-status, api-quota-report-iter-start, api-quota-report-iter-next
```

2.4 OnCommand Plug-In 4.0 for Microsoft Installation

Administrators have the option of installing the entire OnCommand Plug-In 4.0 for Microsoft package or to select specific components with the custom install option. The following image describes the available installation packages under the SCOM management packs. The installation package checks the system being installed and automatically selects or deselects components.

For more information on the components available for installation, refer to the [OnCommand Plug-In 4.0 for Microsoft Installation and Administration Guide](#).

During installation, the installer will:

- Automatically uncheck the SCOM management packs feature from the feature tree if SCOM 2012 SP1 installation is not detected on the system.
- Automatically uncheck the SCVMM console add-ins feature from the feature tree if SCVMM 2012 SP1 installation is not detected on the system.
- Check for any missing management pack requirements and provide a list to the user. Refer to section “, “
- Management Pack Dependencies,” in this document for management pack dependencies.
- Automatically import management packs (those that have met all the requirements) into SCOM.

2.5 Management Pack Dependencies

The following lists the management pack dependencies for OCPM MPs. Most of the Microsoft management packs can be found within the SCOM installation; others might need to be downloaded. Check the Microsoft management pack catalog for missing MPs available at <http://pinpoint.microsoft.com/en-US/systemcenter/managementpackcatalog>.

Following are the management pack dependencies for OCPM MPs:

- Data warehouse library
- Health library
- Microsoft generic report library
- Instance group library
- Network device library
- Performance library
- SNMP library
- System Center core library
- System Center Virtual Machine Manager 2008 R2 PRO library
- Windows core library
- VMM library
- VMM PRO library
- VMM PRO V2 library
- VMM 2012 discovery

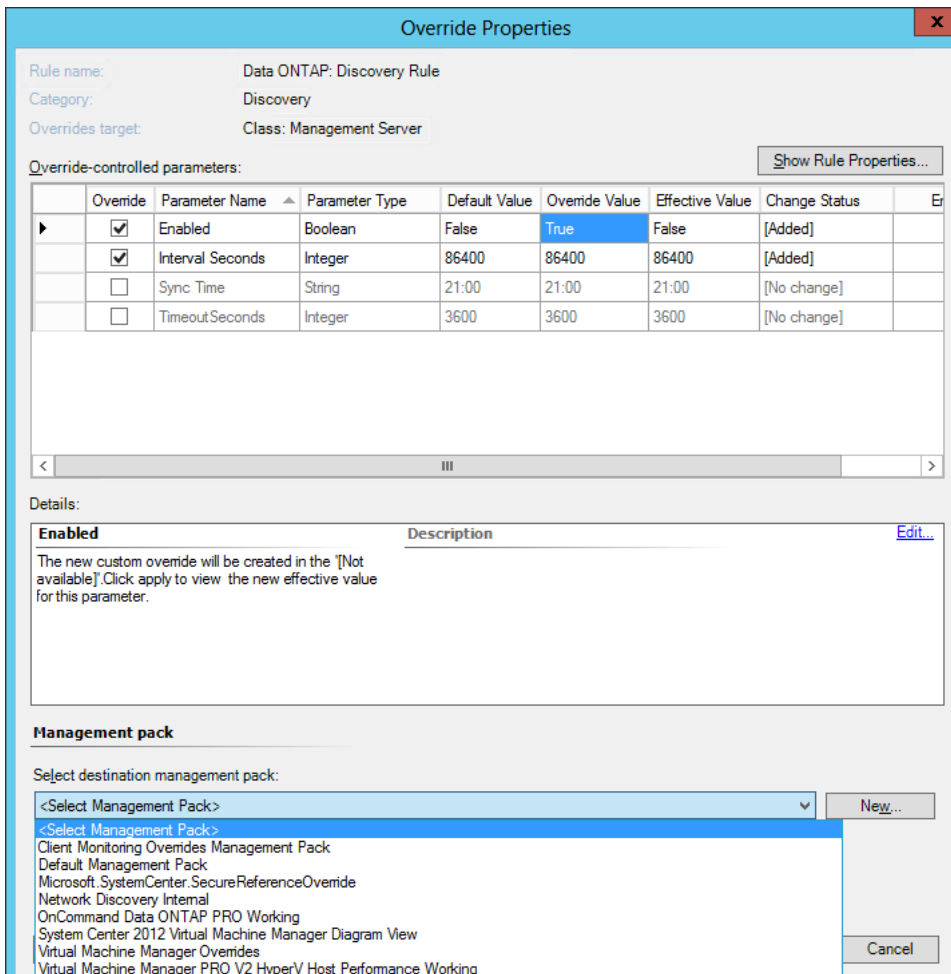
2.6 OCPM Overrides and Defaults

Administrators will be asked to enable specific rules, such as the discovery rule, to start the discovery process. The changes to these rules are called “overrides,” and they will need to be saved in a management pack. Saving overrides in the default management pack will cause issues with upgrades and uninstallation of OCPM. To mitigate any problems in the future, create a new management pack and save the OCPM overrides to the newly created management pack prior to enabling any overrides for OnCommand Plug-In 4.0 for Microsoft.

The discovery interval is 24 hours by default; in most cases this should not be changed because it might disrupt the SCOM environment if the discovery interval is set too short, causing a shortage in resources such as CPU, memory, and network. NetApp does not recommend setting the interval to any less than 4 hours and as a best practice recommends that this be kept at the 24-hour default.

Figure 1 illustrates the Data ONTAP discovery rule overrides.

Figure 1) Data ONTAP discovery rule overrides.



2.7 OCPM for Monitoring Data ONTAP 7-Mode Systems

Many steps are required when configuring SCOM and SCVMM to work with OCPM. OCPM also requires a number of steps after installation of SCOM and SCVMM to function correctly. The following list includes general steps required for having OCPM function properly. For more specific details, refer to the [OnCommand Plug-In 4.0 for Microsoft Installation and Administration Guide](#).

1. SCOM installation prerequisites:
 - Review the SCOM Installation Guide for requirements: <http://technet.microsoft.com/en-us/library/hh205987.aspx>
 - SCOM Reporting: SCOM reporting module installation is required.
 - SCVMM: SCVMM installation and PRO integration are required between SCOM and SCVMM.
2. Make sure that all installation requirements are met. Confirm proper functionality prior to proceeding with OCPM installation. For more details, refer to the Microsoft documentation for SCOM, SCVMM, or reporting at <http://technet.microsoft.com/en-us/library/hh205987.aspx>.
3. OnCommand Plug-In 4.0 for Microsoft installation: Download from [NetApp Support](#) site.
 - a. Install OnCommand Plug-In 4.0 for Microsoft.
 - b. Run the OnCommand Plug-In 4.0 for Microsoft executable on the SCOM server.

Note: SNMP version support:

- For Data ONTAP versions earlier than 7.3, only SNMP V1 will be supported.
 - For Data ONTAP version 7.3 and later, SNMP V3, SNMP V2C, and SNMP V1 will be supported.
 - c. Add NetApp storage controller:
 - Go to Monitoring, Management Server “Data ONTAP: Run Discovery Task” Discovered Inventory (make sure the Discovered Inventory scope is set to Management Server).
 - You can also add controllers individually using “Data ONTAP: Add Controller.”
 - d. Add NetApp storage credentials:
 - e. Select “Data ONTAP: Manage Controller Credentials” (make sure the user credentials have appropriate roles and capabilities assigned; see section 2.3, “NetApp Storage Minimal Access Control,” for minimum roles and capabilities).
4. Enable discovery:
- a. Go to Authoring > Rules > Filter and look for “Data ONTAP: Discovery Rule” under Management Server (not Data ONTAP Management Server). Enable PRO if installed and configured.
 - b. Right-click rule and select Overrides > Override the Rule > for all objects of class: Management Server. Select Override for Enabled and set Override Value to True. Follow the best practice for overrides in section 2.6, “OCPM Overrides and Defaults,” and save all OnCommand Plug-In 4.0 for Microsoft overrides to a new management pack.
- Note:** Any custom_MPs created using earlier versions of OCPM will be deleted during upgrade to OCPM4.0.
5. PRO tips environments:
- a. Install OnCommand Plug-In 4.0 for Microsoft Agent on all Hyper-V parent nodes managed by SCVMM if monitoring is required by OnCommand Plug-In 4.0 for Microsoft.
- Note:** This is only needed if the Hyper-V host has LUNs mapped by using Fibre Channel protocol (FCP).
6. Enable PRO tips:
- a. From SCVMM Console > Settings > Operations Manager Settings > Check the box that states Enable Performance and Resource Optimizations.

2.8 OCPM for Monitoring Clustered Data ONTAP Systems

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.

- Adding a storage system: In the SCOM console navigation pane, click Monitoring. Select clustered Data ONTAP > Management Servers. In the Tasks pane, click clustered Data ONTAP: Manage Storage Systems. The Manage Storage Systems dialog box appears. Click Add. Type the name or IP address of the storage system, whether it is a cluster or an SVM, and the user credentials of the system that you want to add.
- Running discovery on clustered Data ONTAP: In the SCOM console navigation pane, click Monitoring. Select clustered Data ONTAP > Management Servers. In the Tasks pane, click clustered Data ONTAP cluster: Discovery Task. The Discovery Task dialog box appears. Select the storage targets on which you want to run discovery and click Run.

Clustered Data ONTAP SCOM management pack has clustered Data ONTAP storage discovery and clustered Data ONTAP virtualization discovery enabled by default. For the clustered Data ONTAP SCOM management pack, the discovery rules are targeted at a resource pool. Hence the discovery rules are enabled by default. You can verify the same with the Debug-OCHost cmdlet.

Figure 2) Debug-OCHost output.

```
Administrator: OnCommand Cmdlets
PS C:\> Debug-OCHost -CheckSettings
SCOM Clustered Data ONTAP storage discovery : Enabled
SCOM Clustered Data ONTAP virtualization discovery : Enabled
SCOM 7-mode Data ONTAP storage discovery : Disabled
SCOM 7-mode Data ONTAP virtualization discovery : Disabled
OCPM UIM service status : Running
OCPM UIM service port number : 808
OCPM WMI provider status : OK
Remote Registry status : Not Configured
Remote powershell status : Enabled
Firewall settings : Configured
Multipath I/O : Disabled
Data ONTAP DSM : Not Configured
Microsoft DSM : Not Configured
OCPM SQL server instance : SCOM2012SP1-UI
OCPM SQL server port : 1433
PS C:\> _
```

Running virtualization discovery on clustered Data ONTAP: In the SCOM console navigation pane, click Monitoring. Select clustered Data ONTAP > Management Servers. In the Tasks pane, click clustered Data ONTAP: Virtualization Discovery Task. The Virtualization Discovery Task dialog box appears. Select the storage targets on which you want to run discovery and click Run.

- Initiating storage discovery in SCOM: In the SCOM console navigation pane, click Monitoring. Select clustered Data ONTAP > Management Servers. In the Tasks pane, click clustered Data ONTAP cluster: Manage Storage Systems. The Manage Storage Systems dialog box appears. Click Discover. Select the storage targets on which you want to run discovery and click Run.
- Overriding clustered Data ONTAP management pack rules: In the SCOM console navigation pane, click Authoring. In the navigation pane, select Management Pack Objects > Rules. In the search field, type clustered Data ONTAP and click Find Now. From the list of rules, right click any rule and set the overrides for all objects or specific objects or the entire group. 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. Save the changes to the management pack.

2.9 Manual Discovery of Data ONTAP 7-Mode Storage Systems

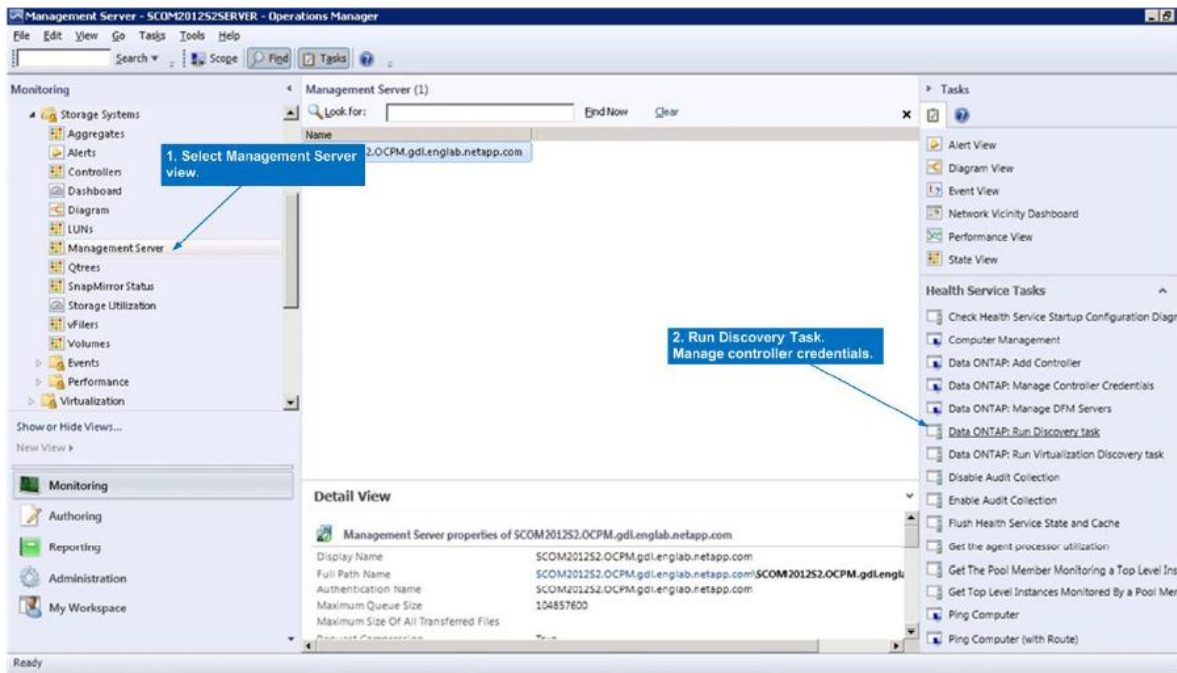
After installing OnCommand Plug-In 4.0 for Microsoft and all of the required management packs, a discovery process is required to capture all of the data to populate the SCOM console with the NetApp information. The manual process can be started by launching the Data ONTAP run discovery task. For Data ONTAP 7-Mode systems, the discovery is disabled by default, and you would need to make sure that you have followed the steps in section 2.7, “OCPM for Monitoring Data ONTAP 7-Mode Systems,” to enable the discovery process. For more details, refer to [OnCommand Plug-In 4.0 for Microsoft Installation and Administration Guide](#) for proper setup of the environment prior to running manual discovery.

To manually run a discovery task:

1. Select the Management Server view under the Data ONTAP folder.
2. Click Data ONTAP: Run Discovery Task to initiate the manual discovery process.

Figure 3 illustrates the manual discovery task.

Figure 3) Manual discovery task.



2.10 Manual Discovery of NetApp Clustered Data ONTAP Storage Systems

1. Select the Management Server view under the clustered Data ONTAP folder.
2. Click clustered Data ONTAP: Discovery Task to initiate the manual discovery process.

After installing OnCommand Plug-In 4.0 for Microsoft and all of the required management packs, run the clustered Data ONTAP discovery task by completing the following steps.

Note: Unlike Data ONTAP 7-Mode, SCOM clustered Data ONTAP storage discovery and SCOM clustered Data ONTAP virtualization discovery are enabled by default, and you need not enable them manually by accessing the authoring pane as we did for clustered Data ONTAP 7-Mode in section 2.7.

OCPM now allows you to perform the discovery task after adding the storage system from one console. The "Discover" button allows you to do this by running both a clustered Data ONTAP discovery task and a clustered data ONTAP virtualization discovery task.

Figure 4 illustrates the manual discovery task for the clustered Data ONTAP SCOM management pack.

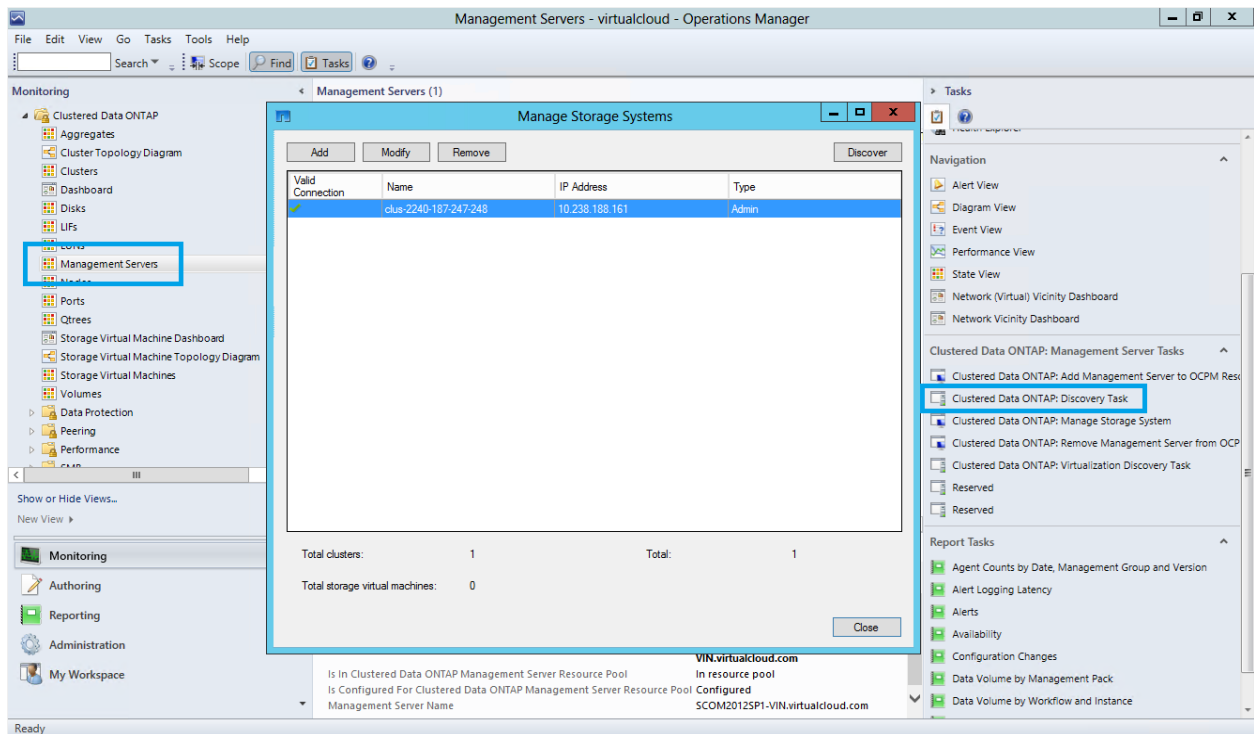
Figure 4) Manage storage systems.

Valid Connection	Name	IP Address	Type
✓	clus-2240-187-247-248	10.238.188.161	Admin
✓	OCPMF9-10-VS1	10.225.80.71	Data

Total clusters: 1 Total: 2

Total storage virtual machines: 1

Figure 5) Clustered Data ONTAP manual discovery task.

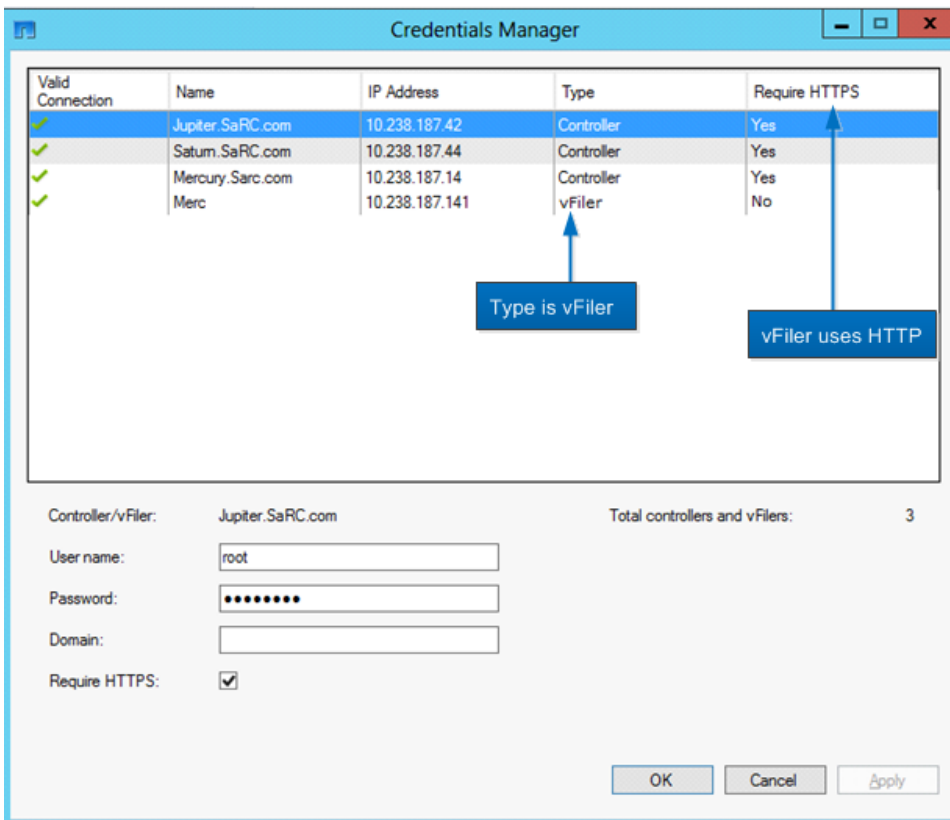


2.11 Support for MultiStore (vFiler) Units for Data ONTAP 7-Mode Systems

MultiStore units, also known as vFiler units in OCPM 4.0, are monitored as individual objects, including their storage, health roll-up, and utilization. vFiler unit discovery is part of the Data ONTAP discovery action. During the discovery, vFiler unit information such as volume info, qtree info, and LUN info are also gathered. Since a vFiler unit's volume, qtree, and LUN path are also the physical appliance's path, these are mapped to the corresponding aggregate(s). The collected information is used to create the object model in Figure 6.

HTTPS is the default protocol used to connect to the storage controller, but you must have socket security layer (SSL) enabled on the controller. If SSL is not enabled, then HTTP is used to connect to the storage. If you want to connect to a vFiler unit, you must use HTTP. This option is available in the Manage Controller Credentials action.

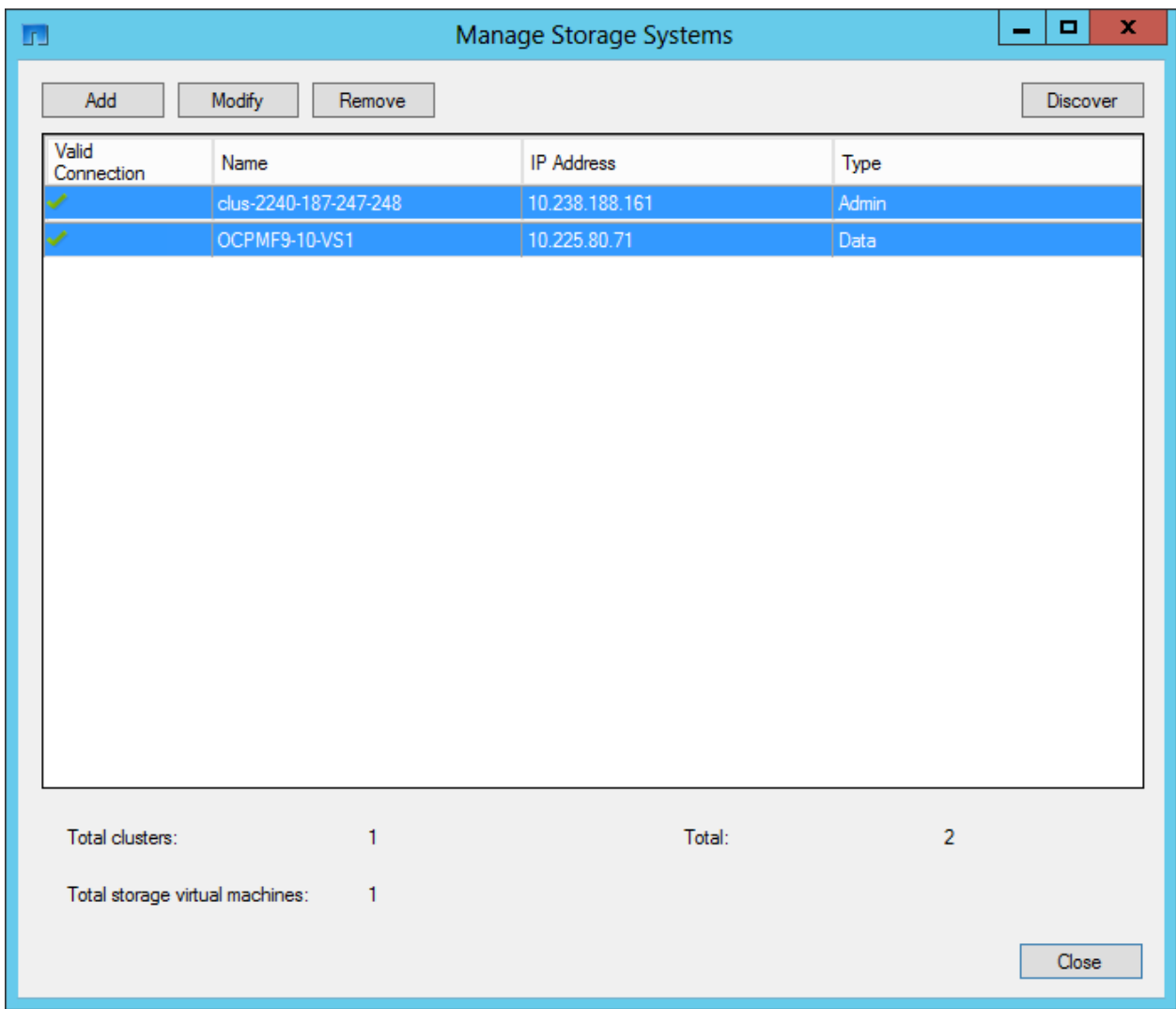
Figure 6) List of controllers and MultiStore units (vFiler units) in Credential Manager window.



2.12 Support for SVMs for Clustered Data ONTAP Systems

The clustered Data ONTAP management pack now allows you to monitor SVMs. Figure 7 shows the OCPMF9-10-VS1 SVM, which has been added and the total number of SVMs shows. OCPM now allows you to perform the discovery task after adding the storage system from one console. The “Discover” button allows you to do this by running both the clustered Data ONTAP discovery task and the clustered data ONTAP virtualization discovery task.

Figure 7) List of clustered Data ONTAP systems and SVMs in Manage Storage Systems window.



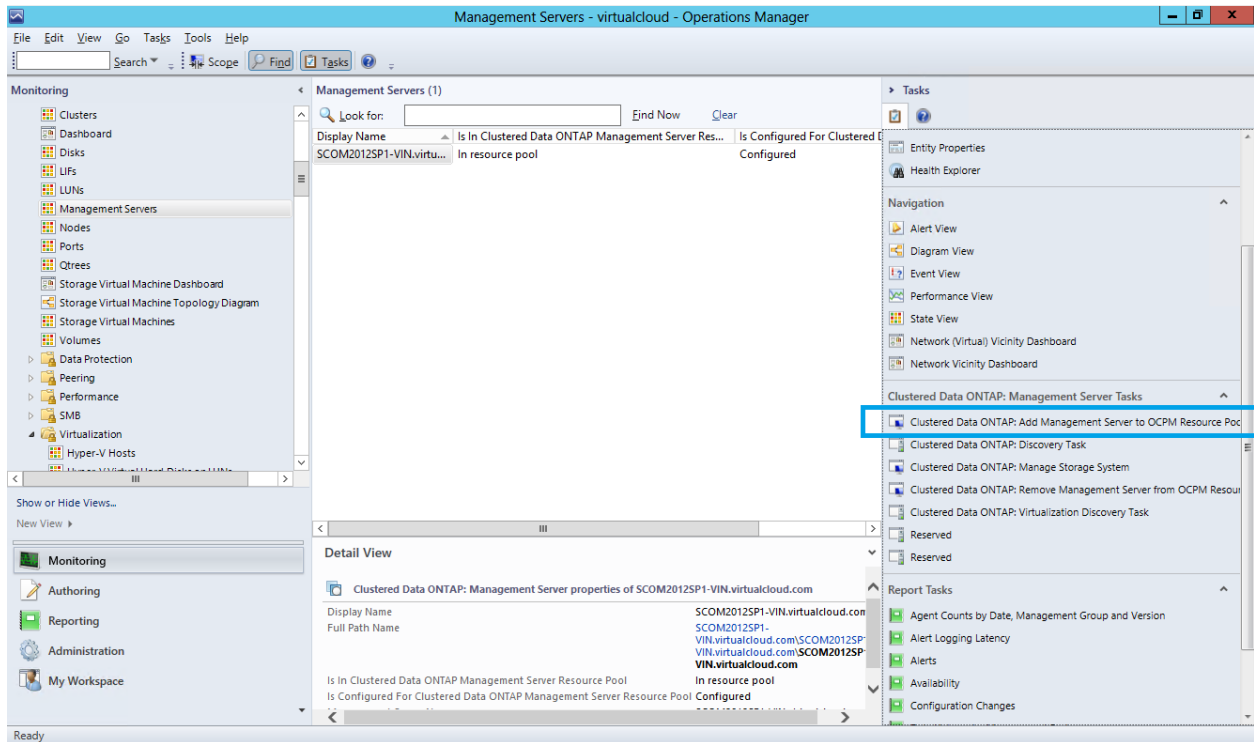
2.13 OCPM Resource Pool Support for Clustered Data ONTAP Management Pack

The clustered Data ONTAP management pack now supports the concept of resource pools.

SCOM 2012 brings a new feature with it called resource pools. A resource pool is a collection of management servers used to load balance work among themselves and take over work from a failed member. Resource pools make sure that there is continuity of monitoring by providing multiple management servers that can take over the monitoring workflows if one of the management servers becomes unavailable.

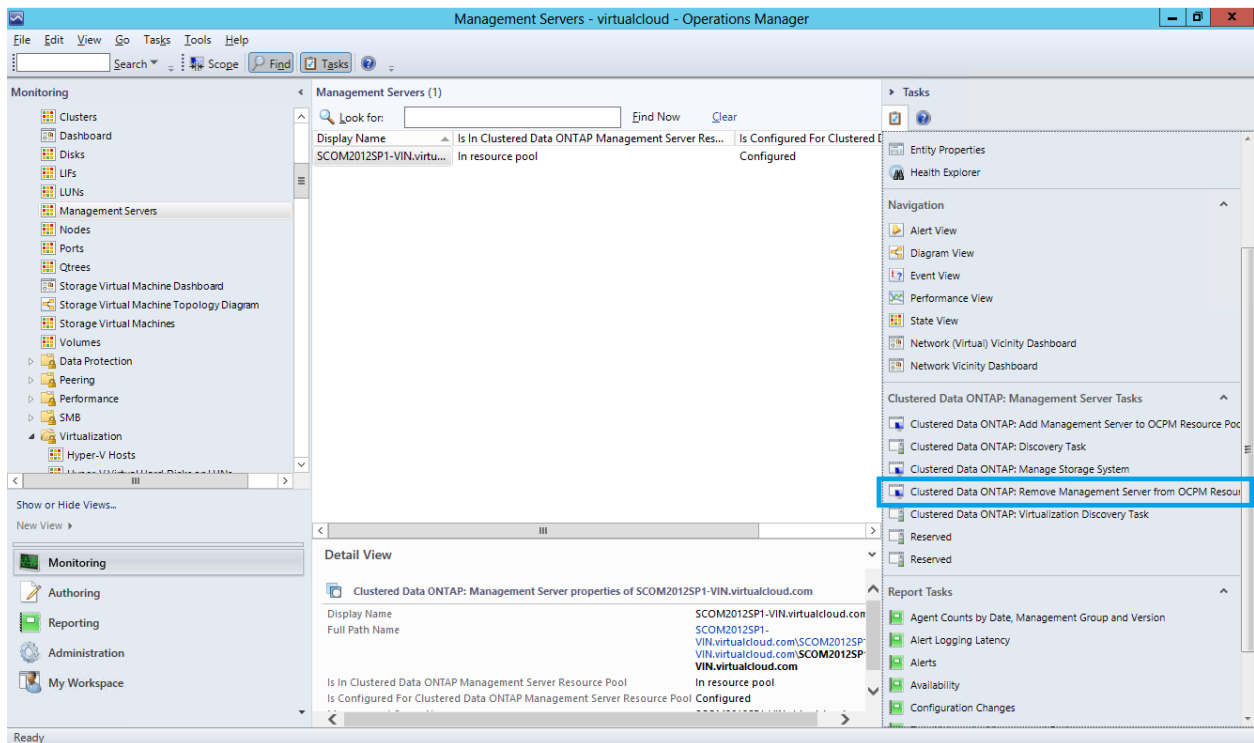
All SCOM servers in a resource pool would be pointing to the same SCOM database. The clustered Data ONTAP management pack consists of an OCPM resource pool. You can individually add SCOM servers to the resource pool by selecting a management server and clicking “clustered Data ONTAP: Add Management Server to OCPM Resource Pool.”

Figure 8) Adding management servers to OCPM resource pool.



You can also remove SCOM servers from the resource pool by selecting a management server and clicking “clustered Data ONTAP: Remove Management Server from OCPM Resource Pool.”

Figure 9) Removing management servers from OCPM resource pool.



For example, let's take a situation in which we have 4 nodes in the resource pool. Discovery task would be run from the node where OCPM is installed, but all other tasks such as alerting and monitoring can be run in parallel from other nodes that are a part of resource pool.

We cannot run discovery task on these servers, but other monitoring and management tasks can be executed.

Data ONTAP 7-Mode management pack does not have a resource pool dependency; only clustered Data ONTAP management pack has a resource pool dependency.

2.14 Microsoft Vulnerability Reported by OCPM

Some Microsoft vulnerabilities are exposed by OCPM 4.0 when installed on a Windows Server 2012 machine. The following figures are some screenshots that show the same when we run the Nessus tool before and after fixing the vulnerabilities.

Figure 10) Vulnerability report from Nessus tool after installing OCPM.

Host	Vulnerabilities	Port/Prot	Vulnerabilities	Plugin ID	Severity	Name
10.225.82.56	109	445 / tcp	6 3 30	67209	High	MS13-052: Vulnerabilities in .NET Framework and Silverlight Could Allow Remote Code Execution
10.225.82.60		0 / tcp	29	69324	High	MS13-059: Cumulative Security Update for Internet Explorer (2862772)
		5985 / tcp	5	69327	High	MS13-062: Vulnerability in Remote Procedure Call Could Allow Elevation of Privilege (2849470)
		51905 / tcp	5	69329	High	MS13-064: Vulnerability in Windows NAT Driver Could Allow Denial of Service (2849568)
		137 / udp	4	69330	High	MS13-065: Vulnerability in ICMPv6 Could Allow Denial of Service (2868623)
		139 / tcp	3	69829	High	MS13-069: Cumulative Security Update for Internet Explorer (2870699)
		5723 / tcp	3	57608	Medium	SMB Signing Disabled
		123 / udp		69334	Medium	MS KB2862973: Update for Deprecation of MD5 Hashing Algorithm for Microsoft Root Certificate
		135 / tcp		69835	Medium	MS13-076: Vulnerabilities in Kernel-Mode Drivers Could Allow Elevation of Privilege (2876315)
		138 / udp		11457	Low	Microsoft Windows SMB Registry : Winlogon Cached Password Weakness
		808 / tcp		10394	Info	Microsoft Windows SMB Log In Possible
		3389 / tcp		10395	Info	Microsoft Windows SMB Shares Enumeration
		3389 / udp		10396	Info	Microsoft Windows SMB Shares Access
		5355 / udp		10398	Info	Microsoft Windows SMB LsaQueryInformationPolicy Function NULL Session Domain SID Enum
		5724 / tcp		10399	Info	SMB Use Domain SID to Enumerate Users
		47001 / tcp		10400	Info	Microsoft Windows SMB Registry Remotely Accessible
		49152 / tcp		10456	Info	Microsoft Windows SMB Service Enumeration
		49153 / tcp		10785	Info	Microsoft Windows SMB NativeLanManager Remote System Information Disclosure
		49154 / tcp		10859	Info	Microsoft Windows SMB LsaQueryInformationPolicy Function SID Enumeration

As you see in Figure 10, the Nessus tool threw several high- and medium-level vulnerabilities when we installed OCPM in a Windows Server 2012 vanilla OS. Here are the steps that can be followed to fix these critical vulnerabilities.

- Vulnerability 1: MSRDP Uses Non-Network-Level Authentication Sessions to Log on to Servers
Fix: Change remote settings to allow connection running remote desktop with network-level authentication (NLA).
- Vulnerability 2: SMB Certificate Is Not Trusted
Fix: Turn on/off SMB signing and trusting: [external link](#).
- Vulnerability 3: KB2862973 Not Installed: This May Cause a Vulnerability
Fix: Install Microsoft KB Windows8-RT-KB2862973-x64.
- Vulnerability 4: SSL Sessions Are Not Signed
Fix: SSL signing issues: [link 1](#) and [link 2](#).

- Vulnerability 5: Servers Store User Logon Details in Local Registry
 Fix: Change registry key on all servers:
 “HKLM\Software\Microsoft\WindowsNT\CurrentVersion\Winlogon\CachedLogonsCount” set to '0'

Figure 11 shows the result of the Nessus Tool run when all the vulnerabilities have been fixed.

Figure 11) Nessus Tool output.

The screenshot shows the Nessus Reports interface. The main content is a table with the following data:

Plugin ID	Count	Severity	Name	Family
23974	5	Info	Microsoft Windows SMB Share Hosting Office Files	Windows
63620	4	Info	Windows Product Key Retrieval	Windows
52001	2	Info	WMI QuickFixEngineering (QFE) Enumeration	Windows
34220	1	Info	Netstat Portscanner (WMI)	Port scanners
34252	1	Info	Microsoft Windows Remote Listeners Enumeration (WMI)	Windows
60119	1	Info	Microsoft Windows SMB Share Permissions Enumeration	Windows

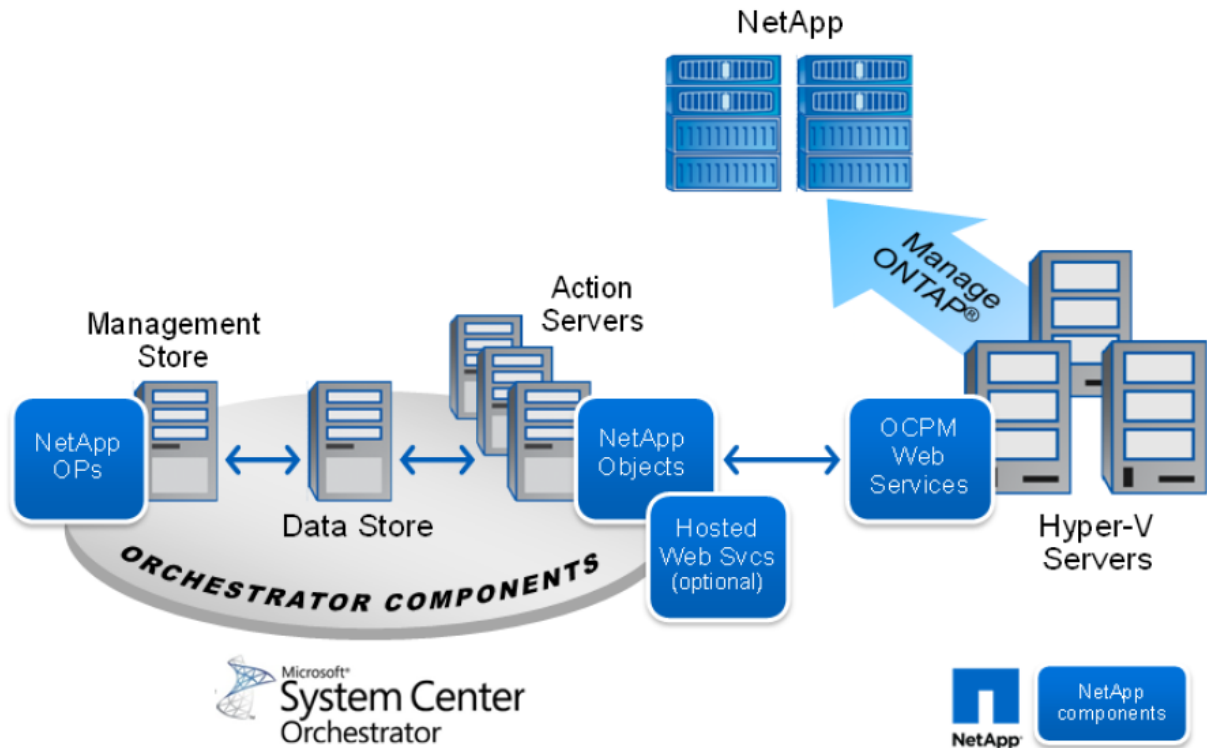
2.15 Installing Orchestrator Components

When installing and using Orchestrator components, it is important to note that the Orchestrator integration packs (OIPs) run on both the management server and all action servers. The deployment of the OIPs is managed by the Orchestrator Deployment Manager tool, but the administrator needs to be aware that the OIPs will attempt to contact the Hyper-V server designated in the runbook through web services. This implies that there is IP connectivity on the designated port between the action servers and the Hyper-V servers you are attempting to manage.

Figure 12 illustrates OCPM-SCO integration.

Note: Orchestrator components are not supported in clustered Data ONTAP environments.

Figure 12) OCPM-SCO integration.



Best Practice

As a best practice, NetApp recommends that the OCPM VIM service be installed on all the Hyper-V servers in your environment that you are planning to manage. This enables the runbooks to work consistently. In addition, OCPM 4.0 now stores all credential-related information in OCPMDB, so you need to enter the credentials only once.

2.16 Uninstalling OCPM SCOM Management Packs

Custom configurations set during the setup of OnCommand Plug-In 4.0 for Microsoft can cause the uninstall process of OnCommand Plug-In 4.0 for Microsoft to react differently. The following steps explain how to completely uninstall OnCommand Plug-In 4.0 for Microsoft and get the SCOM environment back to its original state.

1. Navigate to the Administration tab within SCOM.
2. Select the Data ONTAP management packs that were installed.
3. Delete the Data ONTAP management pack and all other Data ONTAP management packs that have been installed.

Caution

When trying to delete the OCPM management packs, SCOM might prompt you to remove the Microsoft default management pack dependency. This message occurs if you save any override management pack values to the default management pack. You will lose all override settings stored in the default management pack. To eliminate any loss of settings, remove the override settings for Data ONTAP stored in the default management pack prior to uninstalling OnCommand Plug-In 4.0 for Microsoft.

4. To check for Data ONTAP override values, go to the Authoring tab, Overrides; then go to the target where the overrides were saved; and delete the Data ONTAP overrides.
 5. Delete OCPM management packs.
 6. Uninstall the OnCommand Plug-In 4.0 for Microsoft application from the Windows control panel and reboot.
- Note:** Refer to the OnCommand Plug-In 4.0 for Microsoft documentation for exact steps and details.

For specific steps and details, refer to:

- [OnCommand Plug-In 4.0 for Microsoft Installation and Administration Guide](#)
- [OnCommand Plug-In 4.0 for Microsoft Release Notes](#)

2.17 Uninstalling Data ONTAP 7-Mode OCPM SCOM Management Packs Using Operations Manager Windows PowerShell

The following Windows PowerShell cmdlet can be used to remove Data ONTAP 7-Mode management packs from SCOM:

```
Import-Module OperationsManager

Get-SCOMManagementPack | ?{ $_.name -match "ONTAP" } | ?{ $_.name -notmatch "ONTAP.cluster" } |
Remove-SCOMManagementPack
```

2.18 Uninstalling Clustered Data ONTAP OCPM SCOM Management Packs

If the user accidentally deletes the clustered Data ONTAP management packs, the OCPM resource pool does not get initialized correctly. During installation, the OCPM management packs are automatically imported while the OCPM resource pool is initialized and the management servers are discovered.

Manually deleting and then reimporting the management packs are not advised because the OCPM resource pool does not get initialized correctly. We would need to completely uninstall OCPM and reinstall the plug-in if you delete the management packs.

3 Sizing and Scalability for OCPM 4.0 Resource Pool

OCPM 4.0 supports up to 8 nodes in a cluster. When nodes contain more than 2,000 objects per node, it might become necessary to set overrides to increase both the interval seconds and the timeout seconds across all rules in the OCPM management packs. SCOM has parameters in the registry that limit the number of Windows PowerShell scripts that can run simultaneously and the amount of time the scripts can remain in the queue before timing out. Increasing the setting from their default can reduce the number of monitors that time out on large configurations.

On all management servers in the resource pool, edit the (decimal) `ScriptLimit` to “100” and `QueueMinutes` to “60” at the following registry key:

```
[HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\Microsoft Operations
Manager\3.0\Modules\Global\PowerShell]
    "ScriptLimit"=dword:00000064 (100)    The number of scripts that can run simulatneously
    "QueueMinutes"=dword:0000003c (60)    The amount of time a script can remain on the queue
waiting to run.
```

Restart the System Center management service. This will result in raising the SCOM default script execution and queuing timeout limits and hence lead to improved scalability.

4 OnCommand Plug-In 4.0 for Microsoft Alerts, Monitoring, and Views

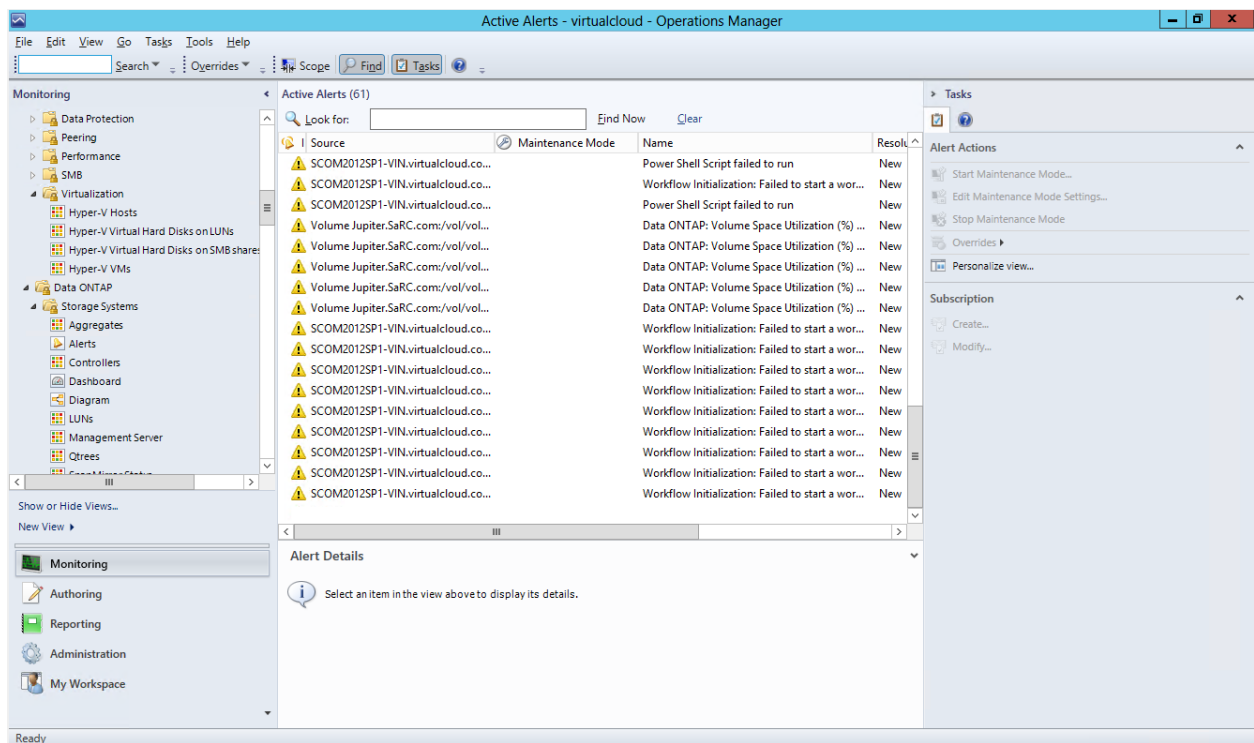
OnCommand Plug-In 4.0 for Microsoft offers various alerts, monitoring options, and views for your NetApp storage array. After installing and discovering all objects within the environment, you will see information on LUNs, qtrees, volumes, aggregates, and other detailed views. These various tools allow you to efficiently manage your NetApp storage systems.

4.1 Alerts

The alerts view allows administrators to instantly view and report problems within their NetApp environment. The following image notes the locations of the important details of each alert.

Figure 13 illustrates the locations of the important details of each alert.

Figure 13) Alerts window.



4.2 Guidelines for Performance Latency Monitor Rules in SCOM

Several performance monitors in the OCPM SCOM management pack are disabled by default. This is based on the best practice recommendations for NetApp storage systems.

While OCPM SCOM management packs can effectively monitor and manage your NetApp storage environment out of the box, System Center Operations Manager 2012 SP1 provides a mechanism for customizing the configuration of any management pack object to allow for scenarios where the default configuration does not provide optimal results.

Users can modify or override the threshold values of the Data ONTAP/clustered Data ONTAP monitors to trigger alerts based on specified threshold values. This can be done by accessing the authoring space in the operations console.

For specific steps and details, refer to:

- [OnCommand Plug-In 4.0 for Microsoft Installation and Administration Guide](#)

The threshold values are environment specific and vary widely for different customers. NetApp recommends that users should baseline their performance statistics on their storage environment and ascertain appropriate thresholds and override and enable the relevant performance monitors.

If the alerts are too frequent even though the system is performing well, the threshold values of SCOM monitors should be adjusted higher.

As per best practices, the latency threshold should be set at 30–40ms so as to avoid spamming of alerts. For more sensitive apps, the latency threshold should be lowered further.

Some of these performance monitors include

- Node latency (ms)
- Volume latency (ms)
- LUN latency (ms)
- Disk data read per node (KB/s)
- Disk data written per node (KB/s)

This is also what SCOM management packs recommend for similar performance metrics.

To get the list of monitors that are enabled or disabled by default for OCPM, open up a Windows PowerShell prompt in administrative mode and type in the following set of cmdlets.

```
Import-Module operationsmanager
Get-SCOMMonitor | ?{$_displayname -match "ONTAP"} | ?{$_enabled -match "false"}
```

To get the list of monitors that are enabled by default, filter the ones that are set to true.

```
Get-SCOMMonitor | ?{$_displayname -match "ONTAP"} | ?{$_enabled -match "true"}
```

Figure 14) List of monitors that are disabled by default.

```
PS C:\> Import-Module operationsmanager
PS C:\> Get-SCOMMonitor | ?{$_displayname -match "ONTAP"} | ?{$_enabled -match "false"}

Enabled      DisplayName                                                                                               ParentMonitorID
-----      -
false       Data ONTAP: Controller FCP Operations Per Second Monitor      ManagementPackEle...
false       Data ONTAP: Controller Warning Trap Monitor                  ManagementPackEle...
false       Data ONTAP: Controller Network Data Sent Monitor             ManagementPackEle...
false       Data ONTAP: Volume Available Space (MB) Monitor              ManagementPackEle...
false       Clustered Data ONTAP: Storage Virtual Machine Network Data Sent Monitor ManagementPackEle...
false       Data ONTAP: Controller iSCSI Operations Per Second Monitor   ManagementPackEle...
false       Data ONTAP: Controller HTTP Operations Per Second Monitor    ManagementPackEle...
false       Data ONTAP: Aggregate Available Space (MB) Monitor           ManagementPackEle...
false       Clustered Data ONTAP: Storage Virtual Machine FCP Read Operations/sec Mo... ManagementPackEle...
false       Clustered Data ONTAP: Storage Virtual Machine iSCSI Write Operations Mon... ManagementPackEle...
false       Data ONTAP: Controller CIFS Operations Per Second Monitor    ManagementPackEle...
false       Clustered Data ONTAP: Node HTTP Operations/sec Monitor       ManagementPackEle...
false       Clustered Data ONTAP: Storage Virtual Machine iSCSI Read Operations Monitor ManagementPackEle...
false       Data ONTAP: Controller Critical Trap Monitor                 ManagementPackEle...
false       Clustered Data ONTAP: Node Disk Data Read Monitor            ManagementPackEle...
false       Clustered Data ONTAP: LIF Network Data Received Monitor      ManagementPackEle...
false       Clustered Data ONTAP: Node NFS Operations/sec Monitor        ManagementPackEle...
false       Clustered Data ONTAP: LIF Network Data Sent Monitor          ManagementPackEle...
false       Clustered Data ONTAP: Node Disk Data Written Monitor         ManagementPackEle...
false       Data ONTAP: Controller Informational Trap Monitor            ManagementPackEle...
false       Clustered Data ONTAP: Storage Virtual Machine Network Data Received Monitor ManagementPackEle...
false       Data ONTAP: Controller Disk Data Read Monitor                ManagementPackEle...
false       Clustered Data ONTAP: Storage Virtual Machine FCP Write Operations/sec M... ManagementPackEle...
false       Clustered Data ONTAP: SMB Server Operations/sec Monitor      ManagementPackEle...
false       Clustered Data ONTAP: Storage Virtual Machine FCP Total Operations/sec M... ManagementPackEle...
false       Data ONTAP: Controller Total Operations Per Second Monitor   ManagementPackEle...
false       Data ONTAP: Controller Disk Data Written Monitor             ManagementPackEle...
```

Figure 15) List of monitors that are enabled by default.

```
PS C:\> Get-SCOMMonitor | ?{$_displayname -match "ONTAP"} | ?{$_enabled -match "true"}
Enabled      DisplayName                                     ParentMonitorID
-----      -
true         Data ONTAP: LUN Latency Monitor                ManagementPackEle...
true         Clustered Data ONTAP: LIF State Monitor        ManagementPackEle...
true         Data ONTAP: Controller Processor Utilization  ManagementPackEle...
true         Data ONTAP: Disk State Monitor                ManagementPackEle...
true         Clustered Data ONTAP: Power Supply State Mon... ManagementPackEle...
true         Data ONTAP: Volume Quota Monitor              ManagementPackEle...
true         Clustered Data ONTAP: Node Availability Depend... ManagementPackEle...
true         Data ONTAP: Power Supply State monitor        ManagementPackEle...
true         Data ONTAP Virtualization: Hyper-V LUN Volum... ManagementPackEle...
true         Data ONTAP: Controller Latency Monitor        ManagementPackEle...
true         Data ONTAP PRO: Hyper-V Host Volume Space U... ManagementPackEle...
true         Data ONTAP PRO: Hyper-V Host VHD Alignment   ManagementPackEle...
true         Clustered Data ONTAP: Storage Virtual Machi... ManagementPackEle...
true         Data ONTAP PRO: Hyper-V Host LUN Alignment    ManagementPackEle...
true         Data ONTAP PRO: Hyper-V Host Volume Deduplic... ManagementPackEle...
true         Clustered Data ONTAP: Aggregate Space Utiliz... ManagementPackEle...
true         Clustered Data ONTAP: Volume Quota Monitor    ManagementPackEle...
true         Clustered Data ONTAP Virtualization: Virtual... ManagementPackEle...
true         Data ONTAP Virtualization: Hyper-V VM Avail... ManagementPackEle...
true         Data ONTAP PRO: Hyper-V Host Thin Provision... ManagementPackEle...
true         Data ONTAP: Controller Connection Monitor     ManagementPackEle...
true         Data ONTAP Virtualization: Hyper-V LUN Volum... ManagementPackEle...
true         Data ONTAP: Fan State Monitor                 ManagementPackEle...
true         Data ONTAP Virtualization: Hyper-V LUN Volum... ManagementPackEle...
true         Clustered Data ONTAP Virtualization: Virtual... ManagementPackEle...
true         Data ONTAP Virtualization: Hyper-V LUN Volum... ManagementPackEle...
true         Clustered Data ONTAP: Node Availability Depend... ManagementPackEle...
```

4.3 Data ONTAP Virtualization Management Pack for Data ONTAP 7-Mode and Clustered Data ONTAP Systems

OCPM 4.0 includes a new Data ONTAP virtualization management pack with all virtualization objects and their related storage discovered and monitored. This includes the Hyper-V host, Hyper-V LUN, and Hyper-V VHD objects.

Table 4 lists all the Data ONTAP virtualization management pack objects.

Table 4) Data ONTAP virtualization management pack objects.

Data ONTAP Virtualization Objects	Description
Hyper-V host	<ul style="list-style-type: none"> This object represents any Hyper-V host in SCVMM that has at least one NetApp LUN (monitored by SCOM) mapped to it, whether the mapped LUN(s) has VHDs or not.
Hyper-V LUN	<ul style="list-style-type: none"> This object represents a NetApp LUN that is mapped to the Hyper-V host object as a Windows disk or CSV. In the case of CSVs, there will be a Hyper-V LUN object for each host that maps to this LUN. If the LUN is not a CSV, the cluster name and CSV name properties shall be "N/A."
Hyper-V virtual machine (VM)	<ul style="list-style-type: none"> This object represents all the virtual machines that are associated with VHDs on a NetApp LUN.
Hyper-V virtual hard disks on SMB shares	<ul style="list-style-type: none"> This object represents a virtual hard disk (VHD) that resides on a NetApp SMB share. During virtualization discovery, all VHDs attached to a VM will be discovered as Data ONTAP virtualization: Hyper-V virtual hard disk instances.

Data ONTAP Virtualization Objects	Description
Hyper-V virtual hard disk (VHD)	<ul style="list-style-type: none"> This object represents a virtual hard disk (VHD) that resides on a NetApp LUN. During virtualization discovery, all VHDs, whether attached to a VM or not, will be discovered as Data ONTAP virtualization: Hyper-V virtual hard disk instances. For clustered Data ONTAP virtualization discovery, the VHDs residing on clustered Data ONTAP LUNs and SMB shares should be attached to the VMs.

4.4 Virtualization Discovery on Data ONTAP 7-Mode Systems

Data ONTAP virtualization discovery finds NetApp storage mapped to all Hyper-V hosts listed in SCVMM, including Hyper-V hosts and NetApp LUNs mapped to them, Hyper-V virtual machines, and Hyper-V virtual hard disks. In some cases, Data ONTAP virtualization discovery requires the OnCommand Discovery agent on the Hyper-V host.

Perform the following steps to invoke the Data ONTAP virtualization: discovery rule manually:

1. Navigate to the Management Server view under the Data ONTAP node.
2. Click the Data ONTAP Virtualization: Run Virtualization discovery task on the management server.

This rule targets the management server and has a default interval of four hours and a default timeout of one hour. The following situations determine if the OnCommand Discovery Agent must be installed on a Hyper-V host:

- The Hyper-V host is mapped to LUNs residing on a NetApp controller running a version of Data ONTAP earlier than 7.3.1.
- The Hyper-V host has Fibre Channel mapped LUNs.
- The Hyper-V host has dedicated LUNs with volume GUID and the SCOM server is not running Windows 2008 R2 SP1 or later.

4.5 Running Virtualization Discovery on Clustered Data ONTAP Systems

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.

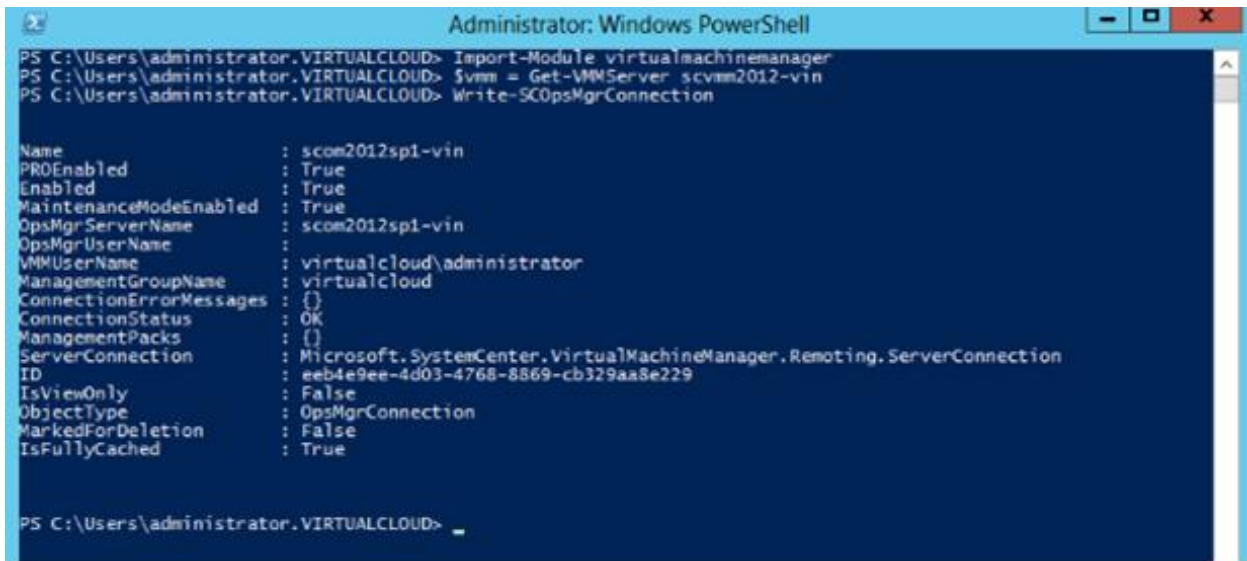
Perform the following steps to invoke the clustered Data ONTAP virtualization: discovery rule manually:

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.
4. The Virtualization Discovery Task dialog box opens.
5. Select the storage targets on which you want to run discovery and click Run.

To speed up the discovery process, open up a Windows PowerShell window in your SCVMM server, import the `virtualmachinemanager` module, and run the `Write-SCOpsMgrConnection` cmdlet. This cmdlet updates the Operations Manager with the most current information from VMM.

```
PS C:\> Import-Module VirtualMachineManager
PS C:\> $vmm= Get-VMMServer <your vmm server name>
PS C:\Users\administrator.VIRTUALCLOUD> Write-SCOpsMgrConnection
```

Figure 16) Updates Operations Manager with most current information from VMM.



```
Administrator: Windows PowerShell
PS C:\Users\administrator.VIRTUALCLOUD> Import-Module virtualmachinemanager
PS C:\Users\administrator.VIRTUALCLOUD> $vmm = Get-VMMServer scvmm2012-vin
PS C:\Users\administrator.VIRTUALCLOUD> Write-SCOpsMgrConnection

Name                : scom2012sp1-vin
PROEnabled           : True
Enabled              : True
MaintenanceModeEnabled : True
OpsMgr_ServerName    : scom2012sp1-vin
OpsMgr_UserName      :
VMMUserName          : virtualcloud\administrator
ManagementGroupName : virtualcloud
ConnectionErrorMessages : {}
ConnectionStatus     : OK
ManagementPacks      : {}
ServerConnection     : Microsoft.SystemCenter.VirtualMachineManager.Remoting.ServerConnection
ID                   : eeb4e9ee-4d03-4768-8869-cb329aa8e229
IsViewOnly           : False
ObjectType            : OpsMgrConnection
MarkedForDeletion    : False
IsFullyCached        : True

PS C:\Users\administrator.VIRTUALCLOUD>
```

4.6 Detecting LUN and VHD Misalignment for Data ONTAP 7-Mode Systems

LUN and VHD misalignments cause I/O performance issues. It is crucial to detect and correct LUN and VHD misalignments to improve storage performance. In most cases, a file system is installed in a partition in a VHD file. The partition should align with the LUN to achieve maximum read and write performance. There are fixed VHDs, dynamic VHDs, and differencing VHDs. The partition can be an MBR or a GPT partition. The GPT partition is also checked for misalignment. In the case of GPT, however, only the first four primary partitions of GPT are checked for misalignment issues since it is very uncommon for customers to have VHD with more than a couple of primary partitions. If any partition is misaligned, the VHD is marked as misaligned. It should be noted, however, that only primary partitions are checked for misalignment issues. The system or reserved partitions in a VHD are not checked for misalignment. NetApp LUNs should be partitioned with a single primary partition.

Note: Detecting LUN and VHD misalignment is only supported for clustered Data ONTAP 7-Mode storage systems and not for clustered Data ONTAP systems.

For dynamic or differencing disks, NetApp cannot guarantee alignment, and so these disks are not checked for misaligned partitions. However, a warning is generated to indicate the type of disks detected.

The misalignment detection does not require a VM to be shut down. Detection is seamless to the Hyper-V VMs.

For VHD alignment checking:

- Remote Windows PowerShell needs to be enabled on these hosts.
Visit <http://technet.microsoft.com/en-us/library/dd819498.aspx> for instructions on how to enable these on remote Hyper-V hosts.

It is important to note that:

- VHD alignment checking for VHDs on LUNs mounted with volume GUIDs is not supported.
- For a VHD for which no partition information is available, the alignment status is marked as unknown.
- The misalignment check cannot automatically fix misalignment issues.

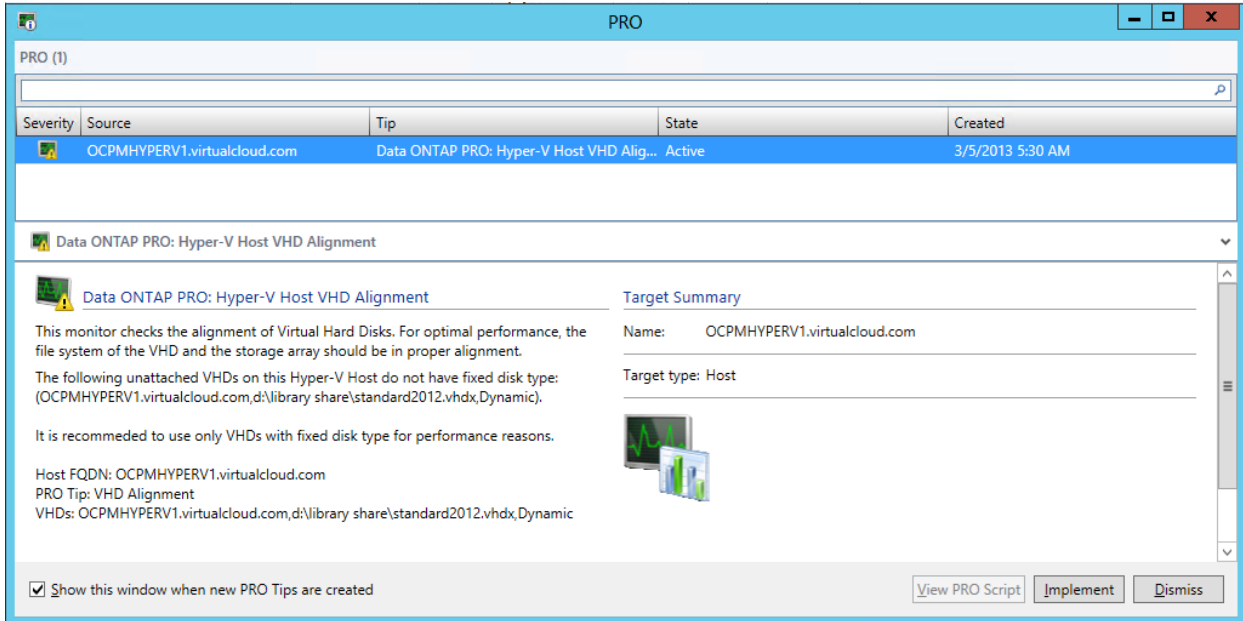
The misalignment check can be invoked as follows:

- A rule to run on a schedule.

- Tasks on virtualization LUN view and host view can invoke misalignment detection on the LUN level and on the Hyper-V host level.

Figure 17 illustrates a VHD misalignment alert in the SCOM console.

Figure 17) Illustrates VHD misalignment alert in SCOM console.



5 OnCommand Plug-In 4.0 for Microsoft Reporting Data ONTAP 7-Mode and Clustered Data ONTAP Systems

OnCommand Plug-In 4.0 for Microsoft includes a reporting management pack so you can view reports on various aspects of your NetApp storage. You must configure System Center Operations Manager 2012 for reporting in order to use the Data ONTAP Reports management pack.

For more information on setting up reporting for SCOM, visit Microsoft TechNet.

5.1 Custom Reporting

The Data ONTAP reporting management pack in OCPM includes various prepackaged reports. You can also create custom reports for specific NetApp objects by performing the following steps.

To create a custom report:

1. Click the Reporting tab.
2. Select Microsoft Generic Report Library.
3. Double-click the specific report type for the custom report.
4. Select Add Group.
5. Filter with the `Ontap` keyword for available report options.

Figure 18 shows the custom reporting option.

Figure 18) Custom reporting.

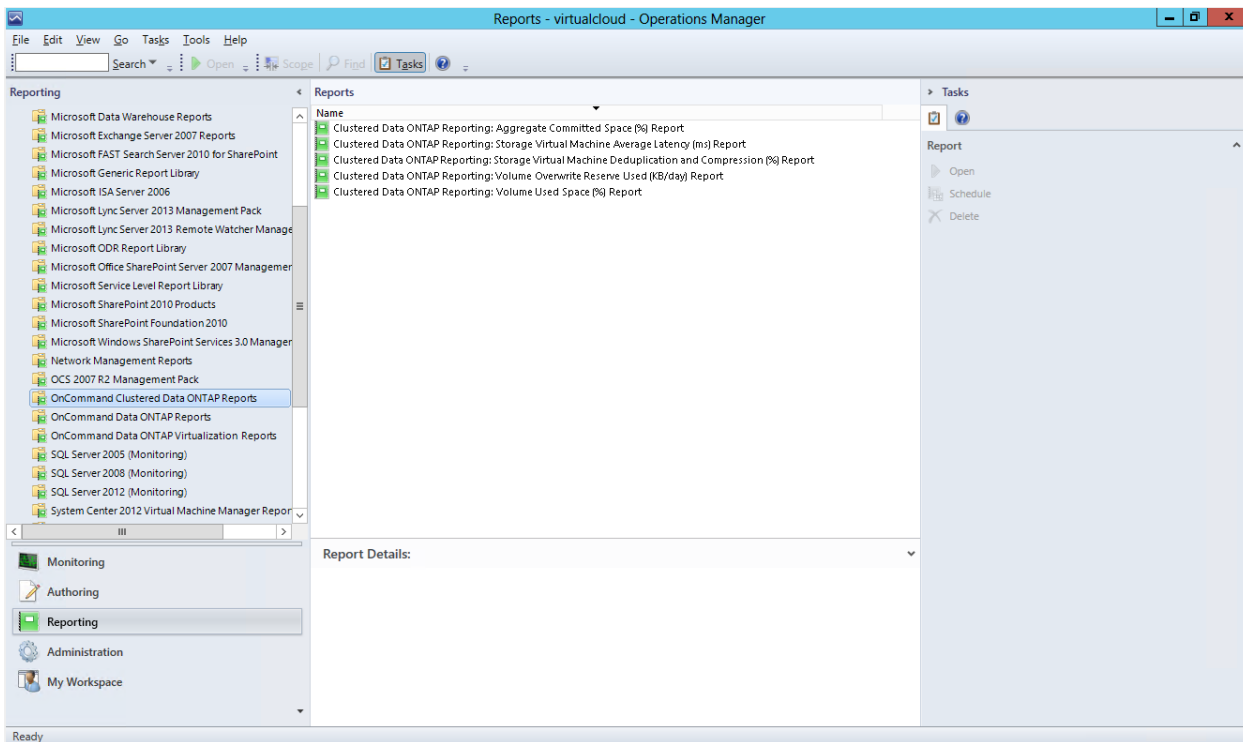


Figure 19 shows how to create custom reports for the Data ONTAP inventory.

Figure 19) Creating custom reports for Data ONTAP inventory.

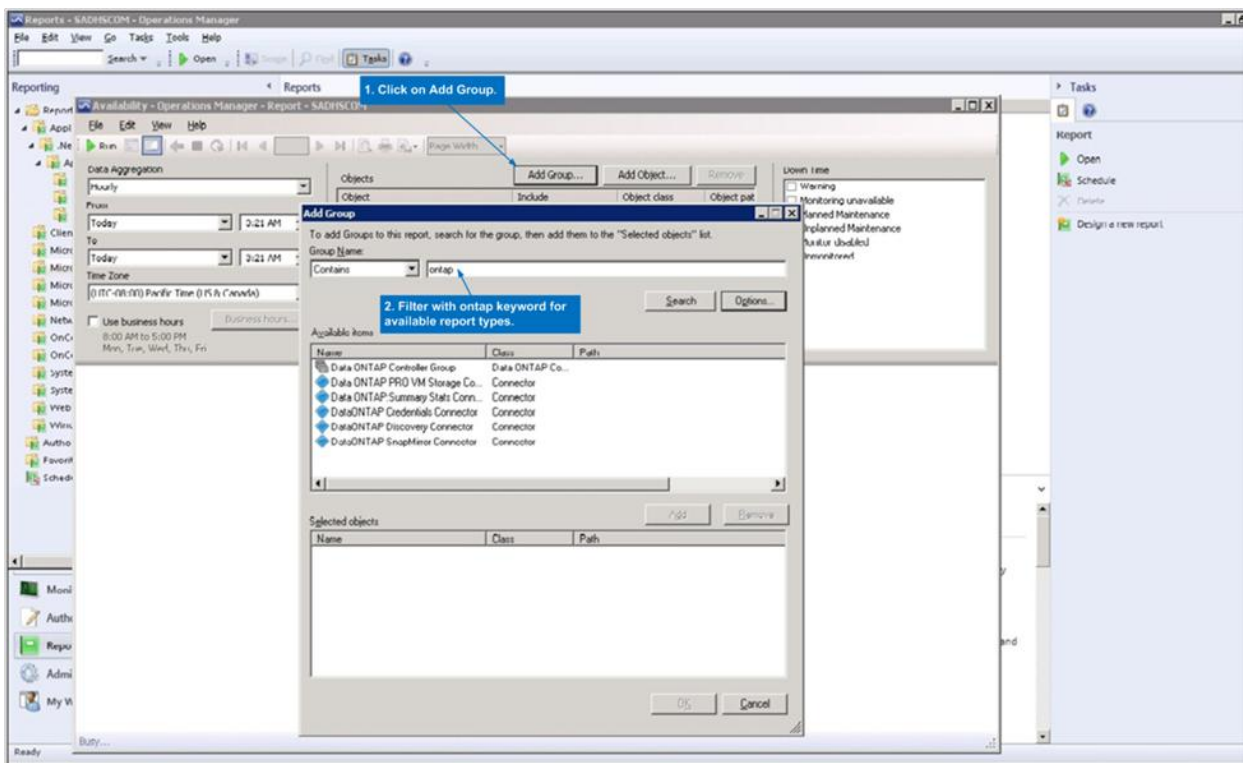
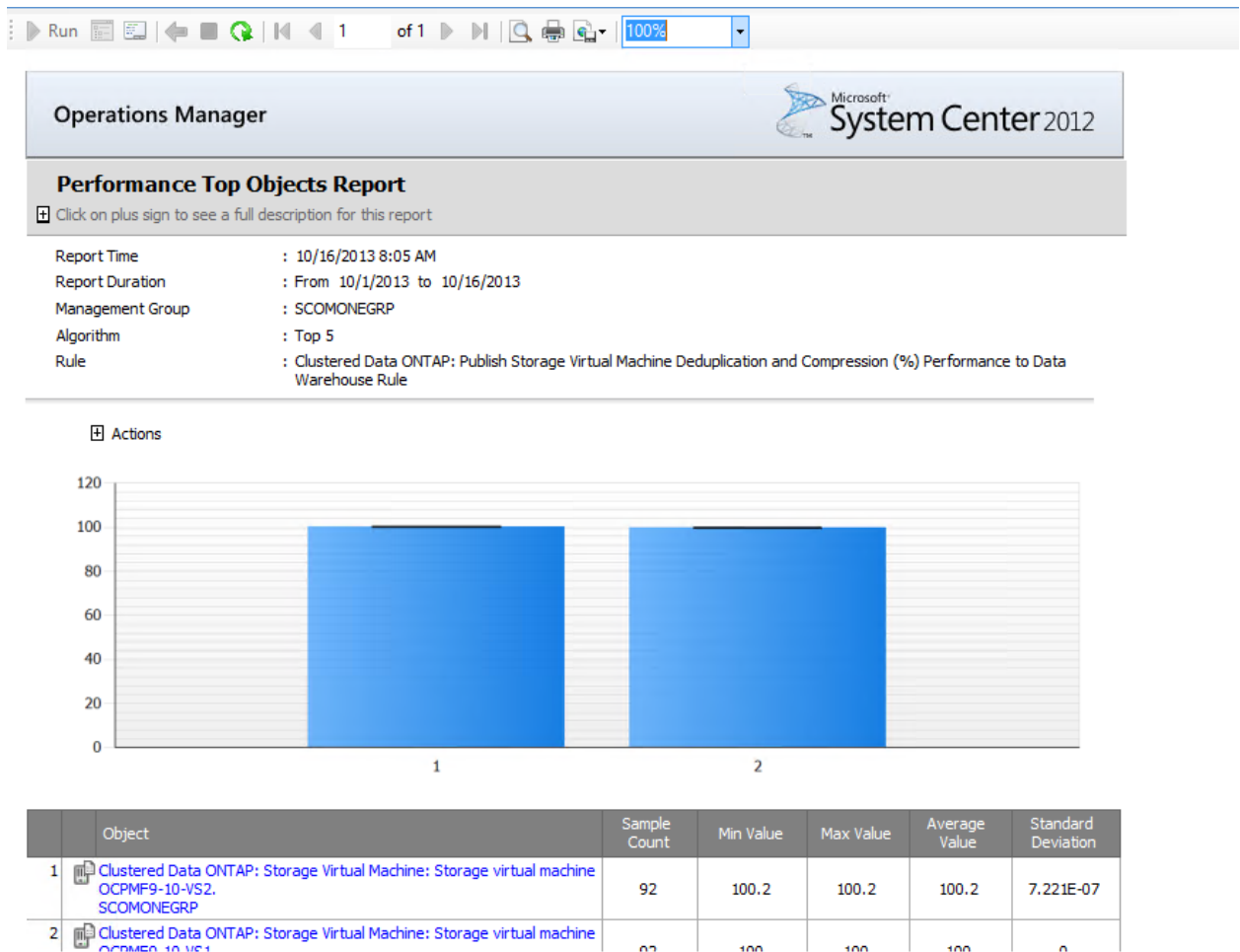


Figure 20 is a deduplication and compression report for SVM. This report can be generated by accessing the Reporting view in the SCOM navigation pane.

Figure 20) Clustered Data ONTAP reporting: SVM deduplication and compression (%) report.



6 OnCommand Plug-In 4.0 for Microsoft PRO Tips for Data ONTAP 7-Mode Systems

PRO tips are a type of alert that you can use with System Center Virtual Machine Manager (SCVMM) to notify when storage-related problems occur in your virtual environment. They can also be enabled to automatically repair many of those problems. You must have an event log subscription to the SCVMM event log to receive problems related to virtual machines. 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, PRO tips can also be configured to display in a pop-up window whenever a new tip is added.

In the case of a highly available SCOM setup, make sure that the SCVMM server is connected to the SCOM server that has the RMS emulator enabled, in order to receive the PRO tips on the SCVMM pane. Use Windows PowerShell cmdlet `Set-SCOMRMSEmulator` to move the RMS Emulator to the specified management server.

Note: PRO tips are only supported for Data ONTAP 7-Mode storage systems and not for clustered Data ONTAP systems.

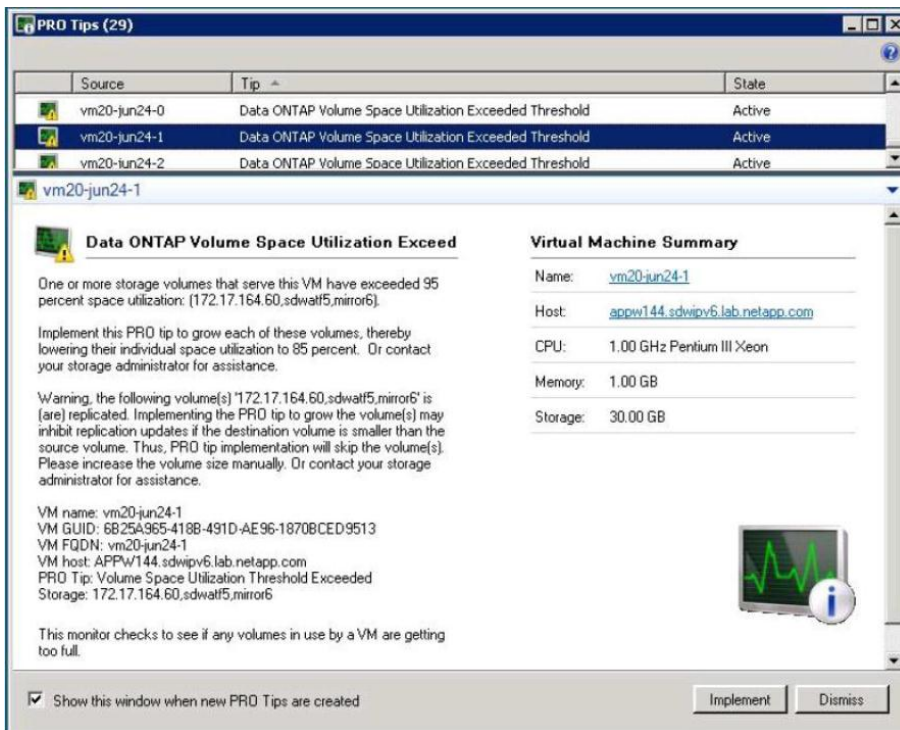
6.1 Volume Space Utilization PRO Tip

When implemented, this PRO tip will increase the size of a volume. There are cases in which the size of a volume cannot be automatically increased; for example, when the aggregate does not have sufficient free space or because the volume is the source of a SnapMirror® relationship (growing the source volume larger than the destination volume would inhibit replication updates). Clicking the Implement button for these situations will not change the size of the volume.

For details on how to efficiently provision storage with NetApp storage systems in a Fibre Channel or iSCSI deployment, refer to [TR-3483: Thin Provisioning in a NetApp SAN or IP SAN Enterprise Environment](#).

Figure 21 shows volume space utilization PRO tip.

Figure 21) Volume space utilization PRO tip.



6.2 Best Practices for Snapshot Autodelete PRO Tip

The thin-provisioning Snapshot™ autodelete PRO tip checks if Snapshot autodelete is turned off for volumes hosting Hyper-V VMs. If implemented, the PRO tip will enable Snapshot autodelete for the volume.

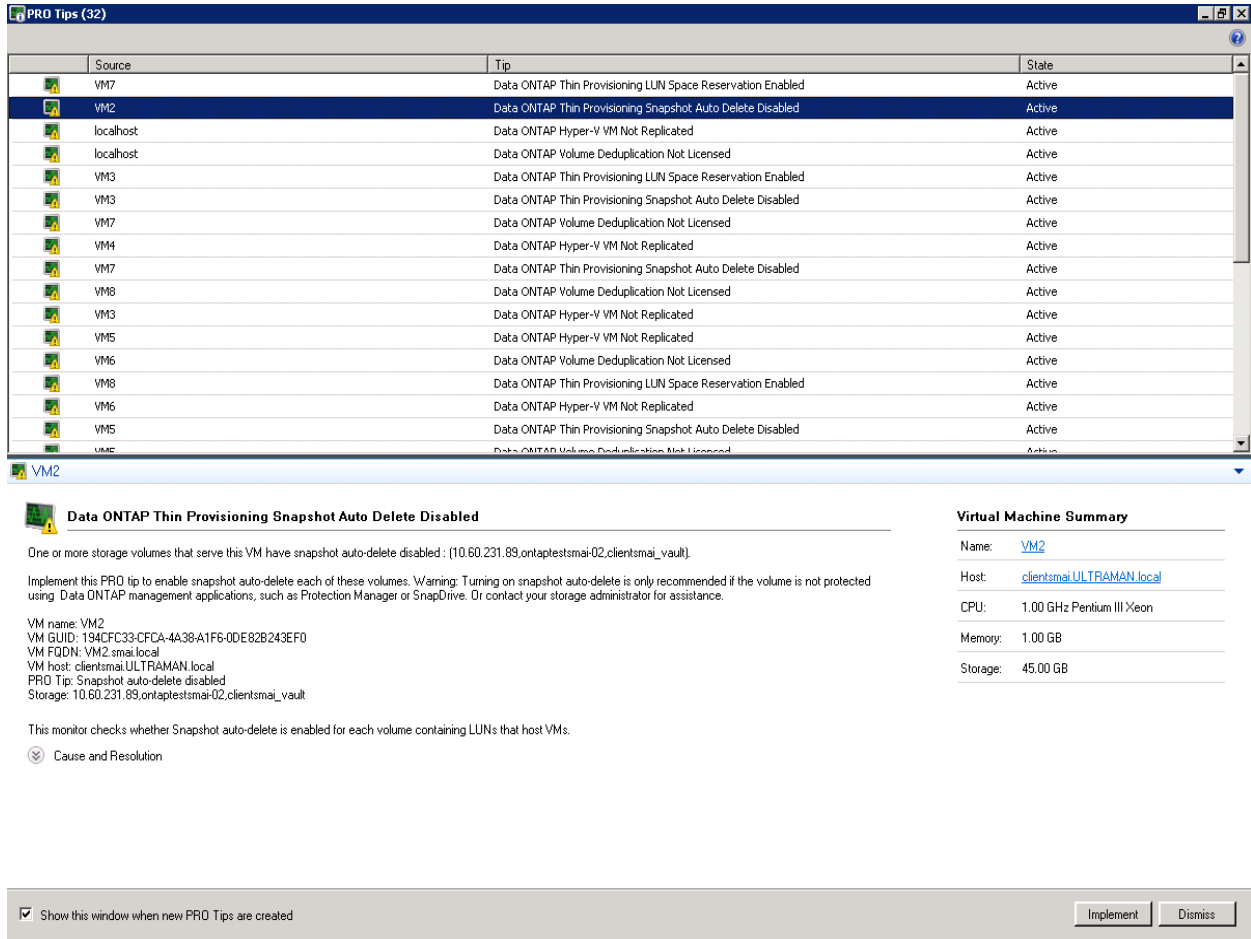
Caution

Do not enable Snapshot autodelete for volumes that are currently protected by other NetApp management applications such as System Manager or SnapManager® for Hyper-V. Enabling Snapshot autodelete on these volumes might disrupt the other protection mechanisms and cause issues with consistency.

For more details on how to efficiently provision storage with NetApp storage systems in a Fibre Channel or iSCSI deployment, refer to [TR-3483: Thin Provisioning in a NetApp SAN or IP SAN Enterprise Environment](#).

Figure 22 shows Snapshot autodelete PRO tip.

Figure 22) Snapshot autodelete PRO tip.



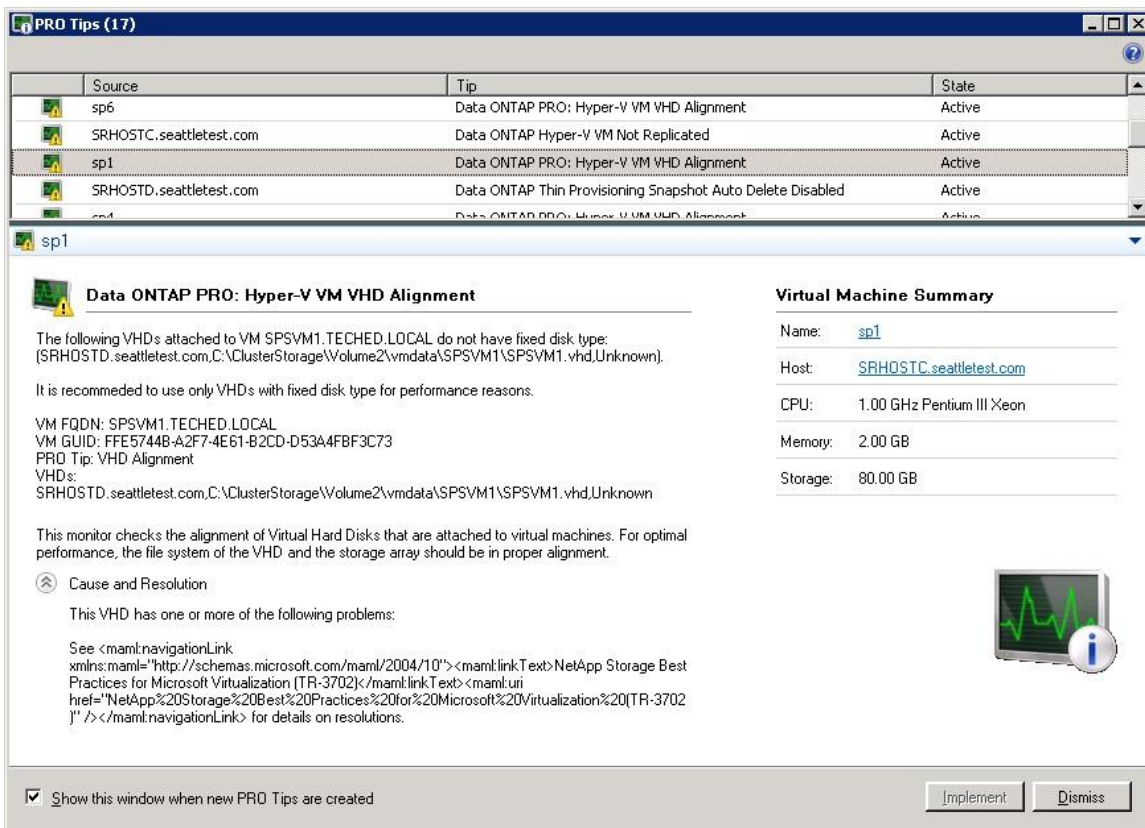
6.3 Best Practices for LUN and VHD Alignment PRO Tip

PRO tips are generated at the Hyper-V host level for misaligned LUNs or misaligned unattached VHDs. For attached misaligned VHDs, the PRO tips are generated at the Hyper-V VM level. These PRO tips cannot automatically correct misalignment issues. Instead, the PRO tips include references to methods for fixing them.

For more details on how to prevent, detect, and correct file system misalignment issues for virtual machines hosted on Hyper-V refer to [TR-3747: Best Practices for File System Alignment in Virtual Environments](#).

Figure 23 illustrates VHD misalignment PRO tips.

Figure 23) VHD misalignment PRO tips.



7 OnCommand Plug-In 4.0 for Microsoft Rapid Provisioning and Cloning Cmdlets for Data ONTAP 7-Mode Systems

Note: Rapid Cloning Utility (RCU) cmdlets are not supported in clustered Data ONTAP environments.

The rapid provisioning and cloning cmdlets are installed separately from the core management packs and have no dependency on them. The rapid provisioning and cloning cmdlets are used with Microsoft System Center Virtual Machine Manager (SCVMM) to dramatically speed up provisioning of Hyper-V virtual machines and minimize storage requirements.

For more information on the provisioning and cloning cmdlets, refer to [OnCommand Plug-In 4.0 for Microsoft Windows PowerShell cmdlet and Orchestrator Activity Reference Guide](#).

7.1 Details on OC.Cmdlets Using Windows PowerShell

Following are the Windows PowerShell commands that need to be used:

```
Import-Module OC.Cmdlets
Get-Help Debug-OCHost -Detailed
```

7.2 Cmdlets and User Access Control

Cmdlets included with the OnCommand Plug-In 4.0 for Microsoft rapid provisioning and cloning cmdlets fail if user account control is enabled within the Windows operating system or if the terminal is not opened using "Run As Administrator." Either disable UAC or open a cmdlet window using Run As Administrator.

7.3 Sub-LUN Cloning Features and Limitations

OCPM provides several methods for accessing sub-LUN cloning. This function is called as part of the new-OCClone cmdlet and can be accessed directly using the New-OCCloneFile cmdlet. These same features can be accessed using the Orchestrator rapid provisioning OIP. In any of these cases, the same limitations and capabilities apply.

Sub-LUN cloning refers to the capability of a FAS series controller to “clone” a single file within a mounted LUN on a Windows host or guest. This operation is performed by the OCPM VIM service and requires that the source and destination LUN be mounted on the local host. When using the new-OCClone cmdlet, the new LUN is managed automatically. However, when using the New-OCCloneFile cmdlet (or an associated clone NTFS file OIP) the source and target files must both reside on NetApp LUNs from the same volume that are mounted on the same Windows host or guest.

Although this technology is truly revolutionary it does come with some caveats; when using these features, keep these restrictions in mind. Sub-LUN cloning uses the same block reference count feature as deduplication. If the Data ONTAP block reference count limit has been exceeded due to deduplication, this will cause Data ONTAP to *copy* the affected block rather than *clone* the block. For all versions of Data ONTAP earlier than 8.1, this maximum is 255. For large fixed-sized VHDs, this could involve copying tens of thousands of blocks and result in cloning delays of up to an hour. When deploying OCPM's rapid provisioning features, check to see if the source volume has exceeded its maximum reference count or use a volume that is not deduplicated as a clone source. (Use `priv set diag; sis stat -lv /vol/test` to view current reference counts.)

In OCPM, MBR partitions are not supported. GPT is the default partition type for Windows Server 2008 R2, but systems that have been upgraded from older Windows versions may still have MBR partitions.

In OCPM, only fixed VHDs are supported as the source VHD for cloning. Dynamic and/or differencing VHDs cannot be cloned. This is consistent with the [TR-3702: NetApp Hyper-V Best Practice Guide](http://technet.microsoft.com/en-us/library/dd440865(W.S.10).aspx#fixed) and with the Microsoft best practice to utilize only fixed VHDs for production VMs ([http://technet.microsoft.com/en-us/library/dd440865\(W.S.10\).aspx#fixed](http://technet.microsoft.com/en-us/library/dd440865(W.S.10).aspx#fixed)).

7.4 Best Practices for New-OCClone Cmdlet

The new-OCClone cmdlet supports cloning across volumes. For copying across different volumes, first it uses copy offload to copy the first VHD to the new volume; later, to clone the remaining VMs, it uses FlexClone® on the destination storage controller.

The new-OCClone cmdlet operates in one of two modes. It can either clone a single VM on a Hyper-V host or it can create a new VM from a SCVMM template. In either case, new-OCClone will perform a sub-LUN clone operation of the VM's VHD file first, and then create the new VM using this cloned file.

In the case of SCVMM templates, it is very important that the template be configured correctly. For example, the guest OS type of the template must match the actual version of Windows installed in the template VHD. The guest operating system installed on the VHD must also be sysprepped prior to the clone operation. This is a requirement of SCVMM.

The cmdlet should be executed on the host, which has the VHD share. The target machines should be managed by the SCVMM server. In local template cloning the VHD share should be on the target machine (local). HA VM will be created in a clustered disk in a clustered environment. Note that if a server switch is not specified by default, it takes the local cluster name.

Table 5 lists the supported configuration for a clustered environment.

Table 5) Supported configuration for a clustered environment.

New Shared	Mount point is specified	nc=1	Create a shared disk on the mount point specified and clone into it	Supported
	No mount point is specified	nc>1	Multiple copying of template cloning into multiple new different shared disks	Supported
	New mount point /AllinSingleLUN is specified	nc>1	Multiple copying of template cloning into a single shared disk	Not supported
Existing Shared	Existing mount point is specified	nc=1	Template cloning into a single shared disk	Not supported
	Existing mount point is specified	nc>1	Multiple copying of template cloning into a single shared disk	Not supported
New CSV	CSV is specified	nc=1	Create a CSV disk and clone into it	Supported
	CSV and AllinsingleLUN are specified	nc>1	Multiple copying of template cloning into a single CSV disk	Supported
	CSV is specified and AllinsingleLUN is not specified	nc>1	Multiple copying of template cloning into multiple new different CSV disks	Not supported
Existing CSV	Existing mount point is specified	nc=1	Clone into the specified CSV	Supported
	Existing mount point is specified	nc>1	Multiple copying of template cloning into a specified CSV disk	Supported

In the case of a dedicated environment, a non-HA VM will be created in a dedicated disk. If server is not specified, it assumes the local host name.

In remote template cloning, the VHD share can be on any node. It is not mandatory to place the VHD share on the target machines. Remote template cloning on an existing clustered/dedicated disk is not supported.

Table 6 lists the supported and unsupported configurations for a dedicated environment.

Table 6) Supported and unsupported configurations for a dedicated environment.

New Dedicated	New Mountpoint/no Mountpoint with AllinsingleLUN	nc=1	Creates a dedicated disk and clone onto it	Supported
	New Mountpoint/no mountpoint with AllinsingleLUN	nc>1	Multiple-copy of template cloning into a single dedicated disk	Supported
Existing Dedicated	Existing Mountpoint is specified	nc=1	Clones into the specified dedicated disk	Supported
	Existing Mountpoint is specified	nc>1	Multiple-copy of template cloning into a single dedicated disk	Supported

Table 7 lists the supported and unsupported configurations for remote cloning.

Table 7) Supported and unsupported configurations for remote cloning.

New Shared	Mount point is specified	nc=1	Create a shared disk on the mount point specified and clone into it	Supported
	No mount point is specified	nc>1	Multiple copying of template cloning into multiple new different shared disks	Supported
	New mount point /AllinSingleLUN is specified	nc>1	Multiple copying of template cloning into a single shared disk	Not supported
New CSV	CSV is specified	nc=1	Create a CSV disk and clone into it	Supported
	CSV is specified	nc>1	Multiple copying of template cloning into multiple new different CSV disks	Not supported
	CSV and AllinSingleLUN are specified	nc>1	Multiple copying of template cloning into a single CSV disk	Not supported
New Dedicated	New mount point/no mount point with AllinsingleLUN	nc=1	Create a dedicated disk and clone into it	Supported
	New mount point/no mount point with AllinsingleLUN	nc>1	Multiple copying of template cloning into a single dedicated disk	Supported

In the case of Hyper-V VMs, the source VM must be turned off for the clone operation to complete. This is because the metadata describing the VM is not available to the new-OCClone cmdlet when it is running and we cannot clone a file that is currently opened by the Hyper-V manager.

Depending on the options chosen in the command, the new VHD will be placed on a new LUN or be added to an existing LUN. In either case, the target Hyper-V host must already have connectivity to the storage controller that owns the source LUN. If a new LUN is created as part of this operation, it will automatically be connected to the Hyper-V host.

In the case of Hyper-V VMs, the source VM must be turned off for the clone operation to complete. This is because the metadata describing the VM is not available to the new-OCClone cmdlet when it is running and we cannot clone a file that is currently opened by Hyper-V.

Depending on the options chosen in the command, the new VHD will be placed on a new LUN or be added to an existing LUN. In either case, the target Hyper-V host must already have connectivity to the storage controller that owns the source LUN. If a new LUN is created as part of this operation, it will automatically be connected to the Hyper-V host.

7.5 Best Practices for Using "Create LUN by Size" Object in SCO 2012

The "Create LUN by size" object allows creating LUNs of different OS types.

Following is the configuration that supports each LUN type:

- **Image.** When the host OS is not specified in the list but it is listed as a supported OS, then use as "image"
- **Windows_gpt.** Windows Server 2008 > physical server > without Hyper-V with SnapDrive® technology installed
- **Hyper_v.** Windows Server 2008 > Hyper-V server > physical disk with SnapDrive installed
- **Windows_2008.** Windows Server 2008 > physical server > without Hyper-V without SnapDrive installed

Refer to the LUN-type table after visiting the following link: <http://www.netapp.com/us/communities/tech-ontap/tot-hyperv-best-practices-0911.html>

7.6 Best Practices for Rapid Deployment

When configuring rapid deployment, you need to consider both your business requirements and the underlying technical restrictions of the cloning technology in Data ONTAP. Since you can only clone within a single FlexVol[®] volume and you must have both the source and destination mapped to a single Windows Server instance, the optimal use case is to have every CSV preprovisioned with your template VHDs prior to provisioning VMs.

In this case, the best practice is to create a single gold master CSV. This CSV will contain your gold master template VHD files. When you provision a new CSV, you should always use a FlexClone volume of this gold master. This enables all CSVs to always have the required templates local to the CSV. It also enables both source and destination to always remain within a single FlexVol volume. If you have a large number of templates, you can create numerous CSVs within a single FlexVol volume. In this case, the additional template VHDs will be deduplicated automatically if you have dedupe enabled on the volume.

In this way, you can have both the advantage of “local” templates without taking up additional space for repetitive template VHDs.

You can create the clone in Windows PowerShell using a script similar to the following.

```
New-NaLunClone -ClonePath <path> -ParentPath <path> -Unreserved -ParentSnapshot <snapshot>
Set-NaLunSignature -GenerateRandom -Path <path>
Set-NaLun -Path <path> -Online
Connect-OCStorage -StoragePath <path> -ClusterSharedVolume
```

Note that in the preceding script, we create a new disk signature before presenting the LUN to the cluster. This is required because the Windows failover cluster will not allow you to mount two disks with identical disk signatures to the same cluster.

After the CSV is created and mounted, you can begin to provision VHDs. Note that the standard OCPM `new-OCClone` cmdlet assumes that the SCVMM library is local to the Hyper-V server. If this is not the case, you can manually create the clone, then call SCVMM to create the VM.

The following Windows PowerShell script is a sample using SCVMM cmdlets, and you can create a similar script using the following OCPM cmdlets.

```
$SCVMMHost = <<VMM SERVER NAME>>
$VMMServer = Get-VMMServer $SCVMMHost;
$CPath = <<TARGET VHD>>
$TPath = <<TEMPLATE VHD>>
$TargetHost = <<Target Host>>
$TemplateName = <<VMM Template Name>>
$JobGroupID = [guid]::NewGuid()
New-OcCloneFile $TPath $CPath
Move-VirtualHardDisk -IDE -BUS 0 -LUN 0 -Path $CPath -JobGroup $JobGroupID
$JName = <<Name for Job and new VM>>
$VMPath = <<Path for VM>>
new-vm -name $JName -Path $VMPath -Template $TemplateName -VMHost $TargetHost -
UseLocalVirtualHardDisks -JobGroup $JobGroupID -StartVM -ComputerName $JName -RunAsynchronously
```

8 OnCommand Plug-In 4.0 for Microsoft SCVMM Add-Ins for Data ONTAP 7-Mode Systems

Note: SCVMM add-ins are not supported in clustered Data ONTAP environments.

System Center 2012 SP1 added the capability to author and add ribbon extensions; OCPM 4.0 leverages this functionality for SCVMM add-ins.

We can now clone Hyper-V virtual machines and SCVMM templates using SCVMM add-ins; they provide similar functionality to that of RCU cmdlets in GUI mode.





SCVMM add-ins need to be imported into the SCVMM console after OCPM installation.

To import the SCVMM add-ins, from the SCVMM console: Click Settings > “Import Console Add In”> Browse to “C:\Program Files\NetApp\OnCommand\MS_Plugin” > Import all the Add-ins listed > Click Next, and Install the Add-in.

Four SCVMM add-ins are added to SCVMM ribbon consoles after importing.

Table 8 provides information about buttons viewed in the SCVMM ribbon.

Table 8) Buttons in the SCVMM ribbon.

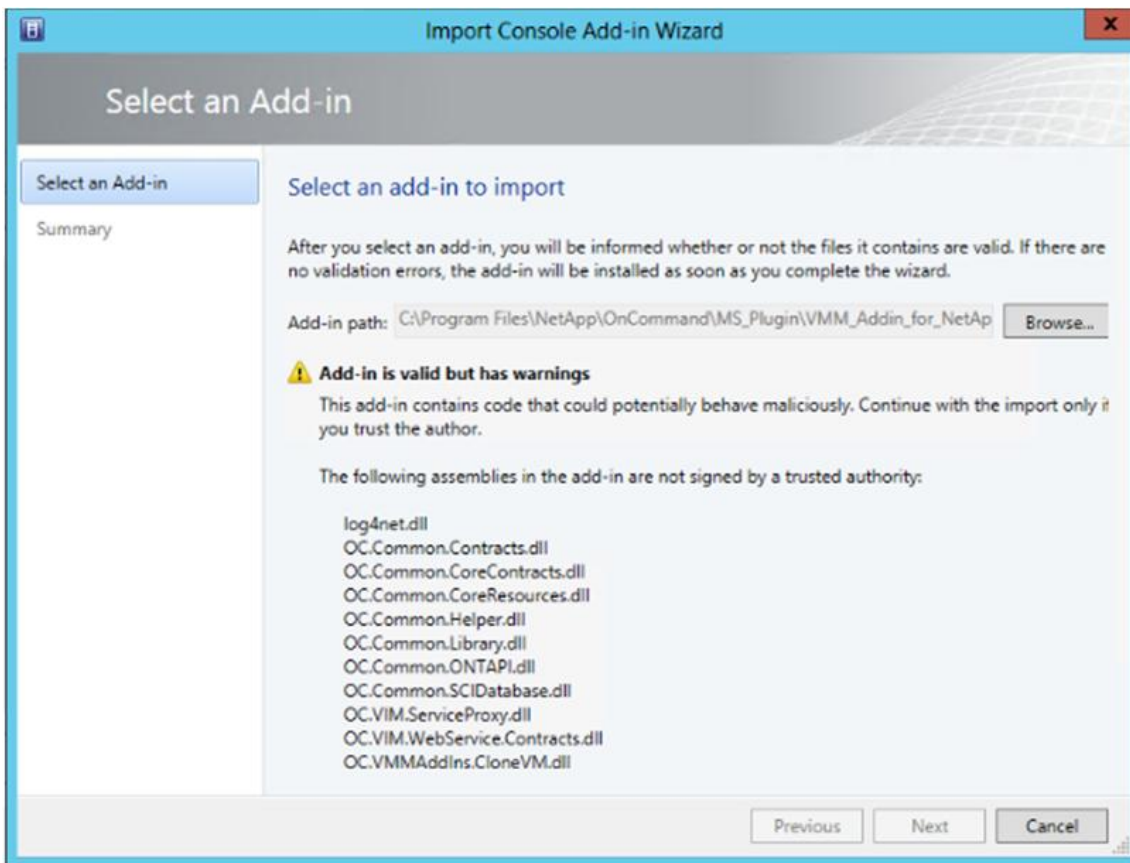
Button	Description
	Allows automated configuration and installation of OCPM across all the Hyper-V hosts managed by SCVMM.
	Allows admins to create numerous clones of a VM; it is a GUI interface for the new-OCClone with –VMName parameter.
	Allows admins to create numerous clones of a VM from an existing template in SCVMM; it is a GUI interface for the new-OCClone with template parameter.
	Allows admins to manage (Add/Remove) controllers in SCVMM; it is a GUI interface for the Add-OCStorageSystem cmdlet.

While importing the plug-ins, you might face an issue in which you would not be able to see the next button and would need to manually resize the window in order to click Next because the window is not resized automatically.

You will experience this issue on version number 3.1.6011.0 of SCVMM.

When you try importing the plug-ins, you might see the following screen.

Figure 24) Import console add-in wizard.



To fix this issue you need to install two Microsoft updates:

- Update Rollup 1 for Microsoft System Center 2012 SP1 - Virtual Machine Manager (KB2792926)
- Update Rollup 1 for Microsoft System Center 2012 SP1 - Virtual Machine Manager Console (KB2792925)

After you get this update installed, you will see that the window is resized automatically. This update also adds some performance optimizations for SCVMM.

After the update is installed, you will see that the build version of SCVMM has changed to (6018) and that the window resize issue has been fixed. You should also install all the cumulative updates that are present for SCVMM.

9 OnCommand Plug-In 4.0 for Microsoft Disaster Recovery for Data ONTAP 7-Mode Systems

OCPM provides the capability to move virtual machines from one Hyper-V cluster to another for the purposes of disaster recovery. This feature heavily depends on NetApp SnapMirror capability. For more information about SnapMirror, refer to [TR-3326: SnapMirror Sync and SnapMirror Semi-Sync Overview and Design Considerations](#). For more information on the OCPM disaster recovery feature, refer to the [OnCommand Plug-In 4.0 for Microsoft Installation and Administration Guide](#).

Note: Disaster recovery components are not supported in clustered Data ONTAP environments.

9.1 Configuring OCPM Disaster Recovery

Prior to failing over workloads to your secondary site, the disaster recovery process must be configured and the underlying storage must be configured correctly. When designing your Hyper-V deployment, take care to identify which VMs need to be replicated to the secondary site. As a best practice, NetApp recommends segregating workloads into several classes of service. Service levels are often expressed in tiers. In our example, we express this with gold, silver, and bronze service tiers. Each tier is associated with RPOs and RTOs and the associated storage features to achieve them.

Table 9 lists sample service levels.

Table 9) Sample service levels.

Service Tier	RPO	RTO	Redundancy	Backup
Bronze	24 hours on site	1 hour on site	Single site only, no DR site	Daily Snapshot copy, 1-week retention
Silver	1 hour on site, 24-hour DR	10 minutes on site, 1-hour DR	DR with daily replication	Hourly Snapshot copy, 30-day retention
Gold	0 on site, 10-second DR	0 on site, 10-minute DR	DR with semi-sync replication	Hourly Snapshot copy, 30-day retention

Table 9 is a sample only. Each organization needs to discuss internal and external SLOs so that the service tiers established in the system reflect actual business requirements. After the service tiers are established, storage infrastructure can be aligned. In our case, this implies a volume-level configuration and mapping. Because operations such as SnapMirror mirroring and dedupe are performed at the volume level, we recommend that each volume be assigned a service tier, and then LUNs and VMs can be provisioned against volumes in the correct service tier.

After finalizing your Hyper-V design, establish SnapMirror relationships and schedules that align with your RPO agreements. These relationships will determine the amount of data that is replicated and the replication frequency. OCPM does not manage these relationships for you.

Once these relationships are established, begin to provision Hyper-V VMs into your cluster. After the VMs have been provisioned but BEFORE they are put into production, you can use the `New-OCDRPlan` cmdlet to generate your DR plan. A DR plan is an XML file that specifies the VM configuration and layout that will be created on the secondary site when you attempt to use the `Invoke-OCDRFailover` cmdlet or associated cmdlets.

By default, this file is placed into `C:\ProgramData\OnCommand\MS_Plugin`. This directory is also shared as `MS_Plugin` by the OCPM installer for ease of use. This xml file must be copied or replicated to the secondary site at configuration time. Without it, restoration cannot be performed. The simplest way to do this is to place it into a container (such as a CIFS share) that exists on the primary that will be replicated to the secondary.

For VMs hosted on a Windows Server 2008 R2 Hyper-V cluster, the VMs must be offlined before running the `New-OCDRPlan` cmdlet. For this reason, we recommend running the cmdlet BEFORE the VMs are placed into production. This will prevent you from having to schedule an outage to create the DR plan. This is not applicable for VMs running on Windows Server 2012 Hyper-V hosts.

9.2 Best Practices for Disaster Recovery

Best Practices for Disaster Recovery

When implementing a planned failover for VMs running on Windows Server 2008 R2 Hyper-V hosts, NetApp recommends that you gracefully shut down the VMs on the primary site before failing over to the secondary site. This will enable the guest operating systems to come up correctly and will eliminate any problems with open files or corrupt application databases. This is not applicable for VMs running on Windows Server 2012 Hyper-V hosts.

On Windows Server 2012 platforms, there is no constraint to “turn off” the Hyper-V VMs. DR plans are generated with live or running VMs. With Windows Server 2012, the VMs are not exported, and their VM configuration files are not generated. However, on Windows Server 2008 R2 SP1 platforms, the VMs are exported, and their VM configuration files are generated along with the DR plan file.

For effective DR:

- A clean Hyper-V environment must be implemented on the secondary site.
- Hosts must be indicated as clustered or standalone.
- On a cluster, VMs must be highly available and reside on mirrored LUNs. VMs that are not highly available are not discovered by the `New-OCDRPlan` and `Update-OCDRPlan` cmdlets.
- The volumes at the primary data center are mirrored to a secondary location by using SnapMirror software.
- Volumes must be created with a similar size and on the same type of aggregate (large or not large aggregate).
- Make sure all host names and cluster names are resolvable through DNS.
- Make sure the Hyper-V node on which you run the cmdlets is the primary node of the cluster and also make sure it owns the cluster group and the available storage.
- Make sure that the virtual network adapter on every host uses the exact name string.

It is very important to *update* the SnapMirror relationship prior to running the restore process. This will enable the final changes to the VHDs to be committed to the secondary site before you attempt to restore them. Again, this will eliminate any issues with open files or corrupt application databases. After the update is complete, quiesce the link so that no additional transactions are committed.

Following are the Windows PowerShell commands that need to be used.

```
Invoke-OCDRMirrorUpdate
Get-OCDRMirrorStatus
Invoke-OCDRMirrorQuiesce
```

Note: The `Invoke-OCDRMirrorUpdate` command is asynchronous. This means that the command might still run in the background. You must wait until the update is complete before running the `Invoke-OCDRMirrorQuiesce` cmdlet. You may need to run `Get-OCDRMirrorStatus` several times before the status returns to “idle.”

In the case of an unplanned failover, it is not possible to update the mirror or gracefully shut down the VMs; additional application recovery steps may need to be taken. For database-driven applications such as SQL Server or Exchange Server, we recommend that additional application-specific backups be performed with tools such as SnapManager for Exchange or SnapManager for SQL Server. After the data volumes are restored to the secondary site, the applications can be restored from Snapshot as would normally be done. SnapMirror replicates all volume Snapshot data along with all other data contained in the volume as part of its normal replication. In most cases, the virtual machine will simply restart with no corrective action, but we recommend a second layer of protection to protect against database corruption.

10 OnCommand Plug-In 4.0 for Microsoft Troubleshooting

Refer to the troubleshooting section in [OnCommand Plug-In 4.0 for Microsoft Installation and Administration Guide](#) for basic troubleshooting guidelines.

10.1 Clearing SCOM-Related Cache Issues

In some situations, there may be times when the cached UI view within SCOM needs to be cleared to troubleshoot the environment. Run the following command to launch a new instance of the SCOM console with a cleared UI cache.

```
Microsoft.MOM.UI.Console.exe /ClearCache
```

10.2 Reinstalling OnCommand Plug-In 4.0 for Microsoft and Discovery

There may be times when reinstallation of OnCommand Plug-In 4.0 for Microsoft is required. After following the instructions within the [Installation and Administration Guide for OnCommand Plug-In 4.0 for Microsoft](#), discovery will need to be reinitiated even if it was executed in the previous installation.

To rediscover after reinstallation:

1. Set up credentials using the Data ONTAP Manage Controller Credentials in the Actions pane.
2. Click Data ONTAP: Run Discovery Task.
Follow the procedure listed in section 2.9, “Manual Discovery of Data ONTAP 7-Mode Storage Systems.”
3. Click Data ONTAP > Management Server if you need NLB to run discovery tasks on the node that is installed with OCPM.
4. If the user accidentally deletes the clustered Data ONTAP management packs, the OCPM resource pool does not get initialized correctly.
5. During installation, the OCPM management packs are automatically imported while the OCPM resource pool is initialized and management servers are discovered.
6. Manually deleting and then importing the management packs are not advised because the OCPM resource pool does not get initialized correctly.
7. You would need to completely uninstall OCPM and reinstall the plug-in if you unimport the management packs.

10.3 SCOM Database

When viewing host, controllers, or entities within the controllers in the Monitoring view and the critical/warning/healthy icons are grayed out instead of colored, this indicates that the database updates are hindered or that the database is full.

If the SQL Server database is full but there is space remaining on the drive where it resides, you may choose to simply allow the database to autogrow. This means that SQL will continue to increase the size of the SQL database until the drive is completely full. Alternatively, you may need to work with your SQL Server DBA to determine how to support SCOM data growth.

To resolve this problem with database autogrow:

1. Go to SQL Server Management Studio.
2. Connect to the SCOM MS-SQL Server database server.
3. Under Databases, select the Operations Manager database.
4. Right-click > Properties and select Files.

5. Two rows in the SQL Server table should be displayed with logical names MOM_DATA and MOM_LOG.
6. In the column Autogrowth, double-click the button on the right showing "..."
7. Adjust the setting to allow the database to use autogrowth.

Alternatively, to resolve this problem by allowing the MOM_DATA file in the Operations Manager database to grow to a reasonable size, run the following SQL Server script:

```
alter database OperationsManager
{
MODIFY FILE (NAME = MOM_DATA, Filegrowth = 10MB);
}
```

10.4 Discovery Troubleshooting

Open a console window to the NetApp storage array to troubleshoot any OnCommand Plug-In 4.0 for Microsoft discovery issues.

If access is denied or if there are issues with user permissions, the following will be logged:

```
[NetAppStorage01:useradmin.unauthorized.user:warning]: User 'scom' denied access
```

If access and discovery complete successfully the following will be logged:

```
[NetAppStorage01: app.log.info:info]: VM1.local OnCommand 4.0.0.0: (100) OnCommand Plugin For Microsoft: DataONTAP MP discovery rule
```

10.5 SNMP Versions

Different versions of Data ONTAP will determine the supported SNMP version for the ApplianceWatch™ pack.

- For Data ONTAP versions earlier than 7.3, only SNMP V1 will be supported.
- For Data ONTAP version 7.3 and higher, SNMP V3 and SNMP V2C will be supported.

If the storage environment contains several different types of Data ONTAP, use SNMP V1 to discover all storage arrays with OnCommand Plug-In 4.0 for Microsoft.

10.6 Event Viewer Logs

Use the Windows event viewer to review the OCPM-specific logs for further information on any issues. Users will find an OCPM-specific event log under Applications and Services Logs in the event viewer. In addition to the OCPM-specific logs, users will find important information in the application logs and the Operations Manager logs. Use these logs to find specific issues with OCPM discovery or any other issues.

10.7 Debugging

To enable debug logging for OCPM you need to set the DEBUG value within the OC.Common.Library.LogSettings.xml. The LogSettings.xml is located within the OCPM installation directory and the default location is C:\Program Files\NetApp\OnCommand\MS_Plugin\OC.Common.Library.LogSettings.xml.

To enable OCPM debugging:

1. Change the INFO to DEBUG value within the root logger section of the LogSettings.xml file:

```
<!--Set root logger level -->
<root>
<level value="INFO" /> <!--Change Info to DEBUG for OCPM Debugging-->
<appender-ref ref="EventLogAppender" />
```

</root>

10.8 Advanced Troubleshooting

When basic troubleshooting does not resolve an issue with OnCommand Plug-In 4.0 for Microsoft, use one of the many support features provided to NetApp customers.

- [NetApp Community](#)
A public forum in which customers can discuss topics with other NetApp experts about specific technologies. For questions and topics specific to OnCommand Plug-In 3.1, visit:
http://communities.netapp.com/community/products_and_solutions/storage_management_software.
- [NetApp Support Community](#)
Support forum for customers with specific NetApp technology questions.
- NetApp customers with support contracts can call our NetApp Global Support (NGS) Center 24/7 for immediate support.

Version History

Version	Date	Document Version History
Version 1.0	November 2013	Initial release

Additional References

- [Hyper-V Disaster Recovery using OCPM 4.0 \(On Command Plugin for Microsoft\) DR PowerShell cmdlets](#)
- [Hyper-V Disaster Recovery using OCPM 4.0 \(On Command Plugin for Microsoft\) DR Orchestrator Integration Packs](#)
- [NetApp OnCommand Plug-In 4.0 for Microsoft](#)

Refer to the [Interoperability Matrix Tool \(IMT\)](#) on the NetApp Support site to validate that the exact product and feature versions described in this document are supported for your specific environment. The NetApp IMT defines the product components and versions that can be used to construct configurations that are supported by NetApp. Specific results depend on each customer's installation in accordance with published specifications.

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